ENVIRONMENTAL IMPACT STATEMENT
FOR A PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

Prepared for:
Greenfields Resource Recovery Facility
Gateway Developments Pty Ltd
Department of Planning, Industry and Environment
NSW Environment Protection Authority
Penrith City Council

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Benbow ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

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Form 2

Submission of
environmental impact statement (EIS)
prepared under the Environmental Planning and Assessment Act 1979 Section 78(A)

EIS prepared by

name	Richard T Benbow
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	25-27 Sherwood Street
	Northmead NSW 2152

in respect of

development application

applicant name	Ellie A Barikhan
applicant address	PO Box 73, Mulgoa NSW 2745
land to be developed: address	344 Park Road, Wallacia NSW 2745
lot no, DP/MPS, vol/fol etc	Lot 5 in DP655046
proposed development	Construction and operation of a resource recovery facility for mixed C&D
	And mixed C&I waste

or
☐ map(s) attached

environmental impact statement

☑ an environmental impact statement (EIS) is attached

certificate

I certify that I have prepared the contents of this Statement and to the best of my knowledge

- it is in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000,
- contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and
- the information contained in the statement is neither false nor misleading.

Signature	R T Benbow
name	Richard T Benbow
date	17 February 2022

LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Gateway Developments Pty Ltd, as per our agreement for providing environmental services. Only Gateway Developments Pty Ltd is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Gateway Developments Pty Ltd for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

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STUDY TEAM

R.T. Benbow	Benbow Environmental	Project Manager Consultation, Environmental Impact Statement Compilation, Technical review
Linda Zanotto	Benbow Environmental	Project Manager Executive Summary, Introduction, Description of Proposal, Justification, Alternatives, Water, Soil, Chemicals, Waste Management, Health, Visual, ESD, Cumulative Impacts, Summary of Impacts & Mitigation Measures, Environmental Impact Statement Compilation
Emma Hansma	Benbow Environmental	Fire Risk Assessment Technical review
Victoria Hale	Benbow Environmental	Noise Impact Assessment
Kate Barker	Benbow Environmental	Air Quality Impact Assessment
Matthew Taylor	Benbow Environmental	Environmental Site Assessment (Phase I and II) , Description of the existing environment, Water and Soil, Construction Environmental Management Plan
Carlo Ranieri	Carlo Ranieri and Associates Pty Ltd	Project Manager Site and Process Design Site Plans Landscaping Plans
Brent Winning	Claron Consulting	Planning Assessment
Benny Chen	ML Traffic Engineers Stanbury Traffic Planning	Traffic Assessment Intersection Treatment
Catherine Gorrie	Bushfire Consulting Services Pty Limited	Bushfire Hazard Assessment
Kha Ngugen David Gunawan	INDESCO	Civil Engineering Hydrology
Jack Tatler	Narla Environmental Pty Ltd	Biodiversity Development Assessment Report (BDAR) Aboriginal Archaeological and Cultural Heritage Assessment
Ciaran Bromhead	Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd	Wastewater Management: Site & Soil Evaluation & Disposal System Design

ABBREVIATIONS

ABL	Assessment background level
ABS	Australian Bureau of Statistics
ADG code	Australian code for the Transport of Dangerous Goods by Road and Rail
AHD	Australian Height Datum
AMMAAP	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW
ARI	Average Recurrence Interval – the average or expected value of the period between exceedances of a given rainfall event or discharge
BCA	Building Code of Australia
BOM	Bureau of Meteorology
DA	Development Application
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (now NSW EPA)
DEWHA	Department of the Environment, Water, Heritage and the Arts
DPI	Department of Primary Industry
DNR	Department of Natural Resources
DoP	Department of Planning
DPIE	Department of Planning Industry and Environment
DWE	Department of Water and Energy
EEC	Endangered Ecological Community
EES	Environment, Energy and Science Group
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cmth)
EPL	Environment Protection Licence
ESD	Ecological Sustainable Development
FRL	Fire Resistance Level
GDE	Groundwater Dependent Ecosystem
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
iSEPP	State Environmental Planning Policy (Infrastructure) 2007
JRPP	Joint Regional Planning Panel
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LPG	Liquefied petroleum gas
Mbgl	Metres below ground level
NES	National Environmental Significance
NPI	National Pollutant Inventory
NPfI	Noise Policy for Industry (NSW EPA)
NRC	Natural Resources Commission
NOW	New South Wales Office of Water
NSW	New South Wales
NSW EPA	New South Wales Environment Protection Authority
NSW RNP	New South Wales Road Noise Policy
OSD	On-site detention
$PM_{2.5}$	Particulate matter of size 2.5 μm or less
PM_{10}	Particulate matter of size 10 μm or less

RBL	Rating background level
RFS	Rural Fire Services
RNP	NSW EPA Road Noise Policy
ROW	Right of Way
RSD	Roller Shutter Door
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
TMP	Traffic Management Plan
TfNSW	Transport for NSW
Tpa	Tonnes per annum
TSC Act	Threatened Species Conservation Act 1995
TSP	Total suspended particulates
VENM	Virgin Excavated Natural Material
WSP	Water Sharing Plan

UNITS OF MEASUREMENT

°C	degree centigrade	(unit of temperature)
dB(A)	A-weighted decibels	(unit of noise)
dB(lin)	Linear-weighted decibels	(unit of noise)
ha	hectares	(unit of area)
g	gram	(unit of mass)
kg	kilogram	(unit of mass)
kL	kilolitre	(unit of volume)
KPa	kilopascal	(unit of pressure)
km	kilometre	(unit of length)
KT	kilo Tonnes	(unit of mass)
Mt	million tonnes	(unit of mass)
m	metre	(unit of length)
m^2	squared metre	(unit of area)
m^3	cubic meter	(unit of volume)
MVA	Mega Volt Amp	(unit of power)
ODU	odour detection unit	(unit of odour)
OU	odour unit	(unit of odour)
T	Tonne (1000 kg)	(unit of mass)
μg	microgram	(10^{-6} gm – unit of mass)
$\mu g/m^3$	microgram/cubic meter	(concentration)

EXECUTIVE SUMMARY

Gateway Developments Pty Ltd trading as Greenfields Resource Recovery Facility proposes to establish a resource recovery facility to be located at 344 Park Road, Wallacia NSW 2745. The facility would receive construction and demolition (C&D) and commercial and industrial (C&I) waste material from infrastructure projects and industries in the regional area and process these within a purpose-built state of the art facility. The total amount of waste to be received annually would not exceed 95,000 tonnes and up to 9,000 tonnes of waste would be stored at the site at any one time.

The development area would be limited to approximately 50,000 square metres of the 200,000 m^2 site and would be situated on previously disturbed land. The construction of the facility involves erecting a new large rural style shed to enclose the processing operations. This would house the resource recovery and transfer facility (RRTF), paper baler, small mobile crusher and internal storage bunkers. The main building would contain a site office and the existing unsealed driveway would be replaced with a two lane sealed driveway with internal roads that provide one way direction of traffic. A gate house and two weighbridges would be established on the internal road prior to trucks entering the facility. A car and truck parking area would also be established adjacent to the existing dwelling which is to be converted into an office.

Demolition of one small shed is required. The development area requires cut and fill works for the foundations of the building and concrete formwork for internal roads and hardstand areas.

In simple terms, the operation of the facility involves the following activities to be undertaken on site:

- Incoming load inspection and weighing;
- Unloading and loading of materials;
- Pre-sorting of materials;
- Loading into feed hopper at start of RRFT;
- Separation of materials through a sorting system; and
- Material storage.

Benbow Environmental was commissioned by Greenfields Resource Recovery Facility to prepare an Environmental Impact Statement (EIS) to support the development application. This EIS addresses the requirements of the Department of Planning Industry and Environment, Penrith City Council, the NSW Environment Protection Authority, Transport for NSW, WaterNSW and the Rural Fire Service. The environmental and planning issues that were raised in these requirements and in the consultation undertaken for the project that warrant detailed assessment include strategic context, noise and vibration, air quality, soil and water, flora and fauna, waste management, bushfire, fire risk, traffic and transport and visual amenity. Other issues that warrant discussion include chemical management, heritage and human health.

A summary of the detailed assessments is included below:

STRATEGIC CONTEXT

The project has been driven by the increase in local and regional demand for recycling of C&D and C&I waste in the area due to the large number of existing and planned infrastructure projects

and industrial developments being established. This proposal allows the proponent to utilise a growing market need that supports sustainable use of waste materials.

The land zoning for the subject land is described as RU1 – Primary Production under the provisions of the *Penrith Local Environmental Plan 2010*, which applies to the subject site. The proposed development is for a resource recovery facility. Resource recovery facilities are not a permitted use with consent within the RU1 Zone, under the Penrith LEP. However, this use is permitted with consent under Clause 121 of Division 23, Part 3, of the *State Environmental Planning Policy (Infrastructure) 2007* (iSEPP).

The proposal constitutes designated development under Schedule 3, Part 1 of the *Environmental Planning and Assessment Regulation 2000*, as it is captured by Clause 32(1)(b)(iii), 32(1)(c) and partly 32(1)(d) being a waste management facility with an intended capacity of more than 30,000 tonnes per year, that recovers more than 5,000 tonnes per year of solid organic material and that is located within 100 metres of a natural waterbody and within 250 metres of a dwelling not associated with the development.

The proposal constitutes integrated development as it includes a number of scheduled activities as defined by clauses 34 and 42 under the *Protection of the Environment Operations Act 1997* as it involves processing more than 6,000 tonnes of waste per year and storing more than 1,000 tonnes of waste on site at any one time, therefore, it constitutes integrated development and requires an Environment Protection Licence (EPL). In addition, the land is bushfire prone land and the development application requires referral to the NSW Rural Fire Service under Section 100B of the Rural Fires Act 1997 for development in Bush fire prone areas.

A planning assessment undertaken in Section 3 demonstrates that the proposal is consistent with all relevant planning strategies, environmental planning instruments and development control plans.

JUSTIFICATION

The proposal supports and is consistent with a number of statutory policies including the “Waste Avoidance and Resource Recovery Act, 2001” (WARR Act), the “NSW Waste Avoidance and Resource Recovery Strategy 2014-21”, the “National Waste Policy 2018” and the “Greater Sydney Region Plan: A Metropolis of Three Cities”.

The justifications for implementing the proposed development include:

- Reduce the quantity of construction and demolition wastes in landfill;
- Generation of local employment;
- The proposal supports ecologically sustainable development;
- The building, site layout, storage areas and process has been designed to ensure there are no significant impacts to the environment; and
- Extensive environmental safeguards have been designed into the development to minimise potential environmental impacts.

SITE SUITABILITY

This site was selected as it was well located to serve the need to recover useful materials. The proposed use is permissible under the iSEPP and the proposal complies with all requirements under this planning policy. The iSEPP prevails over the LEP. The land is suited to this type of activity as it has the following appropriate features:

- The subject site has ample room available to cater for the proposed operations and also enables preservation of environmental values by retaining the majority of the site's vegetation.
- The site is not in a sensitive land use area.
- The development is a permitted use with consent under the iSEPP.
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged.
- The development would generate local employment.
- Existing transport routes are readily available and the site is located adjacent to the Outer Sydney Orbital, a preserved corridor for the future M9 motorway and freight rail.
- The site has sufficient room for on-site parking and truck manoeuvring.
- The proposed development will recycle both C&D and C&I waste, therefore diverting such wastes from landfill and providing a facility able to support the future infrastructure projects in the adjacent growth areas of Western Sydney.
- The proposed development will have extensive environmental safeguards to provide assurance in regards to the expected degree of environmental impacts.

WASTE MANAGEMENT

The purpose of the proposal is to reduce the quantity of wastes going to landfill and recover materials so these can be resources for reuse. Incoming and processed materials would be stored in bunkers within the building. Recovered materials would be sent on for further recycling at licensed facilities or for application to land under a resource recovery order and exemption.

Waste generated as part of ongoing operations would be minimal. The waste types generated would include General solid waste (non-putrescible) and small quantities of General Solid Waste (putrescible) from the office and amenities. These wastes would be managed on site by storing these within designated waste bins or a designated storage bunker for removal by a licensed waste contractor.

Wastewater would not be generated by the processing operations and a trade waste agreement is not required. An aerated wastewater treatment system would be installed for treatment of wastewater from the office areas.

The potential for other waste types like hazardous waste entering the subject site (e.g.: asbestos) within the waste loads would be managed by implementing an Incoming Waste Procedure.

HAZARDS AND RISK

The main hazards and risks associated with the proposal include:

- Storage and use of a hazardous chemical i.e. - diesel fuel;

- Fire risk including bushfire;
- Spillage incidents; and
- Release of sediments.

A preliminary risk screening of the proposed development in accordance with State Environment Planning Policy No. 33 has been undertaken and a preliminary hazard analysis (PHA) is not required due to the fact that the quantity of dangerous goods required to be stored on site does not exceed SEPP 33 thresholds.

A bushfire assessment was undertaken in accordance with requirements in *Planning for Bush Fire Protection 2006*. All plans have been reviewed and certified by the Bushfire Consultant in the Bushfire Compliance of Plans Certificate. The development would satisfy the aims and objectives of Planning for Bush Fire Protection 2006 if the following recommendations are implemented (summary only):

1. A 20,000 L static water supply is to be available for firefighting purposes.
2. Access and egress for emergency services shall meet the following requirements:
    a. Road widths to be a minimum of 4 m
    b. A minimum vertical distance of 4 m to any overhanging obstructions including tree branches;
    c. A suitable turning area in accordance with PBP Appendix 3
    d. Curves have a minimum inner radius of 6 m and are minimal in number
    e. The minimum distance between inner and outer curves is 6 m
    f. Maximum grades for sealed roads does not exceed 15 degrees
3. Where practical, electrical transmission lines are underground. If applicable reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 *The storage and handling of LP Gas*.
4. Wherever possible, the storage of hazardous materials will be away from the hazard.
5. Implementation of an emergency evacuation plan by completing a Bush Fire Safety Plan on the NSW RFS website.

Fire risk was assessed in the EIS. The facility will require firefighting equipment to be installed including a building sprinkler system, fire hydrants with monitors, hose reels and extinguishers in accordance with the Building Code of Australia and NSW Fire and Rescue, Fire Safety in Waste Facilities guidelines. A fire risk assessment found that with mitigation measures in place, the fire risk is low.

An Emergency and Pollution Incident Response Management Plan would be implemented.

AIR QUALITY

An Air Quality Impact Assessment has been undertaken for the proposed development. A brief summary of the findings is presented below.

Dust control measures that would be implemented at the site include:

- The development area would consist of hardstand surfaces;
- All processing operations occur within an enclosed building;
- All waste is stored within designated storage bunkers in the building;

- All truck loads would be covered;
- A water misting system would be installed within the building for dust suppression.

Annual TSP, PM_{10} and $PM_{2.5}$ emissions at all receptors are predicted to comply with the *Approved Methods* criterion.

The maximum predicted impacts for 24-hour averaging periods for PM_{10} and $PM_{2.5}$ exceeded the relevant criteria. The background concentrations for PM_{10} and $PM_{2.5}$ for 24-hour averaging periods are considered elevated, with levels of at 24.96 µg/m^3 and 62.42 µg/m^3 respectively in comparison to the *Approved Methods* criteria of 25 µg/m^3 and 50 µg/m^3.

In cases of elevated background concentrations, the NSW EPA requires a demonstration that no additional exceedances of the impact assessment criteria will occur as a result of the proposed site activities.

Contemporaneous addition of the predicted daily increments of PM_{10} and $PM_{2.5}$ with daily measured background levels for 2015 showed no additional exceedances due to proposed site activities.

With the proposed site activities and dust controls in place, it is considered that emissions to air from the site's operation are unlikely to cause harm to health or the environment.

NOISE AND VIBRATION

A Noise Impact Assessment has been undertaken for the proposed development and addressed construction, operational and road traffic noise. A brief summary of the findings is presented below.

Noise controls include:

- All front-end loaders operated on site are to be no greater than 111kW in power, and produce no higher sound power level than 102 dB(A);
- The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A).
- The building walls must have an R_w of at least 36 dB;
- The building roof must have an R_w of at least 32 dB;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended; and
- Pedestrian access doors should also be kept close when not in use.

Compliance with the Noise Police for Industry, NSW Road Noise Policy and Interim Construction Guidelines was predicted at all considered receptors.

SOIL AND WATER

Water is not required for the proposed processing operations. Water is needed for use in the water misting systems and water sprayers for dust suppression purposes and in the office and amenity areas. Water would be supplied by six rainwater tanks, 5 x 34,000 Litre and 1 x

27,000 Litre that will be supplemented by mains water as needed. A static water supply would be provided at the front of the site for firefighting purposes.

Stormwater from roofed areas would be directed into the rainwater tanks for use on site. Stormwater from external areas would be directed to stormwater pits then a bioretention filter media area before release into a sediment detention basin. Water monitoring would be undertaken at the outlet of these detention basins to ensure required targets are met. Stormwater drainage for the development area has been designed by Indesco. The design takes into account potential overland flooding and has been designed to manage under these circumstances.

The proposed building works and site development would involve cut and fill earthworks which would result in disturbance to soil during construction. There is a low probability that acid sulfate soils exist at the site and the soil is unlikely to be saline. A Limited Phase II Environmental Site Assessment that focussed on the proposed development area found that all soil samples analysed were uncontaminated when compared with relevant criteria. Additional sampling and testing was undertaken as requested by Council and also found all samples analysed were uncontaminated when compared with relevant criteria.

During site operations, processing activities would take place within the purpose-built building and the external area used by the facility would be sealed. There would be diesel storage in a self-bunded tank and minor quantities of chemicals such as oil and grease, LPG and welding gases stored at the site. All materials would be stored within the building. The risk of contamination to soil and land is mainly related to contaminated stormwater seeping into the ground. However, there would be an absence of chemicals in the waste brought to site as all wastes are inert and solid and the potential for soil and water contamination is low.

TRAFFIC AND TRANSPORT

Trucks arriving at the RRTF would mainly consist of hooklift and skip bin trucks with some truck and dog trailers and possibly some semi-trailers. Outgoing material would also be transported in similar vehicles.

The facility would generate an estimated 55 truck trips per day. Truck deliveries and pick-ups would be restricted to between the hours of 7am-6pm Monday to Friday and 8:00am to 1:00pm Saturdays. Gates would be locked at night and on Sundays and no deliveries permitted.

The proposed facility would implement a computerised booking program called “Waste Edge” which enables truck trips to be managed with respect to timing and routes taken. Truck routes can be planned to avoid congestion.

The site is located adjacent to a property to the east that is identified as land to be preserved for the Outer Sydney Orbital for the future development of the M9 motorway. At the time of writing, detailed investigation of this initiative is likely to take place in 10 to 20 years.

A traffic and parking assessment was undertaken by ML Traffic Engineers. A summary of the outcomes of this assessment are provided below:

Parking

- The proposed resource Recovery Facility has enough on-site car and truck parking to accommodate all parking demand.

Traffic

- The proposed resource Recovery Facility is a low trip generator for the weekday AM and PM peak hours.
- The additional trips from the proposed resource Recovery Facility can be accommodated at the nearby intersection without significantly affecting intersection performance, delays or queues.
- There are no traffic engineering reasons why a planning permit for the proposed Recovery Facility at 344 Park Road in Wallacia should be refused.

The car park and driveway certification (Appendix 12) demonstrate that the proposed car park area and driveway are compliant with Australian Standards and Council's DCP. Swept path drawings are provided.

Access intersection treatment has been designed by Stanbury Traffic Planning in consultation with TfNSW. This includes a rural auxiliary left turn treatment (AUL) and basic right turn treatment (BAR) at the junction of Park Road and the site access driveway. A concept design in accordance with relevant AUSROADS requirements has been prepared and indicates the extent of the pavement widening required on both sides of Park Road. This is also reflected on architectural plans.

BIODIVERSITY

The land is not biodiversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*.

A Biodiversity Development Assessment Report (BDAR) was prepared by Narla Environmental to identify the potential impacts of the proposed development on biodiversity values.

The main findings of the BDAR include:

The proposed development has been purposefully designed to minimise impacts on biodiversity values, as it has been positioned within a mostly cleared area of the subject property. Removal of vegetation has been largely avoided and is within an area with the least biodiversity values that avoids higher quality bushland in the western and southern portions of the subject property.
The proposed development is expected to impact one (1) plant community type (PCT): PCT 724 – Broad-leaved Ironbark – Grey Box – Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plan, Sydney Basin Bioregion. This PCT conforms to the Endangered Ecological community (EEC) Shale Gravel Transition Forest in the Sydney Basin Region. Two (2) ecosystem credit for PCT 724 is to be offset in order to mitigate impacts.

The proponent will enter a portion of the undeveloped area of the property into a Biodiversity Stewardship agreement which will conserve the two threatened ecological communities surrounding the subject land.

VISUAL

The site has scenic and landscape values therefore visual aspects of the proposed development were discussed in detail. The site is located within a rural area and is currently well vegetated and screened from view at nearest sensitive receptors to the south, west and south east. The site layout and proposed building have been designed to fit in with the rural surroundings and a landscaping plan would restore native species and enhance the visual appearance of the site. The proposed development as designed would be visible from Park Road and the property on the eastern side of the site. Dense vegetation adequately screens the proposed development area from other directions.

The proposed development is expected to enhance the visual appearance of the site from vantage points along Park Road and the property along the eastern boundary of the site which is the location of the future M9 motorway.

HERITAGE

The subject land was found not to be affected by an Interim Heritage Order under the provisions of the NSW *Heritage Act 1977*. No Aboriginal Places or European heritage locations have been identified or uncovered on the subject site or in its vicinity.

The site is also not listed as being a heritage item or containing items under the Penrith LEP 2010.

Narla Environmental conducted a Due Diligence Aboriginal Archaeological Assessment (Appendix 11) in accordance with the requirements of the Due Diligence Code of Practice for the Protection of Aboriginal Objects (DECCW 2010). The assessment included a site Inspection to identify any potential Aboriginal archaeological constraints that may exist within the development area and provide recommendations to avoid or mitigate impacts to any known or suspected sites, objects or areas that have archaeological sensitivity in accordance with the requirements of the National Parks and Wildlife Act 1974 (NPW Act).

The subject land does not contain any documented Aboriginal sites, or objects, or any specific areas of potential Aboriginal archaeological sensitivity. No Aboriginal heritage constraints were identified for the proposed activity and no further investigations are warranted.

CONSULTATION

Consultation has been undertaken with relevant regulatory authorities including the local Council and the NSW EPA. This led to changes to the proposed design of the facility to incorporate recommendations. A community information sheet was posted to local residents in the surrounding area. No face to face consultation was undertaken with the community due to the COVID-19 restrictions.

CONCLUSIONS

The environmental assessment process has enabled the design of the development to be modified to incorporate best practice technologies and allow potential impacts of the proposed development to be evaluated, and control strategies to be devised in order to ensure compliance with regulatory standards.

To manage potential impacts of the proposed development, an Environmental Management Plan (EMP), and Emergency and Pollution Incident Response Management Plan would be implemented.

A Statement of Commitments is provided as Section 13. The Statement of Commitments summarises the commitment made by Greenfields Resource Recovery Facility to implement the environmental controls designed into the development. The size and nature of the proposed development is considered to be suited to this site and the request is made that approval be granted.

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1. INTRODUCTION

Benbow Environmental has been engaged by Greenfields Resource Recovery Facility Gateway Developments Pty Ltd ('the proponent') for the preparation of an Environmental Impact Statement (EIS) for a proposed resource recovery facility to be located at 344 Park Road, Wallacia.

The EIS addresses the requirements of the Department of Planning, Industry and Environment (DPIE), Penrith City Council (Council), the NSW Environment Protection Authority (EPA), Rural Fire Service (RFS), Transport for NSW, Office of Environment and Heritage (OEH) and WaterNSW.

1.1 PROPOSAL OVERVIEW

The proposal involves the construction of a purpose-built building to house the resource recovery facility and development of internal access driveways, car park, truck parking area, hardstand areas and associated infrastructure on the north eastern portion of the site. The existing dwelling will be converted into a site office and two weighbridges would be provided on the access driveway from Park Road. The proposed development area would be located in the previously disturbed north-eastern section of the site. The remaining area of the site would not be developed. Extensive landscaping to re-establish areas of native vegetation would enhance the existing visual appearance of the site.

The facility would operate 7:00am to 6:00pm Monday to Friday and 8:00am to 1:00pm on Saturdays and would accept up to 95,000 tonnes per year of C&D and C&I waste mainly from the local and Sydney metropolitan area. This waste would be separated to generate a range of materials mainly for use in the construction industry and civil works. Due to the quantity of waste to be processed and stored, the facility will require an Environment Protection Licence.

The proposed facility is ideally located, being 10 km from the Western Sydney Airport and in close proximity to the associated infrastructure projects required to establish growth centres in Western and Southern Sydney. The proposal would generate an estimated 26 new employment positions.

The waste accepted would consist of C&D and C&I waste, classified as "General Solid Waste (Non-putrescible)" under the *NSW Waste Classification Guidelines*. The recyclable material accepted at the facility would be made up of:

Construction & Demolition (C&D)	Commercial & Industrial (C&I)
• Wood • Gyprock – plaster board • Concrete • Brick • Aggregates • Asphalt • Steel	• Cardboard • Paper • Plastic • Steel • Aluminium • Wood

Resource recovery activities would include the following:

1. The plant will be designed to process 95,000 tonnes of C&D and C&I waste materials collected from various businesses across the local and metropolitan Sydney area.
2. The incoming material area will allow for initial inspection and separation of the material.
3. Infeed hopper/Shredder
4. Conveyor system with an electrical magnet for the removal of steel.
5. Waste screen to separate small heavy fraction from large light fractions.
6. Picking station to sorting various recyclable materials, Cardboard, Wood, Plastic, Etc.
7. Various other screens for further separation
8. Air Separation
9. Baling and storage
10. Transfer of resource recovered materials

1.1.1 Objectives of the Proposal

Specifically, the objectives of the proposal include:

- Continually assist the NSW Government to meet its aims for reduction of waste to landfill and resource recovery targets under the NSW Waste Avoidance and Resource Recovery Strategy 2003;
- To increase the amount of recycling and resource recovery which is not currently being applied to the material collected by others;
- To continue to grow and improve the recovery and recycling efforts in the Penrith City Council areas;
- Service the local community with solid waste recycling activities;
- Provide a long-term sustainable recycling service and facility;
- Provide a safe working environment for staff and visitors ;
- Develop a process to increase recycling and create a resource recovery facility that the community can be proud of; and
- Enable the ongoing economic sustainability of the resource recovery and recycling industry in NSW.

1.1.2 Staging of the Proposal

There are two stages to the proposal. This EIS presents and addresses potential environmental impacts of stage one only. The following provides a brief description of the project's stages:

Stage 1:
Stage 1 involves establishment of a resource recovery facility that accepts and processes both C&D and C&I waste streams, generating usable products that can be on-sold to customers for use in infrastructure or other related projects. Stage 1 is the subject of this EIS. The facility is expected to take 12 to 18 months to construct.

Stage 2 (Future Stage):
Once Stage 1 of the project is fully operational, it is envisaged to implement a 1MW gasifier to convert waste to energy. The intention is to use suitable processed waste generated at the facility to feed the gasifier and generate energy that will be used to supply the plant. Depending on the quantities of suitable waste generated, there is potential for additional gasifiers to be

installed to provide energy back to the grid. This is a future stage of the proposal that may be investigated at a later date and is not being considered in this EIS.

1.2 THE PROPONENT

Greenfields Resource Recovery Facility was established for the purpose of operating the proposed resource recovery facility. The company is an Australian owned and operated family enterprise. The company's director and owner of the property through his long history of property development has seen the need for greater waste utilisation on his own projects. This led him to develop the vision to build a facility that would further resource recovery. He also saw the vision to assist the many small waste operators, such as skip bin businesses to have available to them a commercially viable solution as an alternative to landfilling. The view is that it will also assist with reducing illegal dumping in the local area and through the western suburbs of Sydney.

1.2.1 Relationship with other Industries or Facilities

Greenfields Resource Recovery Facility will seek association with various companies that currently take their waste directly to landfill after collections. This is the underlying reason for establishing the business due to a large percentage of waste currently going to landfill that can potentially be recovered. There are currently a number of skip bin companies in the regional area that do not recycle and would form an alliance with this facility. A highly experienced management team would be engaged to operate the facility.

The proponent is committed to a "ZERO HARM" approach in their business. This approach employs safety and sustainability practices to create awareness and build strong relationships with their various stakeholders.

1.3 NEED FOR DEVELOPMENT

Wallacia is a suburb located in Western Sydney. This location and the surrounding suburbs is a rapidly growing area of NSW. The construction of the Western Sydney airport at Badgerys Creek, employment and growth centres and the associated infrastructure projects as well as the increasing demand for residential developments means this region is generating significant quantities of construction and demolition (C&D) and commercial and industrial (C&I) waste. The C&I precinct in this area will grow substantially over the next 10 to 15 years and will increase the need for waste and recycling services. This proposed development is needed to provide an additional recycling centre to manage these waste types and convert them into usable products.

1.4 DEVELOPMENT ALTERNATIVES

Alternatives to the proposed development and design were continually considered during the initial concept stages of the project. This resulted in a final design of the resource recovery facility that has been put forward in this development application.

1.4.1 Alternative Locations

Alternative sites were not evaluated due to the fact that the proponent is also the owner of the property. There was no justification to consider alternative sites as the existing site is fully able to satisfy the business needs.

1.4.2 Site Selection

The site is well located to serve the local community's and surrounding growth area's needs in recovering useful materials. The site has been selected for the resource recovery facility and landfill for the following reasons:

- The existing site has sufficient room available for the proposed development and would not encroach on areas of environmental values that exist at the site;
- The resource recovery facility would be located within an already disturbed area of the site;
- Site infrastructure for a main site office exists and can modified for use for the proposed development;
- The development is a permitted use with consent under the infrastructure SEPP;
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged;
- The subject site is located less than 10 km from the western boundary of the airport footprint and in close proximity to growth centres and therefore able to serve the growth of this area and airport infrastructure projects; and
- Existing transport routes are readily available and the site is adjacent to the outer Sydney Orbital which is currently a corridor being preserved intended for future development of the M9 motorway.

1.4.3 Site Layout, Access Modes and Routes

The development area in the north eastern portion of the site was selected as it is an already disturbed area of land and would provide an approximate separation distance of 100 m from the mapped watercourse that traverses the site. The area chosen would not disturb areas of significant vegetation that occupies the remaining site area and the development was designed to ensure that minimal vegetation would require removal. The existing dwelling is also ideally situated on site for use as an office and amenities building for the proposed development. An area adjacent to the dwelling that was previously disturbed by past tenants has been chosen as the car and truck parking areas.

Vehicles would access the development area directly from Park Road. The existing unsealed driveway access from Park Road is currently inadequate to support the proposal. The driveway requires a wider entrance and alternate locations along the site frontage have been considered in the design of the facility. The upgraded driveway would provide direct access to both the weighbridges, parking areas, office and main building. This access would be sealed. A one-way internal truck route around the main building in an anti-clockwise direction has been decided as the most efficient option, reducing both land space required and potential for conflict between vehicles. This access configuration also isolates the industrial operation from the undisturbed areas of land.

An active working area comprising of approximately 25% of the total land area made of partially impervious and compacted materials with operations to be undertaken in the open and external

stockpiles of materials to the south and west of the operations was originally envisaged. The chosen alternative after consultation with EPA is to construct a building to house operations and to fully seal all internal driveways and areas used for the proposed facility. No external stockpiling is proposed, and storage of all materials would be within designated areas inside the building. This would enclose all equipment and storage bunkers, reducing the impacts of dust, noise and the potential for land and water contamination.

The building has been designed with roller doors located on the eastern and western sides to allow easy access to trucks. Equipment would be located along the western side of the building with conveyors to transfer aggregates directly to storage bunkers within the building.

1.4.4 Alternative Processes

1.4.4.1 Materials Handling and Production Processes

Several alternatives to waste types, materials handling and storage methods were considered. The concept design of this proposal included the possible receipt of building, construction, demolition, excavation and other similar non-putrescible materials including sandstone and VENM extracted from quarries. Less than 10% of waste received was expected to be C&D waste. VENM was planned to be stockpiled externally prior to processing. Once sufficient quantities were available, the materials were to be screened and crushed in mobile equipment. Finished products were to be stockpiled externally. Likewise, C&D waste was planned to be sorted into recyclables and non-recyclables using earth moving equipment. Stockpiles of this material were to be stored externally.

Eliminating the receipt of VENM and undertaking the processing within a building would significantly reduce dust and noise impacts, therefore the proponent decided to move away from VENM and focus on C&D and C&I waste, a much more prevalent waste stream expected to result from the growth areas in the surrounding region. Furthermore, alternatives to the simple methods of materials handling and production processes described above were considered and investigations into a permanent waste sorting plant were undertaken. Although various options are available, the preferred method chosen is an RRTF plant with the following components:

- Infeed hopper/Shredder;
- Conveyor system with an electrical magnet for the removal of steel;
- Waste screen to separate small heavy fraction from large light fractions;
- Picking station to sorting various recyclable materials, Cardboard, Wood, Plastic, etc.;
- Various other screens for further separation;
- Air Separation; and
- Baler.

Waste and Water Management

The proposal is designed to allow maximum recovery of recyclables from the C&D and C&I materials received. The materials will be sorted through the plant in separate runs, the C&I and C&D will not be mixed, which will ensure maximum recovery of recyclables.

Waste management is assessed in Section 8.5. Alternatives to the waste management process are considered in the previous section. Storage of waste was considered to be in external stockpiles or within storage bays within the building, with the latter being the preferred option.

The development has also been designed so that no wastewater is generated. Alternatives for water supply were considered and use of water captured in rainwater tanks from the proposed building roof was determined to be the most efficient option. As water is not required in the primary processes, water use is limited to dust suppression and office & amenities use. A water supply is also required for firefighting purposes should the need arise. Water from the mains would be used for this purpose and stored on site in separate tanks for use in the case of an emergency.

The development area has been designed to utilise the natural fall of the site for surface water management and drainage; any alternatives would require unnecessary earthwork. Onsite detention basins will be constructed as a means to capture surface water runoff. This would receive water from a bioretention filter media system. Water sampling and testing of the basins water are recommended to be undertaken to ensure water quality is of suitable quality. A detailed design of the proposed system is provided.

An aerated wastewater treatment system (AWTS) would be installed for wastewater generated from the main building amenities and existing house to be converted for use as office & amenities. The existing septic tank would be decommissioned. Details are provided in an accompanying wastewater report.

Impact Mitigation Measures

As part of the design of the development, impact mitigation measures were taken into consideration and best practice techniques were applied. This included the decision to enclose the facility within a building and install a misting spray system to suppress dust. In addition, the elimination of external stockpiling and storage of waste would also significantly reduce dust generation from the facility. These mitigation measures are considered best practice for a waste processing facility in terms of dust and stormwater management.

The development area is designed to use the natural fall of the site for drainage purposes, and the processing would be undertaken within the building minimising environmental impacts for dust, noise, soil and water. Building materials selected were for acoustic performance purposes to ensure that noise levels would comply with criteria. There are no additional practical alternatives to the proposed design that would significantly improve the environmental impacts.

Energy Sources

The site is connected to the electricity network and will need to be amplified. Roof solar panels would be installed on the main building for lighting purposes and for office use. Further future considerations may be given to the installation of a 1MW gasifier that would convert appropriate wastes generated at the facility into energy that would supply the plant.

It is also proposed that a backup diesel powered electrical generator be purchased and stored on site just in case it is required in an emergency. A self-bunded diesel tank is proposed for the site and this would fuel the back-up generator.

The proposed development is considered to be the most cost-effective process with minimal environmental impact after consideration was given to the factors discussed above.

1.4.5 "No project" Option

Existing resource recovery and waste facilities in the area do not currently have the capacity to provide for future growth of the region. If this proposed development does not go ahead, then waste from current and future infrastructure and civil works projects may end up collected by unauthorised illegal waste collectors, while some may end up in landfill. The "No Project" option is therefore not relevant for clear reasons and further discussion is not warranted.

1.5 EIS FUNCTION AND STRUCTURE

1.5.1 EIS Function

The EIS report has two main functions. Firstly, the EIS is required to document the existing built and natural environment and assess all potential impacts that the proposal may have on various environmental and social aspects. Based on the impacts' assessment, the EIS discusses the management and control measures required by the proposed development to mitigate negative impacts and to achieve compliance with any criteria that applies to the proposal or site.

Secondly, the other function of the EIS is to provide all necessary information needed by the consent authority, the community, the various government authorities and the applicant to make informed decisions in relation to the proposed development, including its approval.

1.5.2 EIS Structure

The EIS is organised into the following three main sections:

- **Executive Summary**
  This summarises the proposed development, justification and the environmental assessment of the proposal.

- **Main Contents of the EIS**
  The main contents of the EIS describe the proposed development in detail, including the location and settings, the planning framework, the process description and other operational details. Then, the existing environment and the identification of issues are presented, followed by assessments of the potential environmental and social impacts. For each issue, safeguards and mitigation measures are addressed. The need and justification for the project are also included, together with a statement of commitments prepared for the proponent.

- **Appendices and Attachments**
  The Appendices contain the site plans and technical support documents, the Attachments include the requirements of the Secretary's Environmental Assessment Requirements (SEARs) and other supporting documentation.

2. LOCATION AND SETTINGS

This section identifies the site's location, describes the existing site, adjoining land uses, surrounding area, proposed site layout and locates nearest sensitive receptors.

2.1 SITE LOCATION AND BOUNDARIES

The subject site is located at 344 Park Road, Wallacia NSW 2745 and is within the Penrith Local Government Area. The proposed development area would be located in the north eastern section of the site.

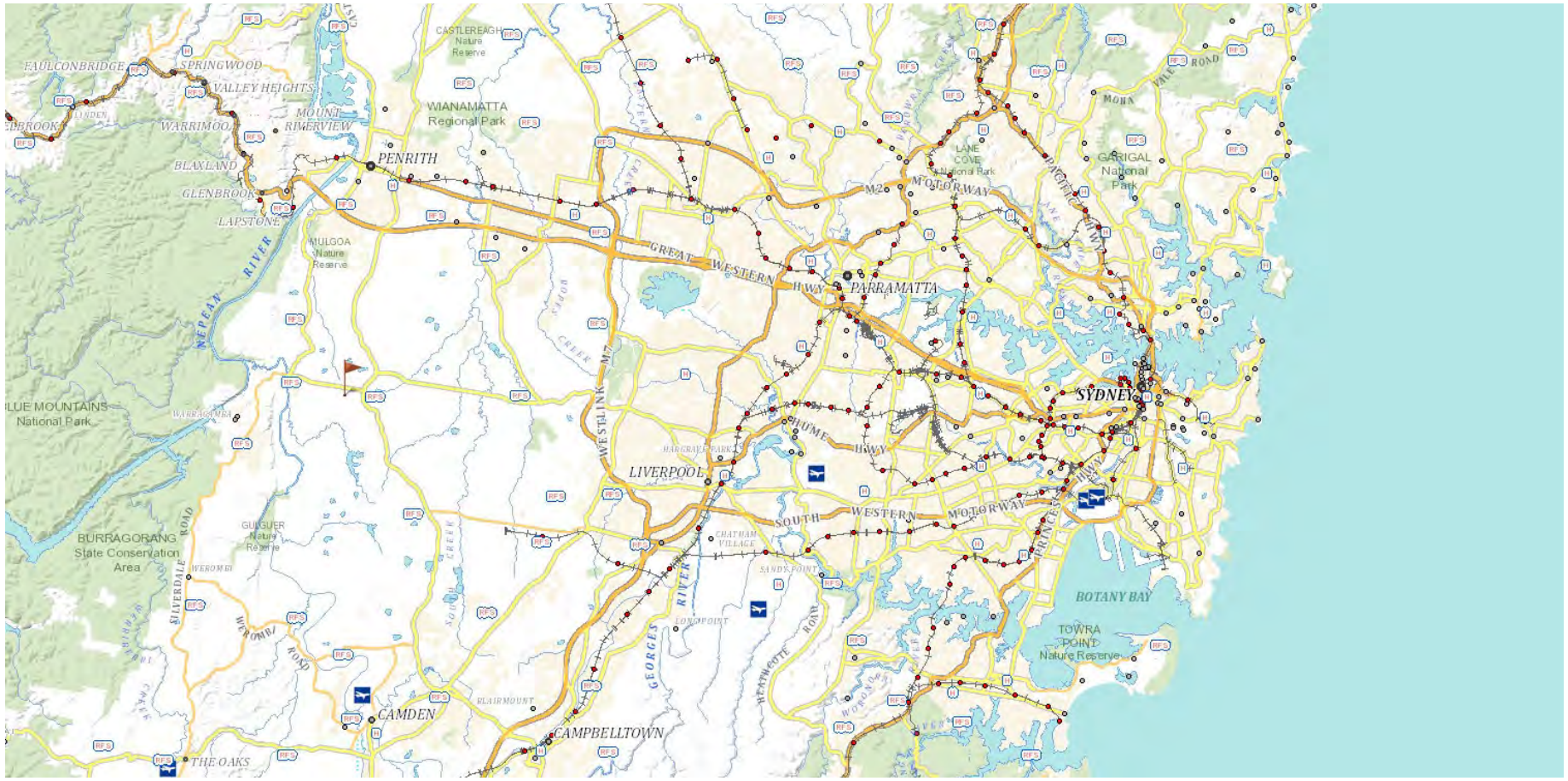
The site is also legally known as Lot 5 in DP 655046.

The site is bounded by Park Road on its northern side, which connects Luddenham and Wallacia.

The site is approximately 200,730 m^2 in area. However, only approximately 50,000 m^2, or 25%, of the site will be used for the proposed development.

Figure 2-1 displays the location of the site in a regional context, whereas Figure 2-2 shows the site location in a local context. Additionally, Figure 2-3 displays an aerial view of the site.

Figure 2-1: Site Location in Regional Context

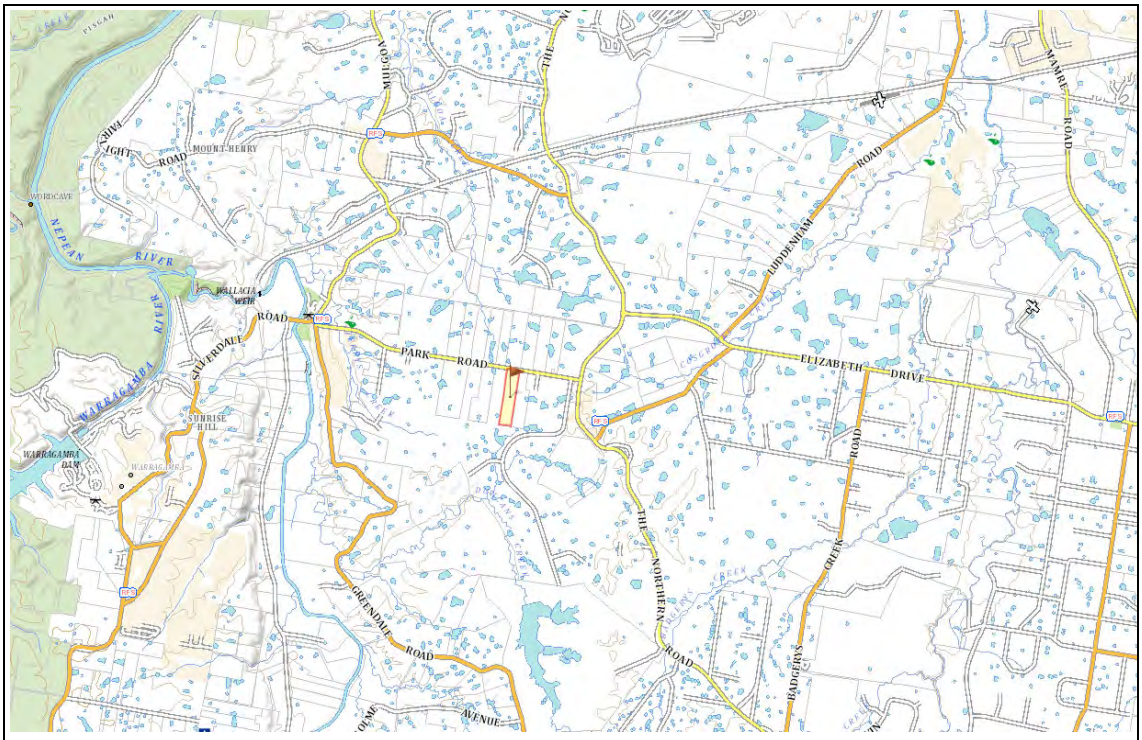


Source: Six Maps 2019

↑N

Benbow Environmental
25-27 Sherwood Street
Northmead NSW 2152

Figure 2-2: Site Location in Local Context



Source: SIX Maps 2019

↑N	LEGEND: Site	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

Figure 2-3: Aerial view of the site

Source: SIX Maps 2019

↑N	LEGEND: Site	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

2.2 EXISTING FACILITIES

The site is currently not being used. An unsealed driveway provides access to the site from Park Road and runs along the eastern boundary providing access to the dwelling and disturbed area. Part of the land at the north-eastern area of the site has previously been cleared and now contains scattered established trees and grassed areas. A residential dwelling is located approximately 200 m to the south of Park Road and was being used as an office for tenants that were leasing the site. An existing pond is located to the north of the dwelling. A large cleared area of land to the south of the dwelling has been disturbed and various stockpiles of materials exist in this area.

The remaining area of the site is densely vegetated. A watercourse traverses the site approximately 100 m south of the disturbed area. Some tracks through the southern area of the site are evident from aerial photographs.

2.3 LAND USE

The current land zoning for the site is RU1 – Primary Production, as displayed in Figure 2-4. The main objectives of this land zone include:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To protect and enhance the existing agricultural landscape character of the land.
- To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.
- To preserve and improve natural resources through appropriate land management practices.

2.3.1 Surrounding land uses

Surrounding land zoning to the north, east and west is also RU1 – Primary Production. To the south of the site, the existing land zoning is RU4 – Primary Production Small Lots. The potential usage for these land zones enable similar developments and allow synergies between businesses.

The following table provides a description of the surrounding land uses immediately adjoining the site and provides photographs.

Table 2-1: Surrounding land uses

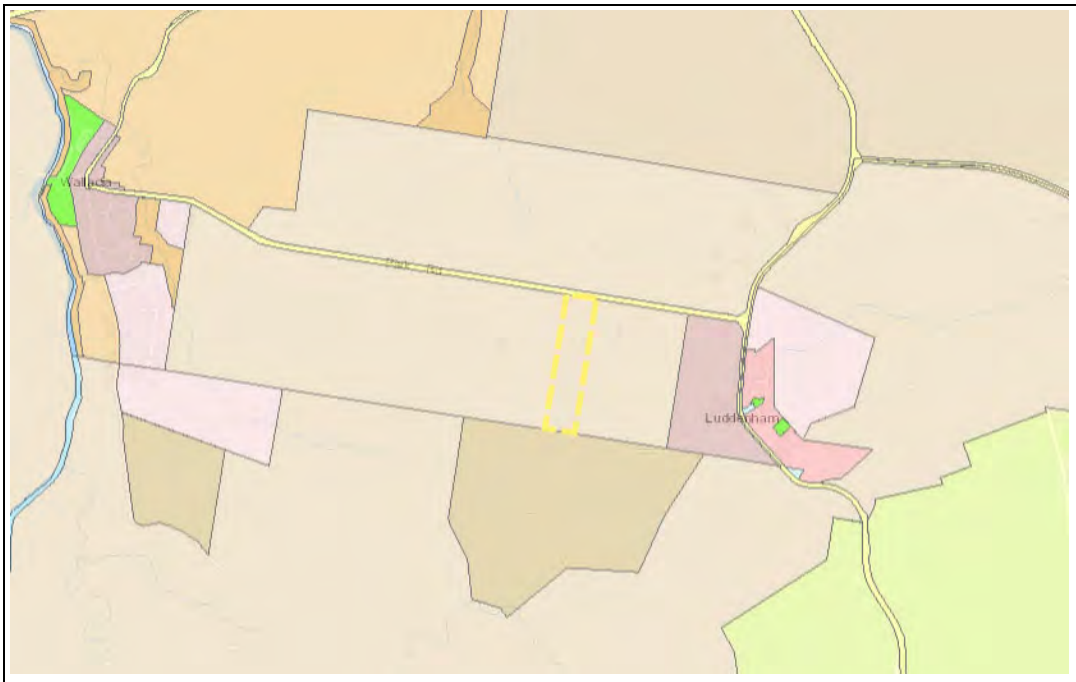
Surrounding Land Uses		Photos (Source: Google Maps)
NORTH	Park Road then: Lot71 DP 594632, 343-351 Park Road, Wallacia Lot72 DP 594632, 353-361 Park Road, Wallacia Agricultural land uses including poultry sheds on Lot 72. Land on both blocks has been mostly cleared.	View looking north from Park Road. 

Table 2-1: Surrounding land uses

Surrounding Land Uses		Photos (Source: Google Maps)
SOUTH	Lot 3 DP 248069, 45 Willowdene Av, Luddenham Rural land use. Part of land cleared with vegetated areas on the east and west of the land.	View of land south of site, looking west from Willowdene Ave. 
EAST	Lot 4 DP 653236, 364 Park Road, Luddenham The majority of this site has been cleared and used for agricultural purposes. A residential dwelling is located to the northern side adjacent to Park Road.	View of site to the east, looking south from Park Road. 
WEST	Lot 1 DP 1145597, 334 Park Road, Wallacia Rural land use with residence. Land appears to be mostly vegetated.	View of the site to the west, looking south from Park Road. 

In the township of Luddenham, to the east of the site, there are areas of RU5 – Village, R2 – Low Density Residential and R5 – Large Lot Residential and small areas of RE1 – Public Recreation and B1 – Neighbourhood Centre land zoning. These land zonings can provide essential services that enable positive relationships between rural and industrial services. Surrounding land use zoning showing the location of the site is shown in Figure 2-4.

Figure 2-4: Surrounding land use zoning



Source: https://www.planningportal.nsw.gov.au

Legend:

B1	Neighbourhood Centre	R2	Low Density Residential
B2	Local Centre	R3	Medium Density Residential
B3	Commercial Core	R4	High Density Residential
B4	Mixed Use	R5	Large Lot Residential
B5	Business Development	RE1	Public Recreation
B6	Enterprise Corridor	RE2	Private Recreation
E1	National Parks and Nature Reserves	RU1	Primary Production
E2	Environmental Conservation	RU2	Rural Landscape
E3	Environmental Management	RU4	Primary Production Small Lots
IN1	General Industrial	SP1	Special Activities
IN2	Light Industrial	SP2	Infrastructure
IN3	Heavy Industrial	W1	Natural Waterways
R1	General Residential	WSP	SEPP Western Sydney Parklands

2.3.2 Existing & Future Road Network

The existing road network consists of Park Road, a local classified road where access to the site can be gained. Park Road connects with The Northern Road, a state road to the east and Mulgoa Road to the west. Both of these roads connect with the M4 Motorway in the north. The Northern Road connects with Bringelly Road, Camden Valley Way and the M5 & M7 Motorways to the south.

The site is adjacent to the outer Sydney orbital which is a corridor of land preserved for the future investigation of the M9 Motorway and freight rail connection between Box Hill in the north and the Hume Motorway near Menangle in the south. This future transport network is expected over the next 40 years.

2.4 LOCAL COMMUNITY

2.4.1 Surrounding Area

The site is located in the suburb of Wallacia in the Penrith local government area. The suburb is situated on the Nepean River, a major river through the Sydney region. The main street of Wallacia is Mulgoa Road, and contains a post office, petrol station hotel and public school.

The main public transport through the region is by bus. Bus routes run south to north, between Warragamba to Penrith. There are no railway facilities in the nearby area.

The primary means of travel through the area is by personal car. Mulgoa Road connects Wallacia to Mulgoa, to the north-east. Park Road connects Wallacia to Luddenham, the east. Silverdale Road joins Wallacia and Warragamba to the south west.

The historic Warragamba Dam, which provides water for Sydney, is located approximately 7.5 km to the west of the site.

2.4.2 Population Demographics

According to the 2016 Australian Census, 1,627 people lived in Wallacia. 51.7% of these were male and 48.3% were female. 3.6% of the population were Aboriginal and/or Torres Strait Islanders.

64.3% of people were engaged in full-time employment. 28.0% of people were engaged in part-time employment and 4.0% of people were unemployed.

The most common occupation in Wallacia was Clerical and Administrative workers, which accounted for 19.0% of people. The next most common occupation was Technicians and Trade Workers accounting for 18.8% of employment. After this, Managers accounted for 13.9% of employment, Machinery Operators and Drivers accounted for 11.9%, Professionals accounted for 10.4%, Labourers accounted for 9.3%, Sales workers accounted for 7.8% and Community and Personal Service Workers accounted for 6.7% of employment.

75.3% of people travelled to work by car, as either a driver or passenger. 4.5% of people utilised public transport to travel to work.

2.5 PROPOSED SITE LAYOUT

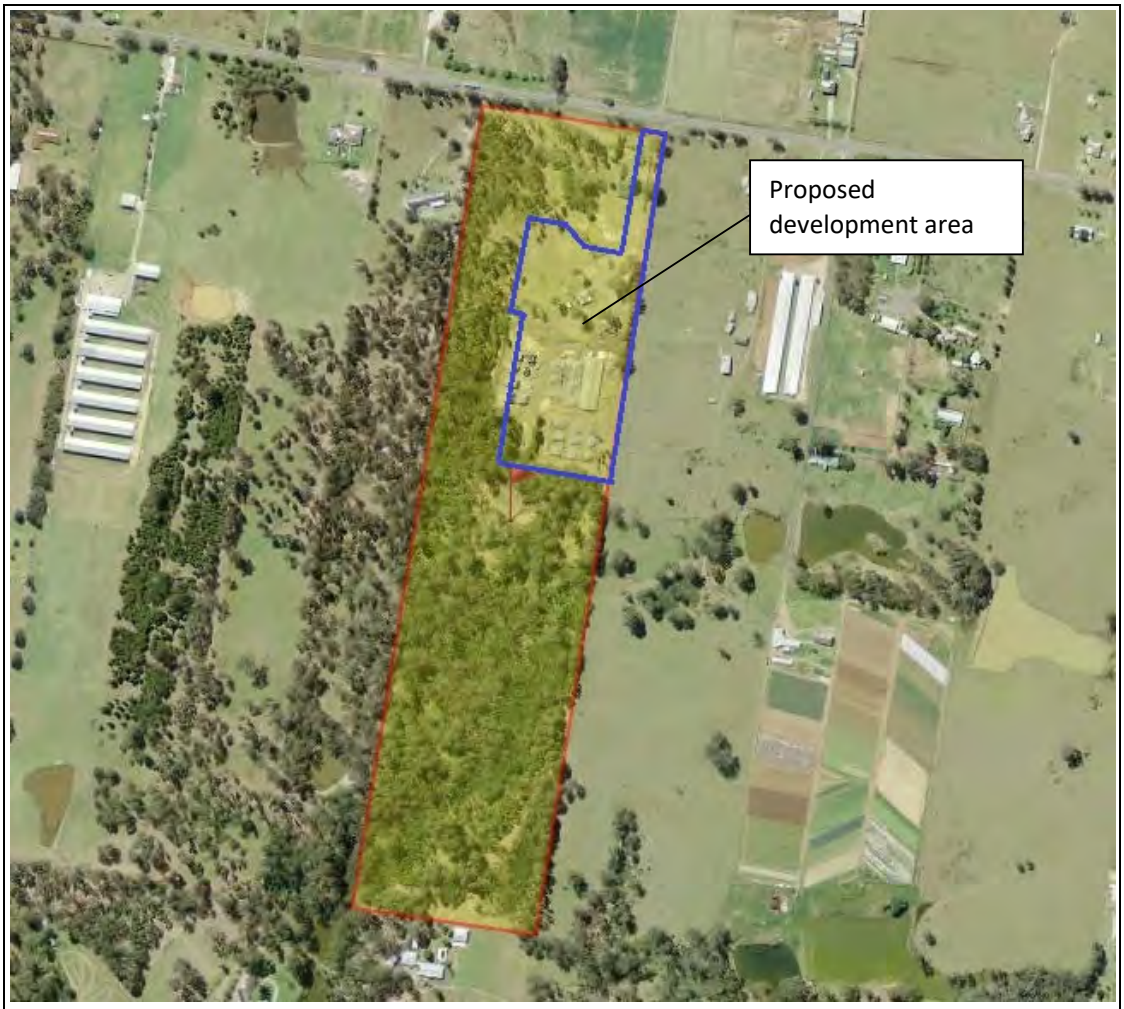
The proposed site layout is provided in Appendix 1.

The development area has been designed to be contained within the already disturbed area on site. This is shown in Figure 2-5. Vehicles would access the site from Park Road via a sealed two way driveway. This driveway would provide access to separate car and truck parking areas to the north of the proposed building. The existing dwelling is adjacent to the proposed car park providing safe pedestrian access for staff. Two weighbridges would be positioned further south along the driveway where trucks would be weighed prior to entering and leaving the main area.

A Colorbond building that would house the RRTF and waste storage bays would be positioned in the cleared area to the south of the existing dwelling. A sealed driveway would provide a one way truck route around the building in an anti-clockwise direction.

Existing vegetation would remain and additional landscaping along the access driveway, around the car park and along the eastern side of the building would be undertaken in accordance with a landscape plan.

Figure 2-5: Proposed development area



Source: SIX Maps 2019

↑N	LEGEND: Subject Site Proposed development area	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

2.6 SENSITIVE RECEPTORS

The EPA *Approved Method for the Modelling and Assessment of Air Pollutants in New South Wales (2017)* (Approved Methods) defines a sensitive receptor as:

> *A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area.*

Surrounding properties include rural farmland and residences where people work and reside. As such, they are considered to be potential sensitive receptors. Due to the broad range of developments that can be undertaken on RU1 and RU4 land zoning, it is important to consider the type of land usage.

Additionally, regarding residential land zone areas, the Approved Methods states:

> *An air quality impact assessment should also consider the location of known or likely future sensitive receptors.*

As such, any residential zoned land must be considered as a potential residential receptor, regardless if there is an existing resident.

2.6.1 Nearest Receivers

Table 2-2 lists the location of potential sensitive receptors relative to the site, as well as other information. Figure 2-6 displays the location of the receptors. As only a portion of the site is being developed, the distance from development has been calculated from the development borders rather than the site borders.

Table 2-2: Nearest Sensitive Receptors

Receptor ID	Address	Direction from Site	Lot and DP	Approximate distance to proposed development	Easting	Northing	Type of receiver
R1	334 Park Road Wallacia	W	Lot 1 DP1145597	120 m	285021.638	6249439.302	Residential
R2	322 Park Road Wallacia	W	Lot 1 DP1145716	225 m	284933.078	6249512.917	Residential
R3	323-341 Park Road Wallacia	NW	Lot 8 DP666928	170 m	285037.927	6249646.635	Residential
R4	343-351 Park Road Wallacia	NNW	Lot 71 DP594632	175 m	285134.703	6249714.806	Residential
R5	353-361 Park Road Wallacia	N	Lot 72 DP594632	220 m	285292.865	6249747.295	Residential
R6	363 Park Road Luddenham	NE	Lot 6 DP651102	200 m	285481.825	6249581.294	Residential
R7	364 Park Road Luddenham	E	Lot 4 DP653236	115 m	285403.646	6249481.174	Residential
R8	386 Park Road Luddenham	E	Lot 1 DP557920	245 m	285485.226	6249150.151	Residential
R9	384 Park Road Luddenham	E	Lot 2 DP557920	275 m	285490.185	6248944.237	Residential
R10	45 Willowdene Avenue Luddenham	S	Lot 3 DP248069	565 m	285042.472	6248548.515	Residential
R11	115 Willowdene Avenue Luddenham	SW	Lot 4 DP248069	720 m	284827.59	6248489.29	Residential
R12	288A Park Road Wallacia	WSW	Lot 1 DP1195400	610 m	284516.692	6249018.95	Residential
R13	32 Willowdene Avenue Luddenham	SE	Lot 32 DP771596	865 m	285871.683	6248638.714	School
R14	288A Park Road Wallacia	W	Lot 1 DP1195400	445 m	284654.005	6249225.993	Agricultural /Industrial
R15	380 Park Road Luddenham	E	Lot 1 DP215057	185 m	285441.875	6249297.194	Agricultural /Industrial

Note: distances measured from the boundaries of the site development area

Figure 2-6: Location of Nearest Sensitive Receptors

Source: Six Maps NSW, 2020

Legend:
+ Receptor
Development Boundaries
Site Boundaries

2.7 SITE HISTORY

Historical aerial photographs indicate the site has been used since the 1950's. Predominantly covered in dense vegetation, were small sheds located in the north eastern corner in 1955 and further clearing of this area of the site during the late 1970's and 80's. Greenhouses were constructed in this same developed area of the north eastern portion of site and used throughout the 1980's and 1990's. Further clearing of the northern end of the property was evident in early 2000's when many of the greenhouses/sheds were removed. Since then, the property has had many tenants and there has been evidence that areas of the site have cleared been used for storage of stockpiles of soils, aggregates and mulch type products. The southern portion of the site still remains covered in vegetation.

2.7.1 DA History

Limited information was acquired from Penrith City Council regarding past approved development applications at the site. These are listed below in Table 2-3.

Table 2-3: Summary of Council's Development and Building Application/Consent Records

Year	Number	Description
2013	DA13/0897	Secondary Dwelling
2013	CC14/0017	Secondary Dwelling
-	S/1700/73	Residential Dwelling
-	S/1610/76	Glass House
-	S/806/80	Toilets

2.7.2 Historical Compliance Matters

Order 10

Order 10 was issued on 16 January 2019 by Penrith City Council under the Environmental Planning and Assessment Act 1979. The order was associated with the alleged unauthorised importation of fill materials onto the premises. The order required four terms to be complied with and response to Council was prepared on 6 May 2019 detailing compliance with these terms.

To further address potential contamination of filled areas associated with the proposed development, sampling and testing within the proposed development area was undertaken as part of the Limited Phase II ESA Report. Additional sampling and testing was undertaken as requested by Council. The findings of the report and additional testing determined all soil samples to be uncontaminated with results of testing well below criteria. Areas outside this boundary were not considered and would not be disturbed as part of the proposal.

Clean up notice

The NSW EPA publishes records under the Protection of the Environmental Operations (POEO) Act 1997 (as amended 2011). A search of the POEO Register revealed one (1) record for the subject site.

An S.91: Clean Up Notice No. 1508170 was issued to the site on 15th of August 2012. This was related to waste storage potentially in excess of 2,500 m^3 at the site including the following:

- Piles of timber pallets;
- Piles of plastic pallets;
- Stockpiles of broken pallets;
- Holes made using an excavator and evidence of burning at the bottom of two of the holes, numerous nails and liquid was observed;
- Excavated interlinked drainage lines across the site; and
- Pallets stored on ground surface and in close proximity to dense bushland.

In addition a draft prevention notice was issued for the following action:

- Cease receiving waste at the premises;
- Do not remove pallets or timber until the RFS have completed a risk assessment to allow removal of pallets or timber;
- Do not shred, chip, break or otherwise process waste; and
- Do not burn waste.

On 8 August 2012, EPA suspected a pollution incident occurred due to evidence of burning at the site.

This issue has been closed.

3. PLANNING FRAMEWORK

This section provides an assessment of the proposed development in accordance with all relevant statutory planning controls.

3.1 COMMONWEALTH CONTROLS

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would apply to the development of the subject land. The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as matter of national environmental significance.

The proposed development would not have a significant impact on matters of national environmental significance, and it is not on Commonwealth land. Therefore, the Provisions of the Act do not have application and the approval of the Minister is not required.

3.1.2 National Greenhouse and Energy Reporting Act 2007

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) would apply to the development of the subject land. The National Greenhouse and Energy Reporting (NGER) scheme is a single national framework for reporting and disseminating company information about greenhouse gas emissions, energy production, energy consumption and other information specified under NGER legislation.

The NGER Act applies to the entire corporate activities of Controlling Corporations, not individual sites or activities in isolation of the Group.

The requirements for registration are found within *Part 2 – Registration* of the NGER Act as follows:

> *(1) A controlling corporation must apply, in accordance with this section, to be registered under Division 3 if the corporation's group meets one or more of the thresholds under section 13 for a financial year (the **trigger year**) ending on or after 30 June 2009.*

The relevant triggers for registration are found in Clause 13 *'Thresholds'*. It is beyond the scope of this EIS to ascertain whether the holding Corporation of the subject land meets the thresholds as defined in the NGER Act, however if such thresholds are met then the Act applies to the activity to be conducted upon the land.

3.2 STATE CONTROLS

3.2.1 Environmental Planning and Assessment Act and Regulation

The *Environmental Planning and Assessment Act 1979 (EP&A Act)* and the *Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)* provide the framework for environmental planning in NSW. The EP&A Act and the Regulation include provisions to ensure that proposals, which have the potential to impact on the environment, are subject to detailed

assessment. Under this legislation the proposed development is defined as both designated and integrated development.

3.2.1.1 State Significant Development

Under Clause 8 (1) of the *State Environmental Planning Policy (State and Regional Development) 2011*, development is potentially state significant development if it is specified in Schedule 1 or Schedule 2.

Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* applies to the development. Clause 23(3) could potentially be relevant to the proposed activities:

> ***23 Waste and resource management facilities***
>
> *(1) Development for the purpose of regional putrescible landfills or an extension to a regional putrescible landfill that:*
>
> *(a) has a capacity to receive more than 75,000 tonnes per year of putrescible waste, or*
>
> *(b) has a capacity to receive more than 650,000 tonnes per year of putrescible waste over the life of the site, or*
>
> *(c) is located in an environmentally sensitive area of State significance.*
>
> *(2) Development for the purpose of waste or resource transfer stations in metropolitan areas of the Sydney region that handle more than 100,000 tonnes per year of waste.*
>
> ***(3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.***
>
> *(4) Development for the purpose of waste incineration that handles more than 1,000 tonnes per year of waste.*
>
> *(5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.*
>
> *(6) Development for the purpose of any other liquid waste depot that treats, stores or disposes of industrial liquid waste and:*
>
> *(a) handles more than 10,000 tonnes per year of liquid food or grease trap waste, or*
>
> *(b) handles more than 1,000 tonnes per year of other aqueous or non-aqueous liquid industrial waste.*

The proposed development is <u>not</u> State Significant as the amount of waste to be processed is estimated to be approximately 95,000 tonnes per year. The waste will consist of Construction and Demolition (C&D) and Commercial and Industrial (C&I) waste. The waste would not be putrescible, hazardous or liquid waste. The proposed activities would not involve incineration.

The subject site is not an identified site under Schedule 2.

3.2.1.2 Environmental Planning and Assessment Act and Regulation

The *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000* provide the framework for environmental planning in NSW. The Act and the Regulation include Provisions to ensure that proposals, which have the potential to impact on the environment, are subject to detailed assessment. Under this legislation the proposed development is defined as both designated and integrated development.

3.2.1.2.1 Designated development

The proposed development constitutes Designated Development as it is captured by Clauses 32(1)(b)(iii), 32(1)(c) and, partly, 32(1)(d) under Schedule 3, Part 1 of the *Environmental Planning and Assessment Regulation 2000*, reported below.

> ***32 Waste management facilities or works***
>
> *(1) Waste management facilities or works that store, treat, purify or dispose of waste or sort, process, recycle, recover, use or reuse material from waste and:*
>
> *(a) that dispose (by landfilling, incinerating, storing, placing or other means) of solid or liquid waste:*
>
> *(i) that includes any substance classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or*
>
> *(ii) that comprises more than 100,000 tonnes of "clean fill" (such as soil, sand, gravel, bricks or other excavated or hard material) in a manner that, in the opinion of the consent authority, is likely to cause significant impacts on drainage or flooding, or*
>
> *(iii) that comprises more than 1,000 tonnes per year of sludge or effluent, or*
>
> *(iv) that comprises more than 200 tonnes per year of other waste material, or*
>
> *(b) that sort, consolidate or temporarily store waste at transfer stations or materials recycling facilities for transfer to another site for final disposal, permanent storage, reprocessing, recycling, use or reuse and:*
>
> *(i) that handle substances classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or*
>
> *(ii) that have an intended handling capacity of more than 10,000 tonnes per year of waste containing food or livestock, agricultural or food processing industries waste or similar substances, or*
>
> ***(iii) that have an intended handling capacity of more than 30,000 tonnes per year of waste such as glass, plastic, paper, wood, metal, rubber or building demolition material**, or*

***(c) that purify, recover, reprocess or process more than 5,000 tonnes per year of solid or liquid organic materials**, or*

(d) that are located:

***(i) in or within 100 metres of a natural waterbody**, wetland, coastal dune field or environmentally sensitive area, or*

(ii) in an area of high watertable, highly permeable soils, acid sulphate, sodic or saline soils, or

(iii) within a drinking water catchment, or

(iv) within a catchment of an estuary where the entrance to the sea is intermittently open, or

(v) on a floodplain, or

***(vi) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development** and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, visual impacts, air pollution (including odour, smoke, fumes or dust), vermin or traffic.*

(2) This clause does not apply to:

(a) development comprising or involving any use of sludge or effluent if:

(i) the dominant purpose is not waste disposal, and

(ii) the development is carried out in a location other than one listed in subclause (1) (d), above, or

(b) development comprising or involving waste management facilities or works specifically referred to elsewhere in this Schedule, or

(c) development for which State Environmental Planning Policy No 52—Farm Dams and Other Works in Land and Water Management Plan Areas requires consent.

The proposed development would fit the description of a waste management facility, with an intended handling capacity of more than 30,000 tonnes per year of building demolition material, and which processes more than 5,000 tonnes per year of solid organic materials.

The site is traversed by an intermittent (un-named) watercourse which forms part of the Duncans Creek catchment.

The site is also located within 250 m of a dwelling not associated with the development.

An Environmental Impact Statement (EIS) is required to accompany an application for designated development.

3.2.1.3 Integrated development

Part 4, Division 4.8, Section 4.46 of the EP&A Act defines what constitutes an "Integrated Development". Integrated development is development (not being State significant development or complying development) that requires development consent and one or more of the following licenses or approvals listed in Table 3-1.

Table 3-1: Licence/Approval Requirements as Integrated Development

Legislation	Require License or Approval
Coal Mine Subsidence Compensation Act 2017	No
Fisheries Management Act 1994	No
Heritage Act 1977	No
Mines Subsidence Compensation Act 1961	No
Mining Act 1992	No
National Parks and Wildlife Act 1974	No
Petroleum (Onshore) Act 1991	No
Protection of the Environment Operations Act 1997	**Yes**
Roads Act 1993	No
Rural Fires Act 1997	No
Water Management Act 2000	No

3.2.1.4 Section 4.15 (1) – Matters for Consideration

Under Section 4.15 of the EP&A Act, in determining a development application a consent authority is to take into consideration such of the following matters as are relevant to the development, the subject of the development application.

(a) The provisions of:

(i) Any environmental planning instrument.

(ii) Any draft environmental planning instruments that have been placed on public exhibition.

(iii) Any Development Control Plans

(iv) Any matters prescribed by the regulations.

(b) The likely impact of the development including environmental impacts in both the natural and built environment and social and economic impacts in the locality.

- *Context and Setting*
- *Potential Impact on Adjoining Properties*
- *Access, Transport and Traffic*
- *Public Domain*
- *Utilities*
- *Heritage*
- *Other Land Resources*
- *Critical Habitat*

- *Air and Microclimate*
- *Waste*
- *Energy*
- *Noise*
- *Natural Hazards*
- *Social Impact in the Locality*
- *Economic Impact in the Locality*
- *Site Design and Building Form*
- *Construction*
- *Cumulative Impacts*

(c) The suitability of the site for the development.

(d) Any submissions made in accordance with the Act.

(e) The public interest

These matters are addressed in the sections that follow.

3.2.2 Protection of the Environment Operations Act, 1997

Part 1 in Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) lists premise-based activities that are scheduled activities and, as such, that require a licence under the Act. The proposed development includes a number of scheduled activities as may be defined by clauses 34, 41 and 42 (shown below):

34 Resource recovery

(1) This clause applies to the following activities:

*"**recovery of general waste**", meaning the receiving of waste (other than hazardous waste, restricted solid waste, liquid waste or special waste) from off site and its processing, otherwise than for the recovery of energy.*

*"**recovery of hazardous and other waste**", meaning the receiving of hazardous waste, restricted solid waste or special waste (other than asbestos waste or waste tyres) from off site and its processing, otherwise than for the recovery of energy.*

*"**recovery of waste oil**", meaning the receiving of waste oil from off site and its processing, otherwise than for the recovery of energy.*

*"**recovery of waste tyres**", meaning the receiving of waste tyres from off site and their processing, otherwise than for the recovery of energy.*

(3) Each activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if—

(a) it meets the criteria set out in Column 2 of that Table, and

(b) either—

(i) less than 50% by weight of the waste received in any year requires disposal after processing, or

(ii) an exemption granted under Part 9 of the Protection of the Environment Operations (Waste) Regulation 2014 exempts the person carrying out the activity from the requirements of section 48 (2) as they apply to waste disposal (application to land), waste disposal (thermal treatment), waste processing (non-thermal treatment) and waste storage.

Table 3-2: Extract from Clause 34 of POEO Act

Activity	Criteria
Recovery of general waste	if the premises are in the regulated area— (a) involves having on site at any time more than 1,000 tonnes or 1,000 cubic metres of waste, or (b) involves processing more than 6,000 tonnes of waste per year if the premises are outside the regulated area— (a) involves having on site at any time more than 2,500 tonnes or 2,500 cubic metres of waste, or (b) involves processing more than 12,000 tonnes of waste per year
Recovery of hazardous and other waste	involves having on site at any time more than 200 kilograms of waste
Recovery of waste tyres	involves having on site at any time (other than in or on a vehicle used to transport the tyres to or from the premises) more than 5 tonnes of waste tyres or 500 waste tyres, or involves processing more than 5,000 tonnes of waste tyres per year

The proposed development will have >1,000 tonnes of general waste stored on site and will process >6,000 tonnes of general waste per annum thus cl. 34 applies.

41 Waste processing (non-thermal treatment)

(1) This clause applies to the following activities:

*"**non-thermal treatment of general waste**", meaning the receiving of waste (other than hazardous waste, restricted solid waste, liquid waste or special waste) from off site and its processing otherwise than by thermal treatment.*

*"**non-thermal treatment of hazardous and other waste**", meaning the receiving of hazardous waste, restricted solid waste or special waste (other than asbestos waste or waste tyres) from off site and its processing otherwise than by thermal treatment.*

*"**non-thermal treatment of liquid waste**", meaning the receiving of liquid waste (other than waste oil) from off site and its processing otherwise than by thermal treatment.*

*"**non-thermal treatment of waste oil**", meaning the receiving of waste oil from off site and its processing otherwise than by thermal treatment.*

*"**non-thermal treatment of waste tyres**", meaning the receiving of waste tyres from off site and their processing otherwise than by thermal treatment.*

(2) However, this clause does not apply to the processing of any of the following:
- *a) stormwater,*
- *b) contaminated soil,*
- *c) contaminated groundwater,*
- *d) sewage within a sewage treatment system (whether or not that system is licensed).*

(3) Each other activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if—
- *(a) it meets the criteria set out in Column 2 of that Table, and*
- *(b) 50% or more by weight of the total amount of waste received per year requires disposal after processing.*

The waste types proposed to be received and processed by the facility are not within the categories specified by cl.41.

42 Waste storage

*(1) This clause applies to **waste storage**, meaning the receiving from off site and storing (including storage for transfer) of waste.*

The proposed development will receive waste from off site and will store this material for processing and/or transfer off-site thus clause 42 applies.

In summary, the proposed development requires an EPL for the following scheduled activities:

- 34 – Resource recovery; and
- 42 – Waste storage.

3.2.3 Biodiversity Conservation Act 2016

According to the Planning Certificate issued under s.10.7 of the EP&A Act, the land is not bio-diversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*, nor does the land form part of a biobanking stewardship Agreement under Part 5 of the *Biodiversity Conservation Act 2016*.

The proposed operation is confined to the existing cleared northern end of the site and requires no significant removal of vegetation. An assessment of the potential effects upon the remnant bushland in the other areas of the site has been undertaken by an accredited ecologist in the BDAR format using the 'Streamlined Assessment Module' as it goes not exceed the area clearing threshold for small area developments as outlined in the *Biodiversity Assessment Method* (*BAM; OEH 2017a* refer to Appendix 12); we rely upon the conclusions of this expert that the effects upon the vegetation are negligible and well within acceptable limits.

The proposal offers an ideal opportunity to protect, enhance and re-establish the remnant vegetation that would otherwise be unavailable if the site remained undeveloped and in its current status.

3.2.4 NSW Heritage Act 1977

The *New South Wales Heritage Act* was introduced in 1977 to protect the important heritage places that form part of our environment and our identity. A review of the NSW Heritage Register (https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx#amapsearch) indicates that the land does not contain a listed heritage item of State Significance, nor does it adjoin or is within a reasonable vicinity of such an item.

A review of the site for any potential Aboriginal heritage has been undertaken by Narla Environmental as part of the ecology assessment and has not identified any item of significance – refer to Appendix 11 for a full discussion.

3.2.5 State and Regional Environmental Planning Policies

A number of State Environmental Planning Policies (SEPPs) apply to the subject land as set out in the Section 10.7 Planning Certificate No. 20/01065 (06 March 2020) and are listed in Table 3-3. The most relevant SEPPs are then discussed in greater detail.

Table 3-3: State and Regional Environmental Planning Policies

Policy	Comments
Deemed SEPP: Sydney Regional Environmental Plan No.9 Extractive Industry (No. 2 – 1995)	No application
Deemed SEPP: Sydney Regional Environmental Plan (SREP) No 20 – Hawkesbury - Nepean River (No.2 – 1997)	**Applies: Discussed below**
SEPP No.19 - Bushland in Urban Areas	**No application: Discussed below**
SEPP No.21 - Caravan Parks	No application
SEPP No.33 - Hazardous and Offensive Development	**Applies: Discussed below**
SEPP No.50 - Canal Estate Development	No application
SEPP No.55 - Remediation of Land	**Applies: Discussed below**
SEPP No.64 - Advertising and Signage	**No application: Discussed below**
SEPP No.65 - Design Quality of Residential Apartment Development	No application
SEPP No.70 - Affordable Housing (Revised Schemes)	No application
SEPP (Housing for Seniors or People with a Disability) 2004	No application
SEPP (Building Sustainability Index: BASIX) 2004	No application
SEPP (State Significant Precincts) 2005	**No application: Discussed below**
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	No application
SEPP (Infrastructure) 2007	**Applies: Discussed below**
SEPP (Exempt and Complying Development Codes) 2008	No application
SEPP (Affordable Rental Housing) 2009	No application
SEPP (State and Regional Development) 2011	**No application: Discussed below**

Table 3-3: State and Regional Environmental Planning Policies

Policy	Comments
SEPP (Vegetation in Non-Rural Areas) 2017	**No application: Discussed below**
SEPP (Education Establishments and Child Care Centre Facilities) 2017	No application
SEPP (Primary Production and Rural Development) 2019	No application
Draft SEPP (Western Sydney Corridors)	**No application: Discussed below**
Draft SEPP (Environment)	**Applies: Discussed below**
Draft SEPP (Remediation of Land)	**Applies: Discussed below**
Draft SEPP (Exempt and Complying Development Codes) 2008	No application
Draft SEPP (Infrastructure) 2007	**Applies: Discussed below**

3.2.5.1 Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No 2—1997)

The *Sydney Regional Environmental Plan No. 20 (SREP 20)* applies to the subject land. The following provides an assessment of the proposed development in accordance with SREP 20.

> *The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.*

Clause 11(18) includes particular Provisions in respect of Waste management facilities or works being:

> ***(18) Waste management facilities or works***
>
> ***Definition:***
> *Development for the purpose of waste management facilities or works described in Schedule 3 (Designated Development) to the Environmental Planning and Assessment Regulation 1994.*
>
> ***Consent required.***
>
> ***Additional matters for consideration by the consent authority:***
> *(a) Any potential for groundwater contamination.*
> *(b) The adequacy of the proposed leachate management system and surface water controls.*
> *(c) The long-term stability of the final landform and the adequacy of the site management plan.*
> *(d) If extraction of material is involved in the creation or other development of the waste management site, whether the extractive operation will have an adverse impact on the river system.*

These matters for consideration have been addressed in this EIS. It can be determined that the proposed use is not inconsistent with the Aims and Objectives of the Policy, whilst the matters for consideration are satisfied.

3.2.5.2 State Environmental Planning Policy No. 19 – Bushland in Urban Areas

The general aim of this Policy is to protect and preserve bushland within the urban areas referred to in Schedule 1 of the SEPP which includes the Penrith LGA, but only insofar as the bushland lies within land zoned or reserved for public open space purposes. As the subject land is zoned RU1 – Primary Production this SEPP is not applicable.

3.2.5.3 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

The proposed development would only store minor quantities of chemicals and dangerous goods site and, therefore does not trigger the thresholds listed in *SEPP No. 33 – Hazardous and Offensive Development* and would not fit the definition of 'potentially hazardous industry' or 'hazardous storage establishment'. This is demonstrated in Section 8.6.2.

3.2.5.4 State Environmental Planning Policy No. 55 – Remediation of Land

The construction and installation of the resource recovery facility would require excavation works and therefore the proposal would be assessable under *SEPP No. 55 – Remediation of Land*.

A Phase I and II Environmental Site Assessment (contamination reports) have been undertaken as part of the environmental assessment process.

The findings of the Contamination Report (provided in Appendix 10) are briefly summarised below. The purpose of the report was to determine the suitability of the proposed development area for use as a resource recovery facility. Historical information indicates that the site contains areas of imported fill and stockpiling of waste has been undertaken. Therefore, the Contamination Report was primarily focussed on the area to be disturbed as part of the proposed development. All soil samples analysed were uncontaminated with results well below relevant criteria.

Remaining areas of the site would not be disturbed as part of the proposed development. Further investigations as part of an Order issued by Penrith City Council in January 2019 have been resolved as a separate issue unrelated to this EIS in consultation with Council.

The proposed development area of the site is considered to be suitable for the proposed development in its current condition, and therefore no remediation is required in that area.

3.2.5.5 State Environmental Planning Policy No. 64 – Advertising and Signage

This SEPP is not applicable as the Development Application does not include details of signage. Any signage pertaining to building or business identification will be subject to a future application to Council.

3.2.5.6 State Environmental Planning Policy (State Significant Precincts) 2005

The SEPP nominates certain precincts as being of State Significance for the purposes of development. As the subject site is not nominated in the relevant Appendices this SEPP is not applicable.

3.2.5.7 State Environmental Planning Policy (Infrastructure) 2007

The proposal is permitted with consent under Clause 121 of Division 23, Part 3, of the *State Environmental Planning Policy (SEPP) (Infrastructure) 2007*, as reported below.

> ***121 Development permitted with consent***
>
> *(1) Development for the purpose of waste or resource management facilities, other than development referred to in subclause (2), may be carried out by any person with consent on land* ***in a prescribed zone****.*
>
> *Where:*
>
> *prescribed zone means any of the following land use zones or a land use zone that is equivalent to any of those zones:*
>
> ***(a) RU1 Primary Production****,*
> *(b) RU2 Rural Landscape,*
> *(c) IN1 General Industrial,*
> *(d) IN3 Heavy Industrial,*
> *(e) SP1 Special Activities,*
> *(f) SP2 Infrastructure*
>
> *waste or resource management facility means a waste or resource transfer station, a resource recovery facility or a waste disposal facility.*
>
> ***resource recovery facility*** *means a facility for the recovery of resources from waste, including such works or activities as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from waste gases and water treatment, but not including re-manufacture of material or goods or disposal of the material by landfill or incineration.*
> *waste or resource transfer station means a facility for the collection and transfer of waste material or resources, including the receipt, sorting, compacting, temporary storage and distribution of waste or resources and the loading or unloading of waste or resources onto or from road or rail transport.*

The subject land is within an RU1 zone thus is a 'prescribed zone' within the terms of clause 121(1)(a).

The intended use is as a 'Resource Recovery Facility' as defined above, being for the '*…separating and sorting, processing or treating the waste…'*

Under Clause 8 of the *SEPP (infrastructure) 2007*, where there is an inconsistency between this Policy and other environmental planning instruments, such as the Penrith LEP 2010, this Policy prevails.

For completeness we have also considered the Objectives of the policy, which are contained at Part 1 clause 2:

2 Aim of Policy

The aim of this Policy is to facilitate the effective delivery of infrastructure across the State by—

(a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and

(b) providing greater flexibility in the location of infrastructure and service facilities, and

(c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and

(d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and

(e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and

(f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing, and

(g) providing opportunities for infrastructure to demonstrate good design outcomes.

The most relevant consideration is at 2(b); the site has been specifically chosen as it is ideally located within close proximity to the Badgerys Creek Aerotropolis precinct and midway between the South-West and North-West Growth Sectors, thus satisfies 2(b) because of its locational advantage.

The proposal would support infrastructure projects in this growing area by providing a facility to recycle wastes as the existing waste facilities approach maximum capacity and be able to serve the growth of this area and the airport infrastructure projects.

Furthermore, the site has the following features that support the proposed development:

- The site has sufficient room available to accommodate the proposed resource recovery activities, on-site parking and truck manoeuvring without encroaching upon existing remnant natural vegetation;
- The development is a permitted use with consent under the Infrastructure SEPP;
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged; and
- Transport routes are readily available.

The proposal is also consistent with 2(e), (f) and (g) as the relevant matters of consideration for assessment have been addressed within this EIS, consultation with Authorities has been

undertaken with their feedback adopted within the project design, and the project generally has been specifically designed for the intended use to current 'best practice' standards with demonstrable architectural merit within the building and site design for projects of this nature.

3.2.5.8 State Environmental Planning Policy (State and Regional Development) 2011

The aims of *SEPP (State and Regional Development) 2011* is to identify development that is State Significant Development, State Significant Infrastructure or Critical State Significant Infrastructure. Under Clause 8 (1) of the *State Environmental Planning Policy (State and Regional Development) 2011*, development is potentially State Significant Development if it is specified in Schedule 1 or Schedule 2.

Clause 23(3) of Schedule 1 is relevant to the proposed activities:

> ***23 Waste and resource management facilities***
>
> *(1) Development for the purpose of regional putrescible landfills or an extension to a regional putrescible landfill that:*
>
> *(a) has a capacity to receive more than 75,000 tonnes per year of putrescible waste, or*
>
> *(b) has a capacity to receive more than 650,000 tonnes per year of putrescible waste over the life of the site, or*
>
> *(c) is located in an environmentally sensitive area of State significance.*
>
> *(2) Development for the purpose of waste or resource transfer stations in metropolitan areas of the Sydney region that handle more than 100,000 tonnes per year of waste.*
>
> ***3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.***
>
> *(4) Development for the purpose of waste incineration that handles more than 1,000 tonnes per year of waste.*
>
> *(5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.*
>
> *(6) Development for the purpose of any other liquid waste depot that treats, stores or disposes of industrial liquid waste and:*
>
> *(a) handles more than 10,000 tonnes per year of liquid food or grease trap waste, or*
>
> *(b) handles more than 1,000 tonnes per year of other aqueous or non-aqueous liquid industrial waste.*

The proposed development is <u>not</u> State Significant as it involves the handling of less than 100,000 tonnes per year of waste. Additionally, the subject site is not an identified site under Schedule 2.

3.2.5.9 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

This SEPP aims to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.

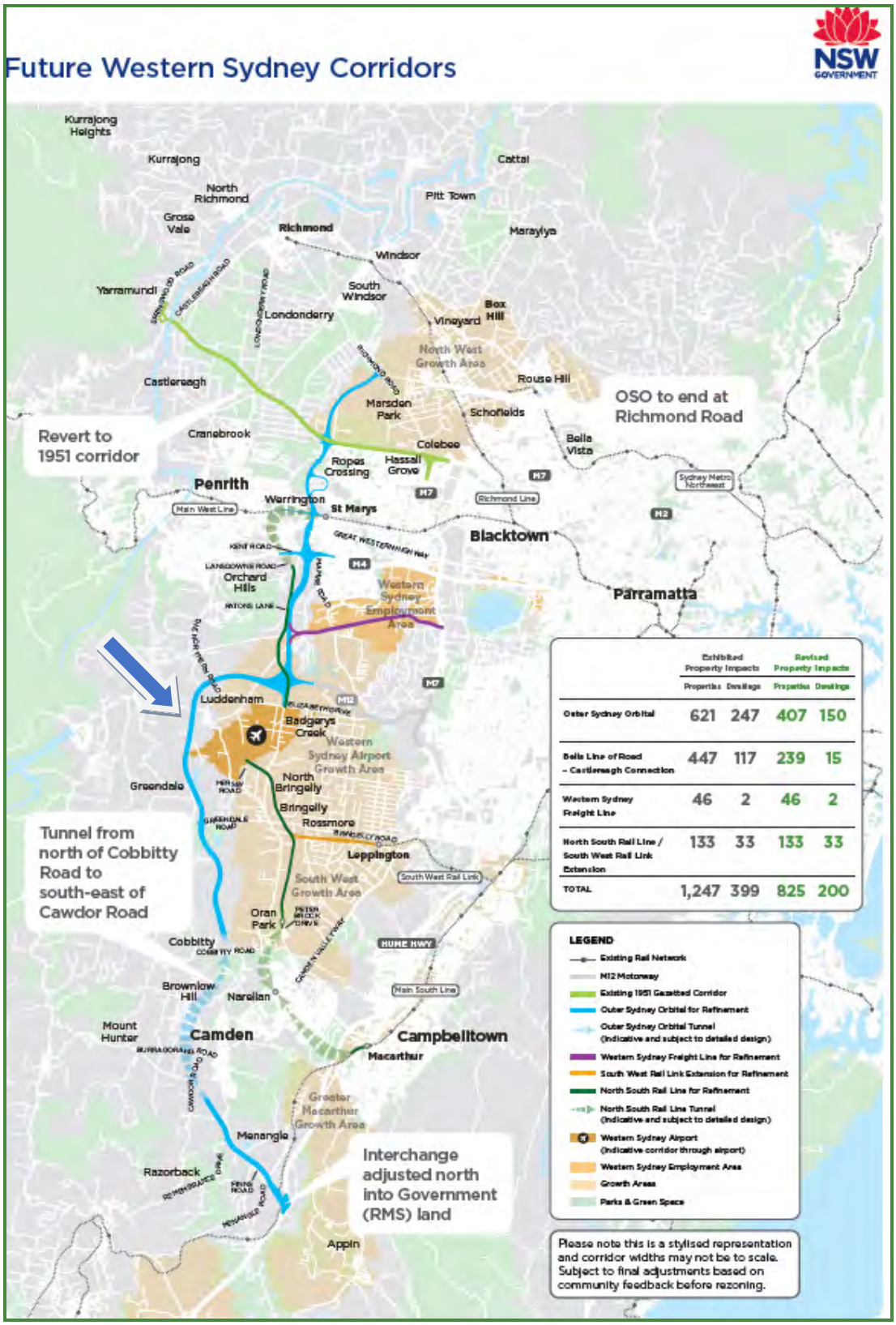
The SEPP is applicable to the Penrith LGA but does not apply, pursuant to clause 5(b), to RU1 – Primary Production land, hence is not applicable to the proposed development.

3.2.5.10 Draft State Environmental Planning Policy (Western Sydney Corridors)

The proposed SEPP will identify land required for the future delivery of major infrastructure projects in Western Sydney and reserve that land for a public purpose, under clause 26(1)(c) of the Act. The land proposed by Transport for NSW to be reserved by the SEPP is identified in Attachment A of the Discussion Paper. Once the corridors are finalised by Transport for NSW and the SEPP is made, land will be rezoned to SP2 Infrastructure – Reserved Infrastructure Corridor and new planning controls will apply. This will ensure that new development does not inhibit the delivery of the major infrastructure required in the future.

Reference to the current mapping available at https://www.transport.nsw.gov.au/corridors indicates that the Park Road site is not within the area defined as comprising the Western Sydney Orbital corridor (shown arrowed in the below Figure):

Figure 3-1: Map of recommended corridor for Outer Sydney Orbital (Transport for NSW)



3.2.5.11 Draft State Environmental Planning Policy (Environment)

This draft *State Environmental Planning Policy (SEPP)* is intended for the protection and management of our natural environment. Changes proposed include consolidating the following seven existing SEPPs:

- State Environmental Planning Policy No. 19 – Bushland in Urban Areas
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- State Environmental Planning Policy No. 50 – Canal Estate Development
- Greater Metropolitan Regional Environmental Plan No. 2 – Georges River Catchment
- Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No.2-1997)
- Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
- Willandra Lakes Regional Environmental Plan No. 1 – World Heritage Property.

The effect of the draft SEPP will primarily guide Councils when preparing Local Environmental Plans that affect urban bushland and, in this specific project, land within the Hawkesbury-Nepean catchment.

The draft SEPP is unlikely to impose significant constraints upon the proposed development over and above those previously addressed in this EIS at sections 3.2.5.1 and 3.2.5.2.

3.2.5.12 Draft State Environmental Planning Policy (Remediation of Land)

This draft *State Environmental Planning Policy (SEPP)* is intended as a new land remediation SEPP to:

- provide a state-wide planning framework for the remediation of land
- maintain the objectives and reinforce those aspects of the existing framework that have worked well
- require planning authorities to consider the potential for land to be contaminated when determining development applications and rezoning land
- clearly list the remediation works that require development consent
- introduce certification and operational requirements for remediation works that can be undertaken without development consent.

The draft SEPP is unlikely to be significantly different in scope than the matters of consideration addressed previously addressed in this EIS at section 3.2.5.4.

3.2.5.13 Draft State Environmental Planning Policy (Infrastructure) 2007

Amendments to the Infrastructure SEPP made in December 2017 included new provisions for health service facilities, public administration buildings, state sports and recreation centres, and lead-in sewer and water infrastructure. They also optimised the use of commuter hubs and enabled councils to better manage and maintain their lands, including their operational lands.

These additional matters included in the draft SEPP are unlikely to be significantly different in scope than the matters of consideration addressed previously addressed in this EIS at section 3.2.5.7 or alter the permissibility for the proposed development on RU1 zoned land.

3.3 LOCAL CONTROLS

3.3.1 Penrith Local Environmental Plan 2010

The subject land is located within the Local Government Area of Penrith City Council. *Penrith Local Environmental Plan 2010 (PLEP 2008)* applies to the land. Clause 1.9 of the LEP applies as:

> ***1.9 Application of SEPPs***
> *(1) This Plan is subject to the provisions of any State environmental planning policy that prevails over this Plan as provided by section 3.28 of the Act*

As discussed above, the proposed use as a resource recovery facility is a use permitted with consent under the Provisions of SEPP (Infrastructure) 2007.

3.3.1.1 Aims of the Plan

The aims of the LEP are:

> ***1.2 Aims of Plan***
>
> *(a) to provide the mechanism and planning framework for the management, orderly and economic development, and conservation of land in Penrith,*
>
> *(b) to promote development that is consistent with the Council's vision for Penrith, namely, one of a sustainable and prosperous region with harmony of urban and rural qualities and with a strong commitment to healthy and safe communities and environmental protection and enhancement,*
>
> *(c) to accommodate and support Penrith's future population growth by providing a diversity of housing types, in areas well located with regard to services, facilities and transport, that meet the current and emerging needs of Penrith's communities and safeguard residential amenity,*
>
> *(d) to foster viable employment, transport, education, agricultural production and future investment opportunities and recreational activities that are suitable for the needs and skills of residents, the workforce and visitors, allowing Penrith to fulfil its role as a regional city in the Sydney Metropolitan Region,*
>
> *(e) to reinforce Penrith's urban growth limits by allowing rural living opportunities where they will promote the intrinsic rural values and functions of Penrith's rural lands and the social well-being of its rural communities,*
>
> *(f) to protect and enhance the environmental values and heritage of Penrith, including places of historical, aesthetic, architectural, natural, cultural, visual and Aboriginal significance,*

(g) to minimise the risk to the community in areas subject to environmental hazards, particularly flooding and bushfire, by managing development in sensitive areas,

(h) to ensure that development incorporates the principles of sustainable development through the delivery of balanced social, economic and environmental outcomes, and that development is designed in a way that assists in reducing and adapting to the likely impacts of climate change.

The proposal is for a Resource Recovery Facility that provides additional employment opportunities within the Penrith LGA through a well-designed, technologically advanced facility that is purpose-designed to recover valuable materials from the C & D waste stream and divert these from landfill in accordance with the principles of sustainability and the circular economy. These factors are implicitly recognised within the SEPP (Infrastructure), the policy that provides permissibility for the proposal, as being ones that comprise critical infrastructure and public benefit.

The site is ideally placed being adjacent to the Western Sydney Aerotropolis precinct, midway between the population growth sectors of Liverpool and Penrith, within easy access to the Western Sydney Orbital and other mass transit corridors.

The facility incorporates strong environmental controls, as demonstrated within this document, to manage environmental risk and minimise unacceptable potential amenity impacts upon neighbours and the public realm.

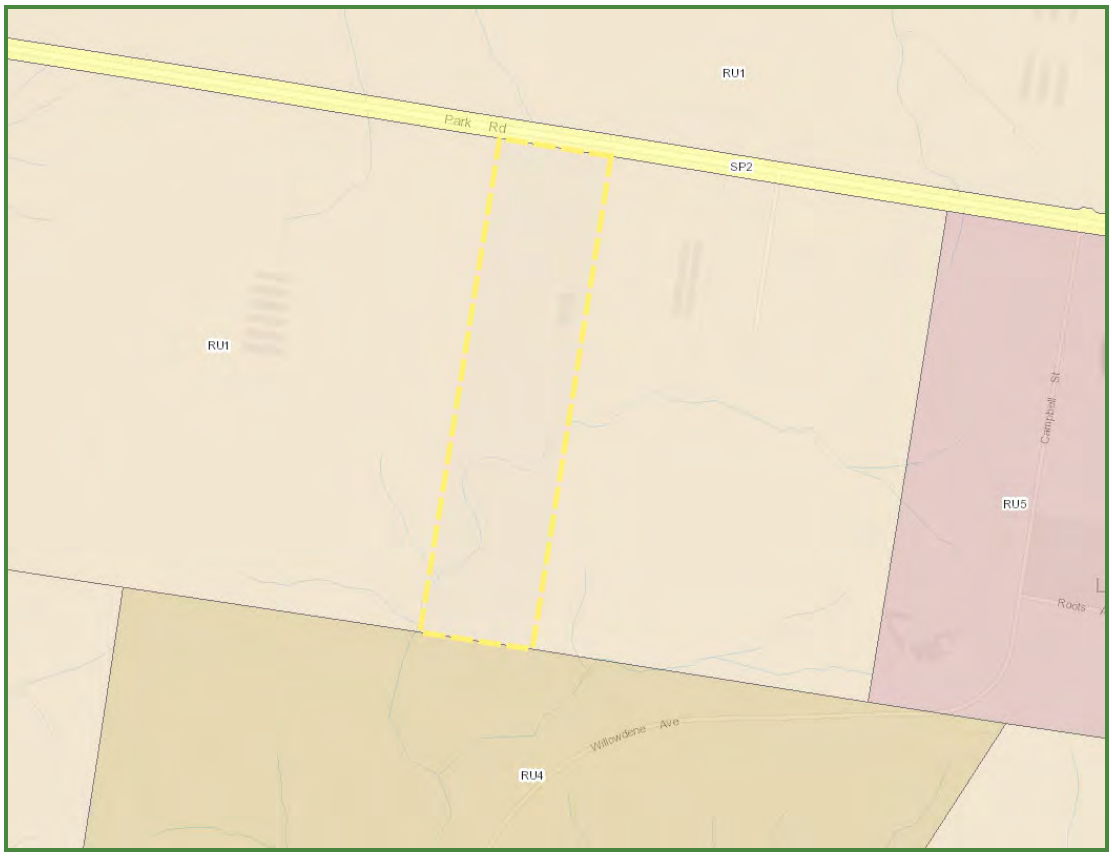
The proposal does not prevent the use of the adjoining land for its current and continuing rural use.

In our view the proposal is not antipathetic to the public interest and entirely consistent with the PLEP 2010 Objectives.

3.3.1.2 Permissibility

Notwithstanding the permissibility of the land for the intended use under the SEPP (Infrastructure), for completeness we note that the subject land is within Zone RU1 – Primary Production. Figure 3-2 is an extract of the Zoning Map with the subject land indicated.

Figure 3-2: Extract of the Zoning Map



Source – NSW Planning Portal March 2020

The Land Use Table for this zone is:

2 Permitted without consent
Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent
Agricultural produce industries; Agriculture; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cellar door premises; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Open cut mining; Roads; Roadside stalls; Rural supplies; Secondary dwellings; Stock and sale yards

4 Prohibited
Any other development not specified in item 2 or 3

Given that the intended use as a 'Resource Recovery Facility' is not a permitted use within the RU1 zone, we rely upon the SEPP (Infrastructure) for permissibility.

3.3.1.3 Zone Objectives

The Objectives for the RU1 – Primary Production zone are:

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To protect and enhance the existing agricultural landscape character of the land.*
- *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*
- *To preserve and improve natural resources through appropriate land management practices.*

As mentioned previously, the proposed development is well-located in close proximity to main population growth centres, performs a public benefit through the recapture and reuse of valuable resources, is well-designed to mitigate potential environmental and amenity impacts and thus provides a public benefit.

Specific measures have been incorporated into the design of the facility and the operational aspects to ameliorate potential impacts upon neighbour amenity and land use conflict, including extensive landscape treatment to provide visual screening of subjective bulk and scale of the building and hardstand areas.

The facility is constrained to the northern section of the land thereby preserving the western and southern sections, which contains remnant natural vegetation along the riparian corridor to be protected and with the opportunity for further ecological improvements to this area to enhance biodiversity.

The development would not constrain the use of adjoining land for any agricultural purpose that is consistent with the RU1 zoning.

The development does not significantly increase demand for public services or facilities and is well within the capacity of the local road network.

The proposal is considered to be generally consistent and not in obvious conflict with the zone Objects of the PLEP 2010.

3.3.1.4 General LEP Requirements

The provisions of the Penrith LEP 2010 are assessed in Table 3-4 and Table 3-5.

Table 3-4: Penrith Local Environmental Plan 2010 – Parts 4 and 5

Clause	Comments	Compliance
4.1 Minimum subdivision lot size	The proposed development does not involve the subdivision of land.	No application
4.2 Rural subdivision	The proposed development does not involve the subdivision of rural land.	No application
4.3 Height of buildings	The land is not included on an LEP map with a Building Height Control. The DCP Controls apply.	No application
4.4 Floor space ratio	The land is not included on an LEP map with a Floor Space Ratio Control.	No application
4.5 Calculation of floor space ratio and site area	The land is not included on an LEP map with a Floor Space Ratio Control.	No application
4.6 Exceptions to development standards	No variation of development standards is required.	No application
5.1 Relevant acquisition authority	No part of the land is required to be acquired for a public purpose.	No application
5.2 Classification and reclassification of public land	No part of the subject land is public land.	No application
5.3 Development near zone boundaries	The site is not located near zone boundaries.	No application
5.4 Controls relating to miscellaneous permissible uses	The proposed development is not of a type provided for in the sub clause.	No application
5.5 Repealed	Repealed	Repealed
5.6 Architectural roof features	The proposal does not include an architectural roof feature. See elevation plans.	No application
5.7 Development below mean high water mark	Not applicable	Not applicable
5.8 Conversion of fire alarms	Not applicable	Not applicable.
5.9 Repealed	Repealed	Repealed
5.10 Heritage conservation	The subject land does not contain a heritage item nor is the immediate land within the vicinity of land containing such an item.	No application
5.11 Bush fire hazard reduction	There is no intent to clear vegetation for the purposes of bush fire hazard reduction.	No application
5.12 Infrastructure development and use of existing buildings of the Crown	Building is not a building of the Crown.	No application
5.13 Eco-tourist facilities	The application does not involve ecotourist facilities.	No application
5.14 Siding Spring Observatory – maintaining dark sky	Clause not adopted	Clause not adopted

Table 3-4: Penrith Local Environmental Plan 2010 – Parts 4 and 5

Clause	Comments	Compliance
5.15 Defence communications facility	Clause not adopted	Clause not adopted
5.16 Subdivision of, or dwellings on, land in certain rural, residential or environment protection zones	Not applicable	Not applicable
5.17 Artificial waterbodies in environmentally sensitive areas in areas of operation of irrigation corporations	Not applicable	Not applicable
5.18 Intensive livestock agriculture	The application does not involve livestock agriculture	No application
5.19 Pond-based, tank-based and oyster aquaculture	The application does not involve aquaculture	No application

Other Provisions within Part 6 'Urban Release Areas' of the LEP are not relevant.

The following table provides Part 7 'Additional local provisions' that are applicable to the proposed development:

Table 3-5: Penrith Local Environmental Plan 2010 - Part 7

Clause	Comments	Compliance
7.1 Earthworks	Minor earthworks required to construct the buildings and hardstand areas are identified within the architectural and civil engineering plans that accompany the application. There is no significant change of levels, cut and fill, retaining walls or excessive batters required to bench the shed's ground floor slab and associated hardstand areas at close to the natural (existing) ground levels.	Satisfactory
7.2 Flood planning	The land is affected by local overland flood hazard. This matter has been addressed within the Water Cycle Management Report (appendix 5) and concept stormwater design – refer to Section 8.3.2.6 for discussion	Satisfactory

Table 3-5: Penrith Local Environmental Plan 2010 - Part 7

Clause	Comments	Compliance
7.3 Development on natural resources sensitive land	The land is not identified on the 'Natural Resources Sensitivity' land map. The rear (south) site boundary appears to abut 'Environmentally Significant Land' mapped as part of Liverpool LEP 2008 (sheet ESL-001). The proposed development does not materially impact upon this land and has been addressed within the ecologist's BDAR report.	Satisfactory
7.4 Sustainable development	The proposal pays due regard to the principles of sustainability as demonstrated in the EIS.	Satisfactory
7.5 Protection of scenic character and landscape values	The land is identified on the Scenic and Landscape Values land map. The visual impact of the development from major roads and other public places has been addressed by screening vegetation to the property boundaries. Visual Impact has been addressed in Section 9.2.	Satisfactory
7.6 Salinity	The land is not identified as being prone to high soil salinity.	No application
7.7 Servicing	The development has appropriate access to services and utilities to function as intended.	Satisfactory
7.8 Active street frontages	The land is not identified on the Active Street Frontages land map.	No application
7.9 Development of land in the flight paths of the site reserved for the proposed Second Sydney Airport	The land is outside of the affected area	No application
7.10 Dual occupancies and secondary dwellings in certain rural and environmental zones	The development does not have a residential component	No application
7.11 Penrith Health and Education Precinct	Not applicable	Not applicable
7.12 Maximum gross floor area of commercial premises	The land is not located within the nominated local commercial centres.	No application
7.13 Exhibition homes limited to 2 years	The development is not for exhibition homes.	No application
7.14 Cherrywood Village	Not applicable	Not applicable
7.15 Claremont Meadows	Not applicable	Not applicable
7.16 Glenmore Park Stage 2	Not applicable	Not applicable

Table 3-5: Penrith Local Environmental Plan 2010 - Part 7

Clause	Comments	Compliance
7.17 Dwelling houses on certain land in Castlereagh, Cranebrook, Llandilo, Londonderry, Kemps Creek and Mulgoa	Not applicable	Not applicable
7.18 Mulgoa Valley	Not applicable	Not applicable
7.19 Villages of Mulgoa and Wallacia	The land is not identified on the Clause Application land map.	No application
7.20 Orchard Hills	Not applicable	Not applicable
7.21 Twin Creeks	Not applicable	Not applicable
7.22 Waterside	Not applicable	Not applicable
7.23 Location of sex services premises and restricted premises	The development is not for sex service or restricted premises	No application
7.24 Sydney Science Park	Not applicable	Not applicable
7.25 Warehouses and distribution centres on land zoned B7 Business Park	The development is not land zoned B7	No application
7.26 Serviced apartments	The development is not for serviced apartments	No application

Other Provisions within Part 8 'Local provisions – Penrith City Centre' and Part 9 'Penrith Panthers site' of the LEP are not relevant.

3.3.2 Penrith Development Control Plan 2010

The provisions of the Penrith DCP 2010 are assessed in Table 3-6.

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
C1 – Site Planning and Design Principles	
1.1 Site Planning	The site design and facility location within the site has been informed by the proximity to the adjoining rural residential development to ensure minimal impacts upon private amenity
1.1.1. Site Analysis	Applies: A site analysis plan is included with the architectural plans.
1.1.2. Key Areas with Scenic and Landscape Values	Applies: Visual impact is assessed in Section 9.2 of the EIS.
1.2 Design Principles	Discussed below
1.2.1. Application of Certification System	Applies: certification to 4.5 stars under the National Australian Built Environment Rating System (NABERS) is provided.
1.2.2. Built Form - Energy Efficiency and Conservation	Applies: the building has been designed by an experienced architectural consultant to pay due regard to the principles of passive solar and thermal design within the normal limitations of site topography and lot orientation.
1.2.3. Building Form - Height, Bulk and Scale	These general principles are discussed elsewhere in detail.
1.2.4. Responding to the Site's Topography and Landform	Applies: the building is not located on a prominent ridgeline with minimal cut and fill of the landform required to bench the ground floor slab.
1.2.5. Safety and Security (Principles of Crime Prevention through Environmental Design)	No application
1.2.6 Maximising Access and Adaptability	Applies: The relevant matters have been considered by the project architect and shown on the architectural plans.
C2 – Vegetation Management	
2.1. Preservation of Trees and Vegetation	Addressed in the BDAR.
2.2. Biodiversity Corridors and Areas of Remnant Indigenous Vegetation in Non-Urban Areas	Addressed in the BDAR and site plans.
2.3. Bushfire Management	Addressed in the Bushfire Assessment Report
C3 - Water Management	
3.1. The Water Cycle/Water Conservation	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.2. Catchment Management and Water Quality	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.3. Watercourses, Wetlands and Riparian Corridors	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.4. Groundwater	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
3.5. Flood Planning	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.6. Stormwater Management and Drainage	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.7. Water Retention Basins/Dams	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
3.8. Rainwater / Storage Tanks	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
SEPP (Infrastructure) 2007	Applies: Discussed elsewhere (See Section 3.2.5.7)
C4 – Land Management	
4.1. Site Stability and Earthworks	Addressed in Geotechnical Investigation, Preliminary Acid Sulfate Soils Assessment, Salinity Assessment & Wastewater Assessment. There are no geotechnical issues identified that would constrain the proposed development.
4.2. Landfill	Applicable – Some cut and fill will be required: All fill (if required) will be VENM, there is no fill near native vegetation. No excavations will be with zones of influence of any other building. No structures are proposed within easements.
4.3. Erosion and Sedimentation	An Erosion and Sedimentation Control Plan (ESCP) is included with the Application
4.4. Contaminated Lands	Section 8 assesses the potential for the proposed activity to contaminate land, sources of contamination and details mitigation measures to be implemented to prevent contamination.
4.5. Salinity	Addressed in Geotechnical Investigation
C5 – Waste Management	
5.1. Waste Management Plans	Addressed in Waste Section. A Waste Management Plan is provided as Appendix 3.
5.5. On-Site Sewage Management	Addressed in the Wastewater Management: Site & Soil Evaluation & Disposal System Design (Appendix 4)
C6 – Landscape Design	
6.1 Controls	Applies: a 'Category 3' Landscape Plan has been provided
C7 – Culture and Heritage	
7.1. European Heritage	No application: The site does not contain a Schedule 5 listed item, does not adjoin nor is in the immediate vicinity of such an item nor is it within a Conservation Zone
7.2. Aboriginal Culture and Heritage	Applies: a due diligence assessment of likely Aboriginal culture and Heritage has been undertaken.

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
7.3. Significant Trees and Gardens	No application.
C8 – Public Domain	
General Controls	No application: there are no works proposed in the Public Domain
C9 – Advertising and Signage	
9.1. General Requirements for Signs	Signage will comply with the Rural Zone requirements of the DCP.
9.2. Signs in the Vicinity of Heritage Items	Not applicable
9.3 Residential, Rural and Environmental Zones (E3 and E4)	Signage will comply with the Rural Zone requirements of the DCP.
9.4. Commercial, Mixed Use and Industrial Zones	Not applicable
9.5. Open Space Zones (Public and Private Recreation)	Not applicable
9.6. Special Event Advertising	Not applicable
C10 – Transport, Access and Parking	
10.1. Transport and Land Use	Carparking and access is addressed in Section 5.5.5 and 9.4.
C11 – Subdivision	
11.1. General Subdivision Requirements	Not applicable
C12 – Noise and Vibration	
12.1. Road Traffic Noise	Road traffic noise is addressed in the Noise Impact Assessment in Appendix 6
12.2. Rail Traffic Noise and Vibration	Not applicable
12.3. Aircraft Noise	The site is not affected by Aircraft noise
12.4. Industrial and Commercial Development	Not applicable – refer to the Rural Development criteria
12.5. Rural Development	Operational noise is addressed in the Noise Impact Assessment in Appendix 6
12.6. Open Air Entertainment	Not applicable
12.7. Vibration and Blasting	Vibration is addressed in the Noise Impact Assessment in Appendix 6. There is no blasting.
C13 – Infrastructure and Services	
13.1. Location of Easements for Infrastructure	Not applicable
13.2. Utilities and Service Provision	The land is fully serviced with the exception of sewer. Refer to 13.3 below.
13.3. On Site Sewage Management	An on-site sewer management system is proposed. Refer to the Wastewater Management: Site & Soil Evaluation & Disposal System Design (Appendix 4).

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
13.4. Engineering Works and Construction Standards	To be addressed with the Construction Certificate stage
13.5. Development Adjacent to the Sydney Catchment Authority Controlled Areas – the Warragamba Pipelines	Not applicable. The land does not adjoin a Warragamba pipeline or other Authority water asset.
D1 – Rural Land Uses	
1.1 Rural Character	Applies: Visual impact is assessed in Section 9.2 and landscaping treatment including boundary screen planting for visual amelioration
1.2 Rural Dwellings and Outbuildings	Not applicable
1.3 Farm Buildings	The proposal is for an industrial building in a rural zone, thus takes the form of a 'rural shed' ie a type of 'farm building'. The relevant criteria are addressed below.
1.3.1. Siting and Orientation C. Controls 1) Farm buildings and outbuildings should be clustered in one location on properties. Where possible, this should be close to dwellings, but not where this will result in land use conflict.	The proposed building and activity area is located adjoining the eastern boundary. The dwelling upon the site is to be converted to a site office.
2) Farm buildings should have complementary colours and finishes to the dwelling house and surrounding environment.	Standard Colorbond colours are specified for wall cladding and roof. Refer to the Materials and Finishes Schedule on Sheet A08 of the architectural set for details
3) Farm buildings should not be erected on land having a slope in excess of 15%. Cut and fill for farm buildings should be limited to 1 m of cut and 1 m of fill as shown in Figure D1.11.	The site is relatively level with a minor change of levels across the building envelope. Minimal cut and fill n.e. 1.0 m is proposed to bench the shed's ground floor slab at close to natural ground level.

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
4) Farm buildings should be sited on the land so any disturbance to native vegetation is minimal.	The building is located clear of the remnant native vegetation in accordance with the recommendations of the ecologist as contained in the BDAR.
5) The narrowest elevation of farm buildings should face the road.	Complies. The end of the building faces the street.
6) Farm buildings shall be set back a minimum of 40 m from any watercourse.	Addressed in the Stormwater Water Management Plan and Water Cycle Management Report
7) Farm buildings should be setback behind the building line of the existing dwelling house on the property.	Complies. The existing house is to be retained and converted to office accommodation.
8) Farm buildings should be a minimum distance of 10 m from a dwelling located on the same allotment as the farm building.	Not applicable. The existing house is to be retained and converted to office accommodation.
9) Farm buildings should be a minimum distance of 20 m from a dwelling located on an adjacent allotment to the farm building.	Complies. The building is located >20 m from the adjoining neighbours' dwellings at 364 Park Road to the east, and 324 Park Road to the west respectively.
10) Landscape buffers should be provided, where possible, between farm buildings and nearby dwellings to minimise the visual impact of the farm building.	Landscaped buffers are provided. Refer to the Landscape Concept Plan for details.
11) Farm buildings should be a minimum distance of 5 m from the side boundaries.	Complies. The setback to the eastern boundary is 20.0 m

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
1.3.2. Floor Space, Height and Design C. Controls 1) For allotments 3 hectares in size or less, the maximum accumulative building footprint of all farm buildings on an allotment shall not exceed 200 m² (see Figure D1.13).	Not applicable.
2) For allotments between 3 hectares and 10 hectares in size, the maximum accumulative building footprint of all farm buildings on an allotment shall not exceed 400 m². Note: 'Accumulative building footprint' means the total sum of the ground floor area of all of the farm buildings on a single property. (The floor area under an awning may also be included as part of the accumulative building footprint, depending on the circumstances).	Not applicable.
3) For allotments more than 10 hectares in size, the maximum accumulative building footprint of all farm buildings on an allotment shall not exceed 600 m².	The site area is approximately 20 Ha. The building footprint exceeds 600 m² however the proposal is not for a 'farm building' but a building to facilitate a resource recovery activity, thus the SEPP (Infrastructure) takes precedence. There is no building footprint control in that document.
4) Intensive agricultural uses may require larger accumulated building footprints than those specified above. Variation will be considered but must be justified in the application.	Not applicable.

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
5) A farm building should not be more than 8 m high.	The building height exceeds 8 m (11.361 m) however the proposal is not for a 'farm building' but a building to facilitate a resource recovery activity, thus the SEPP (Infrastructure) takes precedence. There is no building height control in that document. The building height is the minimum necessary required to accommodate the specialised plant and equipment for resource recovery and processing.
6) The maximum external wall height of a farm building shall be 5m. External wall height means the distance from the natural ground level to the underside of the eaves.	Refer to the above discussion
7) Where a farm building is higher than the dwelling on the land, the building must be located behind the dwelling and screened from view by vegetation (or similar).	Not applicable.
8) The design of farm buildings should comprise traditional roof shapes to provide visual relief to the building, reduce the buildings dominance over its setting and to provide interest and character to the locality.	The building has a standard low-profile roof of 5 deg pitch with gable ends.
9) Farm buildings should have a maximum external wall length of 15 m between distinct corners or significant features such as awnings.	Refer to above discussion. The building is purpose designed for the proposed resource recovery activity.
10) Farm buildings shall have a minimum roof pitch of 15° and a maximum roof pitch of 25°.	Refer to above discussion. The building is purpose designed for the proposed resource recovery activity.

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
11) All elevations of farm buildings that face the street are to present a suitable level of detailing to minimize their visual bulk. Features which can be used include windows, awnings and verandahs.	Refer to above discussion. The building is purpose designed for the proposed resource recovery activity.
1.3.3 Materials and Colours C. Controls 1) The colour of farm buildings shall complement the colours of the natural vegetation and background of the property, such as grey, brown, beige and green.	Complies. Standard green and brown Colorbond materials is proposed. Refer to the Materials and Finishes Schedule on Sheet A08 of the architectural set for details
2) Farm buildings shall be constructed of non-reflective materials. Where traditional materials, such as unpainted corrugated iron, are used, the building must be screened by landscaping to minimise its visual impact.	Complies. Non-reflective Colorbond material is proposed. Refer to the Materials and Finishes Schedule on Sheet A08 of the architectural set for details
3) The construction of farm buildings should utilise a range of materials to aid in the articulation of the building form.	Refer to above discussion. The building is purpose designed for the proposed resource recovery activity.
4) Where farm buildings are below the 1:100 ARI flood level, they are to be constructed of materials that can withstand flooding.	Not applicable
1.4. Agricultural Development	Not applicable

Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
1.5 Non-Agricultural Development	
1.5.1 Rural Amenity and Design C. Controls 1) Rural Amenity a) Non-agricultural developments must demonstrate the following:	
i) There will not be significant visual impacts from either the main activity or associated activities on the rural area or adjacent properties; and	The primary resource recovery activity is entirely enclosed within the building. Truck movements and the hardstand manoeuvring area are screened from the eastern and northern (road) boundaries by existing and new screen planting. There is substantial spatial separation to the western neighbour with existing vegetation along this boundary.
ii) The development will achieve the noise control standards established by the NSW Office of Environment and Heritage or relevant authority.	Refer to the Noise Impact Assessment
2) Design	
a) Structures associated with any use shall be designed with regard to the rural character of the area and the form and scale of buildings on rural land surrounding the site.	The proposed building takes the form of a large rural shed with low roof profile and standard Colorbond wall and roof cladding. Although by necessity of a large size necessary to facilitate the proposed resource recovery activity, the scale and configuration is not dissimilar to other rural buildings that accommodate agricultural businesses.
b) Bulky buildings of industrial character are not favoured.	Refer to above discussion. The building is purpose designed for the proposed resource recovery activity.
c) Structures on sites adjoining the villages should relate to the character of the village.	Not applicable

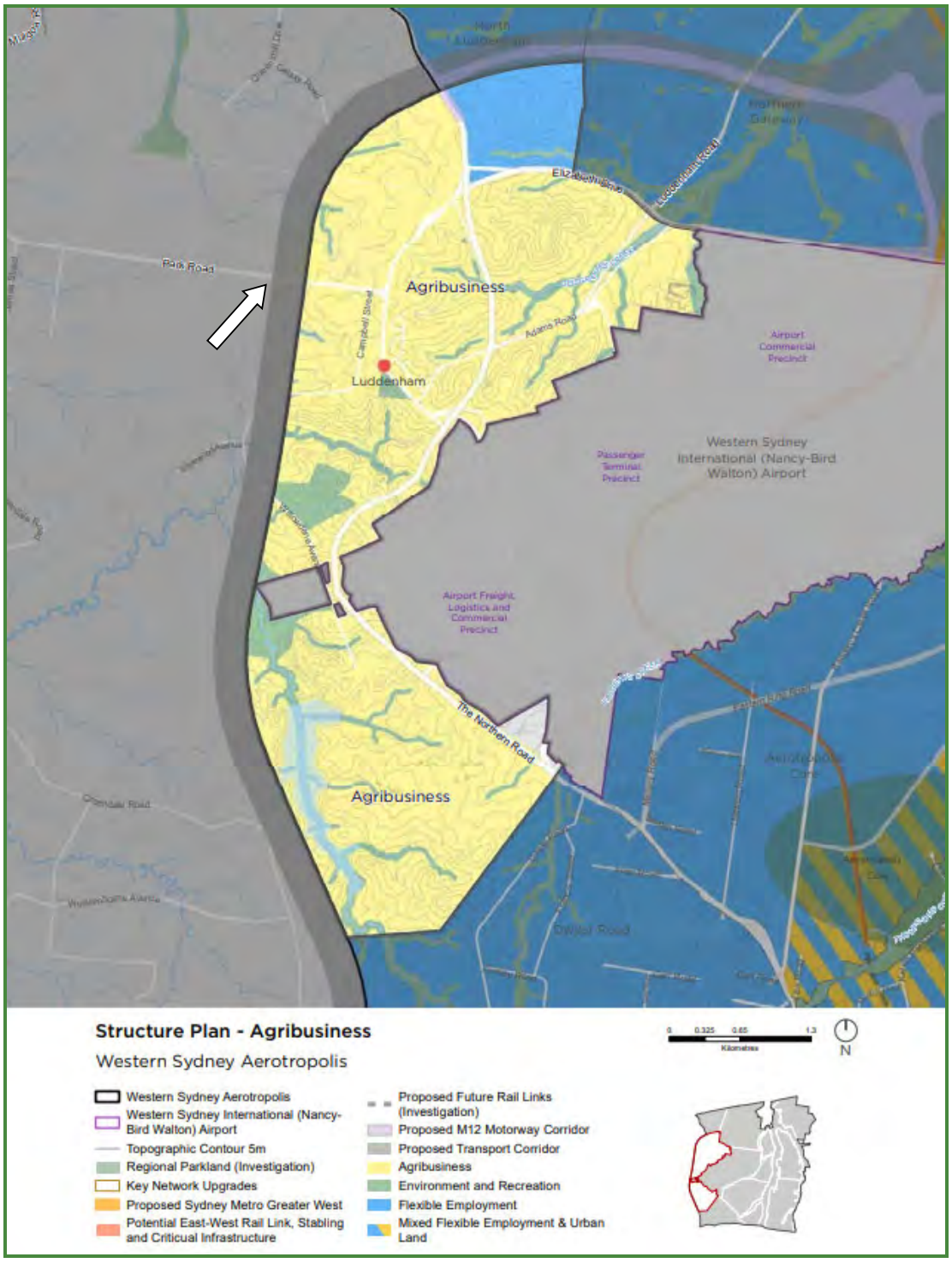
Table 3-6: Comments on Penrith DCP 2010

DCP Requirements	Comments
d) Buildings used for non-agricultural purposes also need to comply with the controls in Section 1.3 'Farm Buildings', unless specifically stated.	Refer to previous discussion at 1.3
D4 – Industrial Development	
A. Background	Not applicable. This section provides controls and objectives for all industrial land in the City of Penrith. As the site is located within a Rural location section D1 prevails.

3.4 DRAFT WESTERN SYDNEY AEROTROPOLIS PLAN (WSAP)

The *Western Sydney Aerotropolis Plan* sets the planning framework for the Western Sydney Aerotropolis and was issued as a 'draft - for Public Comment' document in December 2019. Section 7 of the plan discusses precinct planning, including the 'Agribusiness Zone' at section 7.3.6. From the map shown below, the subject site lies outside of the 'Agribusiness Zone' and is thus not captured by this draft policy document.

Figure 3-3: Agribusiness Zone Map (Western Sydney Aerotropolis Plan)



It should be noted however that the subject site lies immediately adjacent to the proposed Transport Corridor (marked grey on the Structure Plan map), making the site ideally suited to the proposed activity due to its proximity to future major transport infrastructure.

3.5 Draft Western Sydney Aerotropolis Development Control Plan 2019 (Phase 1 DCP)

This Phase 1 DCP applies to the initial precincts as identified in the Aerotropolis SEPP and WSAP. As the site lies outside of the identified precincts, the Draft DCP does not apply to the subject site.

3.6 Western Sydney Aerotropolis Discussion Paper on the Proposed State Environmental Planning Policy – Draft for Public Comment

The proposed SEPP will provide the primary development controls for the Aerotropolis, zoning land for urban, environmental, recreational and infrastructure purposes, establishing appropriate development controls, permitting compatible land uses next to an airport, and requiring the protection of native vegetation and natural areas.

The proposed SEPP will apply to the area of land shown on the draft Land Application Map.

Figure 3-4: Draft Land Application Map (Site location indicated by arrow)

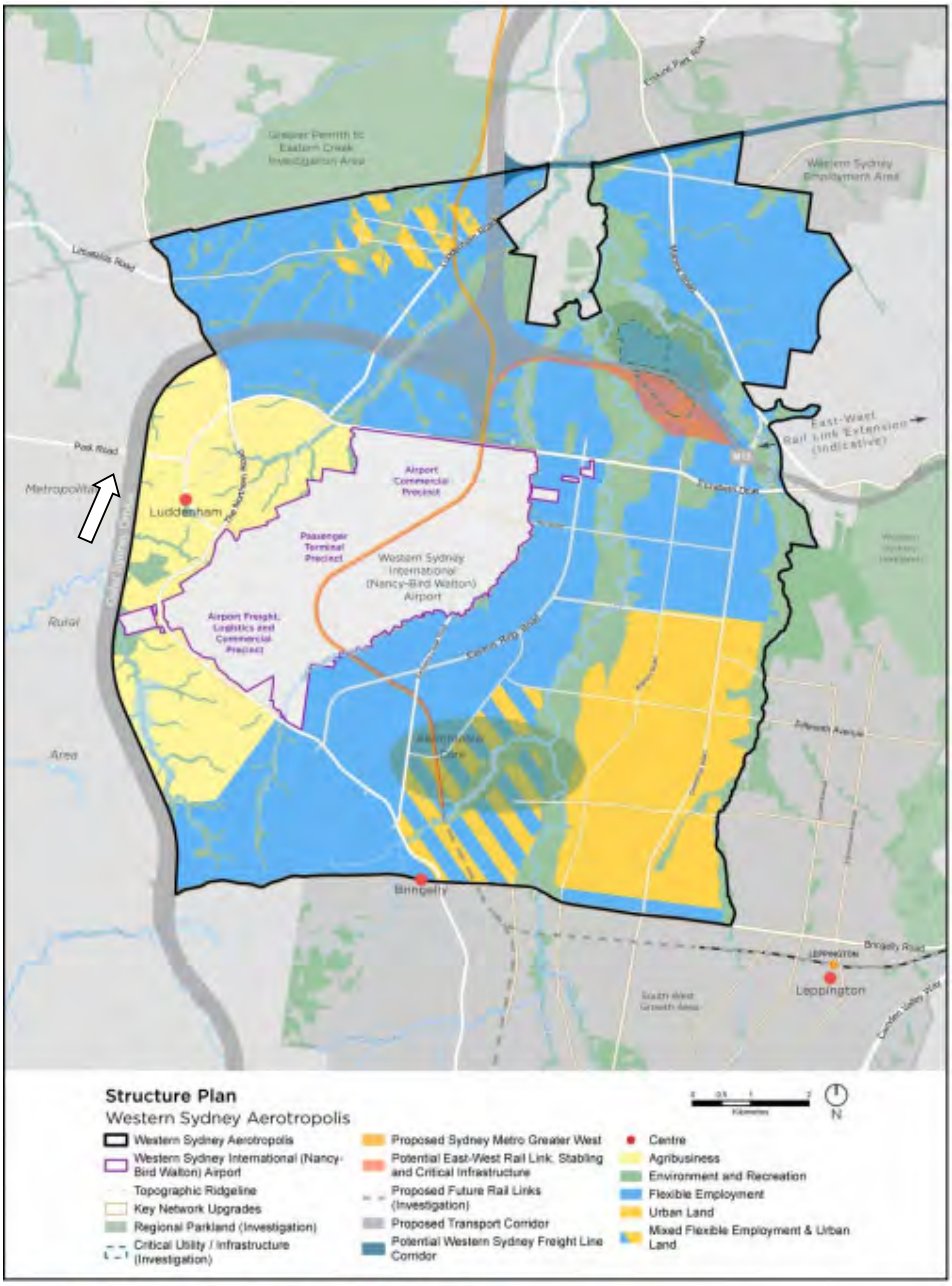


Figure 1 Western Sydney Aerotropolis Structure Plan

Again, as the site lies outside of the precinct the Draft SEPP has no direct application for the proposal, except for reinforcing the site's proximity to the activity precinct and major transport corridor.

4. CONSULTATION

Consultation with government departments and key stakeholders plays an important role in ensuring that all potential environmental impacts are evaluated and the most important issues are prioritised. The following sections provide details on consultation and stakeholder engagement, such as that with regulators and government bodies. Key aspects and assessment requirements identified through the consultation process are also summarised in the following sections, together with the reference to where these aspects and requirements have been addressed in the report.

4.1 STAKEHOLDER ENGAGEMENT

Liaison with relevant government authorities regarding the proposed development and requirements of the EIS has been ongoing since the inception of the project. Consultation has been undertaken on a formal basis. Detailed below are the regulatory stakeholders that have been consulted as part of this development application.

- Department of Planning, Industry and Environment
  A request for the Secretary's Environmental Assessment Requirements (SEARs) and related Scoping Report (dated March 2018) was sent to the Planning Services Division. The SEARs (document reference 1227) were provided on 5 June 2018 with requirements attached (Attachment 1). The Department has included input from NSW Environment Protection Authority (EPA) and Rural Fire Service (RFS). Roads and Maritime Services (RMS) – now known as Transport for NSW, Office of Environment and Heritage (OEH) and WaterNSW were not able to respond in time.

- NSW Environment Protection Authority (EPA)
  Key issues and assessment requirements from the NSW EPA were included in the SEARs.

- Rural Fire Service (RFS)
  Key issues and assessment requirements from the RFS were included in the SEARs.

- Transport for NSW – former Roads and Maritime Services (RMS)
  Key issues were provided via separate consultation with Transport for NSW and are included in Attachment 1 following the SEARs. A letter requesting requirements was sent on 2 March 2020 and specifically noted the location of the site to be adjacent to the outer Sydney orbital and provided an updated concept plan and description of the proposal. It is noted that requirements from Transport for NSW did not include issues related to the outer Sydney orbital or future M9.

- Environment, Energy and Science Group (EES) – former Office of Environment and Heritage (OEH)
  The Environment, Energy and Science Group (EES) was consulted and advised via email that *at this stage of the process has no comment.*

- WaterNSW
  A letter was emailed to the WaterNSW Customer.Helpdesk@waternsw.com.au on 2 March 2020 requesting requirements to be addressed in the EIS. WaterNSW responded via email on 5 March 2020 with the following advice:

There are no WaterNSW assets or land located within close proximity to the subject site, however your request has been forwarded to the Water Regulation Team within WaterNSW to assess any requirements relating to water licensing.

At the time of writing, no response had been received from the Water Regulation Team.

- Penrith City Council
  A pre-lodgement meeting was held on 14 November 2017. The pre-lodgement minutes are provided in Attachment 3. The permissibility of the development was considered under both the definition for extractive industries and resource recovery facility. Going forwards, the proposed development will address permissibility as under resource recovery facility alone as this most accurately categorises the development. Feedback from relevant authorities resulted in changes to the proposal including the decision to establish a purpose-built building to enclose the operations. An additional meeting was arranged for 7 April 2020 to discuss the new concept plan and design of the facility but this had to be cancelled due to the COVID-19 restrictions. Instead, Council provided written advice on 20 April 2020, also provided in Attachment 3.

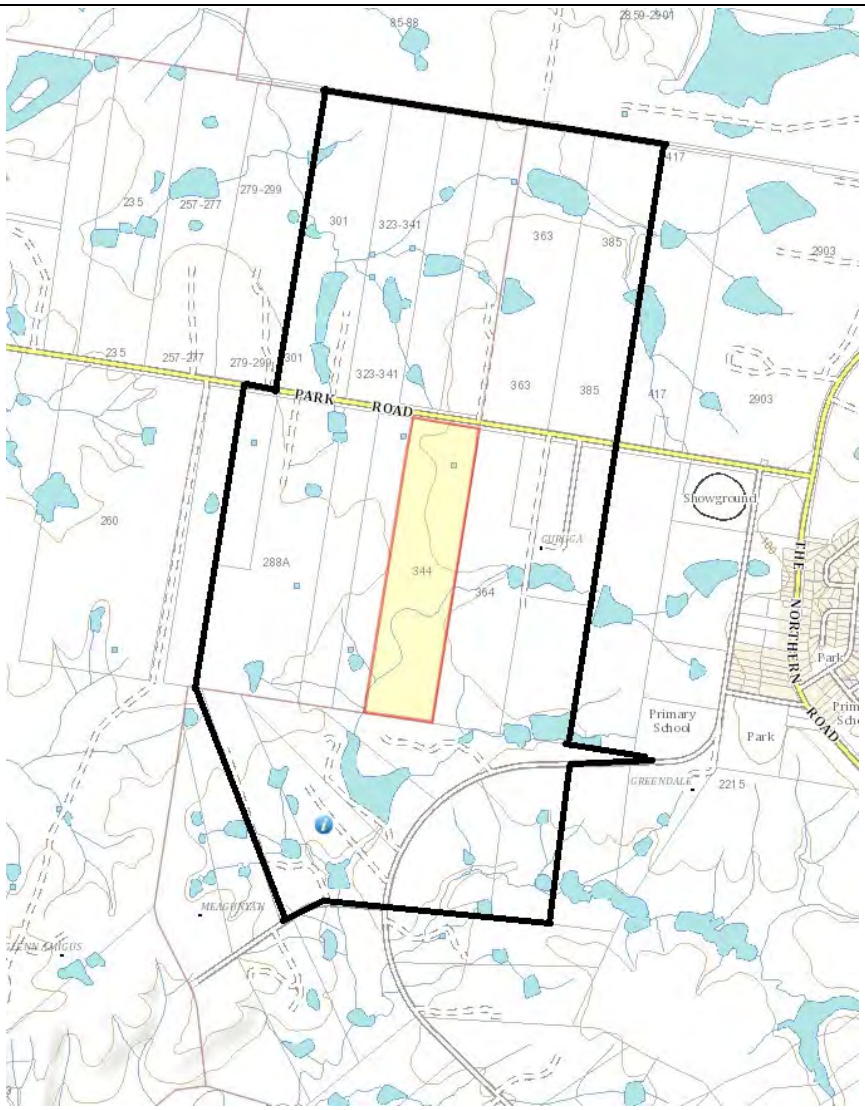
4.2 COMMUNITY CONSULTATION

A community consultation leaflet (Attachment 5) was prepared and sent to the following surrounding landowners and occupiers shown in Table 4-1 and via post on Wednesday 1 April 2020:

Table 4-1: Distribution of community leaflet

Address	Direction from Subject Site
353-361 Park Road, Wallacia (N)	N
343-351 Park Road, Wallacia (N)	N
334 Park Road, Wallacia (W)	W
364 Park Road, Luddenham (E)	E
45 Willowdene Ave, Luddenham (S)	S
363 Park Road, Luddenham (NE)	NE
386 Park Road, Luddenham	E
384 Park Road, Luddenham	E
385 Park Road, Luddenham	NE
323-341 Park Road, Wallacia	NW
301 Park Road, Wallacia	NW
332 Park Road, Wallacia	W
288A Park Road, Wallacia	W
290-298 Park Road, Wallacia	W
115 Willowdane Ave, Luddenham	S
80 Willowdane Ave, Luddenham	S
120 Willowdane Ave, Luddenham	S
135 Willowdane Ave, Luddenham	S
25 Silverwood Ave, Luddenham	S

Figure 4-1: Map showing distribution of community leaflet



Source: Six maps

↑N Not to scale	LEGEND: Leaflet distribution area: Subject Site:	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

No face to face community consultation was undertaken due to COVID-19. Four phone calls were received from residents as a result of the mail out. Brief discussions were undertaken to answer any questions to the satisfaction of the callers. The main concerns raised included noise, dust, visual appearance, overland flooding and an industrial development being within a rural area. The following summaries concerns:

Resident 1: Immediately east of the site

- Noise – from 24/7 operations;
- Noise – The area is so quiet at night that the retired lions at the bullens circus 1 km west, and the traffic at the roundabout on Elizabeth Drive and The Northern Road can be heard.

Resident 2: Immediately south east of the site

- Visual – Expressed concern regarding the visual appearance of the proposed development and whether any bushland would be removed;
- Noise – Concerns regarding activities at night. Asked if there would be any trucks at night.
- Overland flooding – How is the overland water path being dealt with?

Resident 3: Further east of the site

- Noise – Concerned about 24/7 operations;
- Noise – Concerned about activities being undertaken outside of the building will be heard;
- Noise – Concerned about sleep disturbance.
- Rural Locality – Concerned an industrial development should not be allowed in a rural area. There is a group of residents who would like to do things on their properties but they are not allowed because it is rural. The proponent should find an industrial area to put the development on. They are not opposed to this type of development but don't want it in the rural area.

Resident 3 advised that a group of residents would oppose the development.

Resident 4: Farm to the east of the site

- Visual – "It will be an eyesore";
- Noise & Dust – It will have noise and dust impacts on farming activities that could be sensitive to these impacts;
- Noise/Locality – Concerned about 24/7 operations in a rural area.
- Noise – Concerned that the increased truck movements will impact on the farming business.

During phone calls, resident's questions were answered and concerns listened to. It was recommended that any concerns should be expressed to Council during the exhibition period.

4.3 ASSESSMENT REQUIREMENTS

The Secretary's Environmental Assessment Requirements (SEARs) obtained for the proposed development include key issues and requirements identified by the DPI&E, the EPA, Transport for NSW and RFS, which have been provided in the following tables (Table 4-2, Table 4-3, Table 4-4 and Table 4-5, respectively). A copy of the SEARs is also provided in Attachment 1.

Table 4-2: DPI&E Assessment Requirements and EIS Reference

Environmental Assessment Requirements – Key Issues	EIS Reference	
	Section	Page No
Strategic context		
A detailed justification for the proposal and suitability of the site for the development.	1.4	1-3
A demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies.	3	3-1
A list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out;	14	14-1

Table 4-2: DPI&E Assessment Requirements and EIS Reference

Environmental Assessment Requirements – Key Issues	EIS Reference	
	Section	Page No
Suitability of the site		
A detailed justification that the site can accommodate the proposed processing capacity, having regard to the scope of the operations and its environmental impacts and relevant mitigation measures; and Floor plans depicting the proposed internal layout including the location of machinery and equipment.	8 Appendix 1	8-1 Appendix 1
Traffic and transport		
Details of road transport routes and access to the site; Details of car parking required on site; Road traffic predictions for the development during construction and operation; and An assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development.	9.4	9-9
Air quality and odour		
A description of all potential sources of air and odour emissions; An air quality impact assessment in accordance with relevant Environment Protection Authority guidelines; and A description and appraisal of air quality impact mitigation, management and monitoring measures.	8.1	8-1
Noise and vibration		
A description of all potential noise and vibration sources during construction and operation, including road traffic noise; A noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines; and A description and appraisal of noise and vibration mitigation, management and monitoring measures.	8.2	8-2
Biodiversity		
Accurate predictions of any vegetation clearing on site or for any road upgrades; An assessment of the proposal in accordance with the *Biodiversity Assessment Method* (BAM) including an assessment of any potential impacts on aquatic and riparian vegetation and groundwater dependent ecosystems;	8.4	8-20
Hazards and risk		
A preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011). with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Leve/ Risk Assessment* (DoP, 2011); and	8.6	8-29
An assessment of the risk of bushfire, including addressing the requirements of *Planning for Bush Fire Protection 2006* (RFS). Any proposed Asset Protection Zones must not adversely affect environmental objectives (e.g. buffers). Provision is to be made for their appropriate management into the future.	8.6.3.3	8-38

Table 4-2: DPI&E Assessment Requirements and EIS Reference

Environmental Assessment Requirements – Key Issues	EIS Reference	
	Section	Page No
Waste management		
Details of the type, quantity and classification of waste to be received at the site; Details of the resource outputs and any additional processes for residual waste; Details of waste handling including, transport, identification, receipt, stockpiling and quality control; Details of the machinery and waste processing to be used; and The measures that would be implemented to ensure that the proposed development is consistent with the aims. objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21.*	8.5	8-21
Fire and incident management		
An assessment of bushfire risk and asset protection zones (APZ) in accordance with the NSW Rural Fire Service guidelines; Identification of any aggregate quantities of combustible waste products to be stockpiled at any one time; Identification of foreseeable on-site and off-site fire events and other emergency incidents; and Technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill cleanup equipment and fire (including management of fire water, location of fire hydrants and water flow rates at the hydrant) management and containment measures.	8.6.3	8-33
Soil and Water		
A description of local soils, topography, drainage and landscapes; Details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*; An assessment of potential impacts on floodplain and stormwater management and any impact to flooding in the catchment Details of sediment and erosion controls A detailed site water balance An assessment of potential impacts on the quality and quantity of surface and groundwater resources	8.3	8-8
Details of the proposed stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts Characterisation of the nature and extent of any contamination on the site and surrounding area; and A description and appraisal of impact mitigation, management and monitoring measures.	8.3.2	8-12
Heritage		
Including Aboriginal and non-Aboriginal cultural heritage.	6.3	6-11
Visual		
Including an impact assessment at private receptors and public vantage points.	9.2	9-3

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Key Information Requirements		
1. The facility must be enclosed - The EPA requires that all waste and materials are stored and processed inside an enclosed building. All waste handling activities, including receival, sorting, processing, sampling, quarantine, storage and loading must be conducted within an enclosed building. All surfaces inside the enclosed building must be sealed hardstand. No waste, including finished products, may be stored outside. Any external haulage areas or roads must be sealed hardstand. Any unused external surfaces must be sealed hardstand or vegetated. The EPA will not consider the storage of waste (including finished product) outside.	Appendix 1	Appendix 1
2. Waste Management - the environmental impact statement (EIS) must include a detailed assessment of the waste management processes to be undertaken at the Premises. This includes but is not limited to: • details of the sources of waste to be received at the Premises; • details of the types and quantities of each type of waste to be received at the Premises; • details of the maximum volume of waste to be stored on the Premises at any one time; • details of the maximum annual throughput of waste for be processed at the Premises; • a description of waste processing procedures for each waste type; • the PEA indicates that the proposal will trigger the scheduled activities of resource recovery and waste processing. The EPA is unable to issue a licence for both these activities simultaneously. Resource recovery applies to activities which dispose of less than 50% of waste after processing, while waste processing applies to activities that dispose of more than 50% of waste after processing; • a description of how the proponent will meet the EPA's record keeping and reporting requirements, including weighing material in and out of the Premises (refer to the EPA's Waste Levy Guidelines for more information – available at http://www.epa.nsw.gov.au/your-environment/waste/waste-levy; • a detailed site plan(s) identifying areas for: ► haulage; ► waste receival, processing, storage and loading (for each waste type) ► quarantine; ► infrastructure for environmental controls including dust, noise, water and wheelwash; ► weighbridge; ► site boundaries; ► stormwater drainage areas; and ► unused stabilised areas; • details of the type and quantities of materials to be produced and their intended fate; • details of any materials produced under a Resource Recovery Order, and the controls in place for meeting the conditions of that order; and • a description of procedures for dealing with non-conforming waste (i.e. waste not permitted to be received at the Premises).	8.5	8-21

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
It is noted that the Proponent wishes to accept both VENM and building & demolition waste to the Premises. The Proponent is reminded that VENM certificates must be retained for all loads of VENM received at the site. It is noted that the Proponent stated that less than 10% of the waste received at site will be building and demolition waste. The Proponent should be aware that the EPA will formalise this as a condition of an Environment Protection Licence, should it be issued for this proposal.		
3. Waste types – the EPA requires detailed information on the waste types proposed to be received at the Premises. For each waste type the Proponent must detail the physical and chemical content of the waste, the types of pollution which may result from the storage and processing of that waste and mitigation measures for managing any such impacts. The list of waste types to be received at the Premises must be made clear. Please note that the EPA will not consider including the following waste types on the licence: • Excavated Natural Material or other wastes listed under a resource recovery exemption –resource recovery exemptions apply to the application of waste to land. It is not appropriate to list these on an environment protection licence. • General Solid Waste (Non-putrescible) – this classification is too broad. The applicant must specify which types of General Solid Waste it proposes to receive at the Premises.	8.5	8-21
4. Water Management – the EPA expects that assessment of the impacts to water be included in the application. This must include as a minimum characterisation of any proposed discharges from the premises (both volume and quality), assessment of the potential impacts from these discharges and proposed mitigation measures to manage any impacts. Please refer to Attachment A for detail of what is to be included in water impact assessments. Details of stormwater management during both construction and operation must be included in the EIS. The EPA would expect that the building be constructed to exclude all stormwater and that internal surfaces be graded inwards to contain any contaminated water (being any water that has come into contact with waste). The EPA notes that even where all waste storage and processing is conducted within an enclosed building, waste may be tracked on to external surfaces leading to the generation of contaminated water. Any external areas where waste vehicles travel or wait for loading/unloading must drain to a stormwater quality treatment device sufficient to remove any contaminants, both solid and dissolved, prior to discharge offsite.	8.3.2	5-11
5. Wheelwash - Best practice waste management facilities contain a wheelwash to reduce risk of contaminants being tracked out onto public roads. The EPA notes that the Report does not contain reference to a wheelwash for the site. The Proponent should set out in the EIS whether a wheelwash will be installed and if not, justification as to why a wheelwash will not be installed. If the Proponent does not intend to put in a wheelwash, the EPA requires details on how contaminates are to be kept from leaving the Premises.	5.6.3.1	5-11

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
6. Water flow diagram & water balance - The EIS should include details of how surface water flows across the site and locations of any drains or storage tanks for stormwater or waste contaminated water. This will include how much water is required for dust suppression and how adequately the site is set up to hold this quantity of water. Please provide further details about the system, including dust suppression methods, the source of the water and the receptacles for the resulting water from the system. Provide any details of trade waste agreements.	8.3.2	8-12
5. Air Quality – the EIS should include an air quality assessment that identifies all potential air emission from the Premises, including but not limited to coarse particulates, PM10, PM2.5 and odour. The Proponent must assess the impact of these discharges and demonstrate effective control of all identified air emissions from the Premises. Please refer to Attachment A for detail of what is to be included in the air quality impact assessment**.**	8.1	8-1
6. Noise - the proponent must assess noise impacts and demonstrate effective controls to manage noise impacts, including from traffic, at all receptors. Please refer to Attachment A for detail of what is to be included in the noise impact assessment.	8.2	8-2
7. Fit and proper person – in accordance with section 45 of the POEO Act the EPA must take into consideration whether the person concerned is a fit and proper person (as defined in section 83 of the Act). The EPA requires the applicant to demonstrate it is fit and proper to hold a licence.	1.2	1-3
8. Occupier of the Premises - the EPA can only issue an environment protection licence to a person who is the lawful occupier of a Premises. The EPA understands that the Proponent is not the same entity that owns the land. The EPA requires evidence that the Proponent is the lawful occupier of the Premises, such as a lease agreement or other permission of the land owner.	Provided with application	
9. Other – the EPA requires: • details of any workshop or garaging of waste vehicles. All vehicle repair or washing must be conducted in an area that excludes rainwater, is sufficiently bunded to contain all fluids within and is sealed to be impervious to those fluids; and • details of any fuel storage areas on the Premises. The EIS should demonstrate that these areas comply with the Australian Standard AS 1940:2017 - The storage and handling of flammable combustible liquids. The Proponent should also consider constructing or installing any necessary infrastructure to the diesel tanks and surrounds to prevent spill, leaks, impact and penetration. This may include barriers to protect against impact and/or penetration from heavy vehicles, leak detection, automatic cut-off mechanisms to filling points and hoses used for the transfer of fuel and positioned within a bunded, impervious hardstand.	8.6	8-29

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
The Proposal		
1. Objectives of the Proposal		
The objectives of the proposal should be clearly stated and refer to: a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced b) a life cycle approach to the production, use or disposal of products c) the anticipated level of performance in meeting required environmental standards and cleaner production principles d) the staging and timing of the proposal and any plans for future expansion e) the proposal's relationship to any other industry or facility.	1.1	1-1
2. Description of the Proposal - *General*		
Outline the production process including: a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc) b) any life-cycle strategies for the products. Outline cleaner production actions, including: a) measures to minimise waste (typically through addressing source reduction) b) proposals for use or recycling of by-products c) proposed disposal methods for solid and liquid waste d) air management systems including all potential sources of air emissions, proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points e) water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge. f) soil contamination treatment and prevention systems. Outline construction works including: a) actions to address any existing soil contamination b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site) c) construction timetable and staging; hours of construction; proposed construction methods d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures. Include a site diagram showing the site layout and location of environmental controls.	5	5-1
3. Description of the Proposal - *Air*		
Identify all sources or potential sources of air emissions from the development. *Note: emissions can be classed as either:* *- point (e.g. emissions from stack or vent) or* *- fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*	8.1	8-1

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Provide details of the project that are essential for predicting and assessing air impacts including: a) the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored b) an outline of procedures for handling, transport, production and storage c) the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.		
4. Description of the Proposal – *Noise and Vibration*		
Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials. Specify the times of operation for all phases of the development and for all noise producing activities. For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.	8.2	8-2
5. Description of the Proposal - *Water*		
Provide details of the project that are essential for predicting and assessing impacts to waters including: a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from *the Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000) b) the management of discharges with potential for water impacts c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal. Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc. Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.	8.3.2	8-12
6. Description of Proposal – *Waste and Chemicals*		
Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*	8.5	8-21

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Provide details of liquid waste and non-liquid waste management at the facility, including: a) the transportation, assessment and handling of waste arriving at or generated at the site b) any stockpiling of wastes or recovered materials at the site c) any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site d) the method for disposing of all wastes or recovered materials at the facility e) the emissions arising from the handling, storage, processing and reprocessing of waste at the facility f) the proposed controls for managing the environmental impacts of these activities. Provide details of spoil disposal with particular attention to: a) the quantity of spoil material likely to be generated b) proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil c) the need to maximise reuse of spoil material in the construction industry d) identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material e) designation of transportation routes for transport of spoil. Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.		
Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage. Reference should be made to the guidelines: EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*	8.6.1	8-29
7. Description of the Proposal - *ESD*		
Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including: a) an assessment of a range of options available for use of the resource, including the benefits of each option to future generations proper valuation and pricing of environmental resources b) identification of who will bear the environmental costs of the proposal.	11	11-1
8. Rehabilitation		
Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).	5.9	5-15
9. Consideration of Alternatives and Justifications for the Proposal		
Consider the environmental consequences of adopting alternatives, including alternative: a) sites and site layouts b) access modes and routes c) materials handling and production processes d) waste and water management e) impact mitigation measures f) energy sources	1.4	1-3

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Selection of the preferred option should be justified in terms of: a) ability to satisfy the objectives of the proposal b) relative environmental and other costs of each alternative c) acceptability of environmental impacts and contribution to identified environmental objectives d) acceptability of any environmental risks or uncertainties e) reliability of proposed environmental impact mitigation measures f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.		
The Location		
1. General		
Provide an overview of the affected environment to place the proposal in its local and regional environmental context including: a) meteorological data (e.g. rainfall, temperature and evaporation, wind speed and direction) b) topography (landform element, slope type, gradient and length) c) surrounding land uses (potential synergies and conflicts) d) geomorphology (rates of landform change and current erosion and deposition processes) e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils) f) ecological information (water system habitat, vegetation, fauna) g) availability of services and the accessibility of the site for passenger and freight transport.	6	6-1
2. Air		
Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models. Describe surrounding buildings that may affect plume dispersion. Provide and analyse site representative data on following meteorological parameters: a) temperature and humidity b) rainfall, evaporation and cloud cover c) wind speed and direction d) atmospheric stability class e) mixing height (the height that emissions will be ultimately mixed in the atmosphere) f) katabatic air drainage g) air re-circulation.	8.1	8-1
3. Noise and Vibration		
Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality. Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.	8.2	8-2

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
4. Water		
Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: http://www.environment.nsw.gov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.	8.3.2	8-12
5. Soil Contamination Issues		
Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred. The EPA has had communications in the past with the previous owner of the land and more recently with State Road Constructions in regard to the illegal storage of asbestos waste and wood pallets at the site. The EPA will require proof that all this waste has been lawfully disposed of before the submission of the EIS. This includes all receipts proving that the waste has been removed lawfully.	8.3.1	8-9
Identification and prioritisation of issues/scoping of impact assessment		
Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account: a) relevant NSW government guidelines b) industry guidelines c) EISs for similar projects d) relevant research and reference material e) relevant preliminary studies or reports for the proposal f) consultation with stakeholders. Provide a summary of the outcomes of the process including: a) all issues identified including local, regional and global impacts (e.g. increased/ decreased greenhouse emissions) b) key issues which will require a full analysis (including comprehensive baseline assessment) c) issues not needing full analysis though they may be addressed in the mitigation strategy d) justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).	7	7-1
The Environmental Issues		
1. General		
The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution. Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.	8	8-1
1. General - *Describe baseline conditions*		
Provide a description of existing environmental conditions for any potential impacts.	6	6-1

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
1. General - *Assess impacts*		
For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers. Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts. The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc. The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and decommissioning if relevant. The level of assessment should be commensurate with the risk to the environment.	8	8-1
1. General - *Describe management and mitigation measures*		
Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented. Proponents are expected to implement a 'reasonable level of performance' to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change. Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts. Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include: a) operational procedures to manage environmental impacts b) monitoring procedures c) training programs d) community consultation e) complaint mechanisms including site contacts f) strategies to use monitoring information to improve performance g) strategies to achieve acceptable environmental impacts and to respond in event of exceedances.	12	12-1
2. Air		
2. Air - *Describe baseline conditions*		
Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data.	6.6	6-33

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
2. Air - *Assess Impacts*		
Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point. Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA. Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals. Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations. For potentially odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate. *Note: With dust and odour, it may be possible to use data from existing similar activities to generate emission rates.* Reference should be made to Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2016); Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2007); Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006); Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006)	8.1	8-1
2. Air - *Describe Management and Mitigation Measures*		
Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.	8.1.2	8-1
3. Noise and Vibration		
3. Noise and Vibration - *Describe baseline conditions*		
Determine the existing background (LA90) and ambient (LAeq) noise levels in accordance with the *NSW Industrial Noise Policy*. Determine the existing road traffic noise levels in accordance with the *NSW Environmental Criteria for Road Traffic Noise*, where road traffic noise impacts may occur.	6.5.2.2.1	6-24

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including: a) details of equipment used for the measurements b) a brief description of where the equipment was positioned c) a statement justifying the choice of monitoring site, including the procedure used to choose the site, having regards to the definition of 'noise sensitive locations(s)' and 'most affected locations(s)' described in Section 3.1.2 of the *NSW Industrial Noise Policy* d) details of the exact location of the monitoring site and a description of land uses in surrounding areas e) a description of the dominant and background noise sources at the site f) day, evening and night assessment background levels for each day of the monitoring period g) the final Rating Background Level (RBL) value h) graphs of the measured noise levels for each day should be provided i) a record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring under Step 1 in Section B1.3 of the *NSW Industrial Noise Policy* j) determination of LAeq noise levels from existing industry.	6.5	6-20
3. Noise and Vibration - *Assess Impacts*		
Determine the project specific noise levels for the site. For each identified potentially affected receiver, this should include: a) determination of the intrusive criterion for each identified potentially affected receiver b) selection and justification of the appropriate amenity category for each identified potentially affected receiver c) determination of the amenity criterion for each receiver d) determination of the appropriate sleep disturbance limit. Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible effects on sleep. Where LA1(1min) noise levels from the site are less than 15 dB above the background LA90 noise level, sleep disturbance impacts are unlikely. Where this is not the case, further analysis is required. Additional guidance is provided in Appendix B of the *NSW Environmental Criteria for Road Traffic Noise*. Determine expected noise level and noise character (e.g. tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during: a) site establishment b) construction c) operational phases d) transport including traffic noise generated by the proposal e) other services. *Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).*	8.2	8-2

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Determine the noise levels likely to be received at the most sensitive locations (these may vary for different activities at each phase of the development). Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is not the most adverse condition. The noise impact assessment report should include: a) a plan showing the assumed location of each noise source for each prediction scenario b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc d) methods used to predict noise impacts including identification of any noise models used. Where modelling approaches other than the use of the ENM or SoundPlan computer models are adopted, the approach should be appropriately justified and validated e) an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify the assumed conditions f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario under any identified significant adverse weather conditions as well as calm conditions where appropriate g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived h) an assessment of the need to include modification factors as detailed in Section 4 of the *NSW Industrial Noise Policy*. Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures. The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation. Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying: a) locations where the noise level exceeds the criteria and extent of exceedance b) numbers of people (or areas) affected c) times when criteria will be exceeded d) likely impact on activities (speech, sleep, relaxation, listening, etc) e) change on ambient conditions f) the result of any community consultation or negotiated agreement. For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS. Where blasting is intended an assessment in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment: a) bench height, burden spacing, spacing burden ratio b) blast hole diameter, inclination and spacing c) type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.	8.2	8-2

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
3. Noise and Vibration - *Describe management and mitigation measures*		
Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.	8.2.1.3	8-5
For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include: a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage b) control of traffic (eg: limiting times of access or speed limitations) c) resurfacing of the road using a quiet surface d) use of (additional) noise barriers or bunds e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern f) more stringent limits for noise emission from vehicles (i.e. using specially designed 'quite' trucks and/or trucks to use air bag suspension g) driver education h) appropriate truck routes i) limit usage of exhaust breaks j) use of premium muffles on trucks k) reducing speed limits for trucks l) ongoing community liaison and monitoring of complaints m) phasing in the increased road use.	8.2.2	8-6
4. Water		
4. Water – *Describe Baseline Conditions*		
Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts). *Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004) *or be approved and analyses undertaken by accredited laboratories).* Provide site drainage details and surface runoff yield. State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: http://www.environment.nsw.gov.au/ieo/index.htm. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.	6.2	6-4

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water Quality* (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater. State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government/nswstrategy.htm). Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.		
Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include: a) lake or estuary flushing characteristics b) specific human uses (e.g. exact location of drinking water offtake) c) sensitive ecosystems or species conservation values d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc e) an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment f) historic river flow data where available for the catchment.	6.2.1.1	6-5
4. Water - *Assess impacts*		
No proposal should breach clause 120 of the *Protection of the Environment Operations Act* 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations). Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented. Include a rationale, along with relevant calculations, supporting the prediction of the discharges. Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).	8.3.2	8-12

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow). Identify any potential impacts on quality or quantity of groundwater describing their source. Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation. Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils. Containment of spills and leaks shall be in accordance with EPA's guidelines section 'Bunding and Spill Management' at http://www.epa.nsw.gov.au/mao/bundingspill.htm and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge. The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered: a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters. Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment. *Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.* Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines. Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact. Reference should be made to *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Guidelines for Fresh and Marine Water Quality* ANZECC 2000).		

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
4. Water - *Describe management and mitigation measures*		
Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls. Outline erosion and sediment control measures directed at minimising disturbance of land, minimizing water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies. Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements. Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate. Describe hydrological impact mitigation measures including: a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition) b) minimising runoff c) minimising reductions or modifications to flow regimes d) avoiding modifications to groundwater. Describe groundwater impact mitigation measures including: a) site selection b) retention of native vegetation and revegetation c) artificial recharge d) providing surface storages with impervious linings e) monitoring program. Describe geomorphological impact mitigation measures including: a) site selection b) erosion and sediment controls c) minimising instream works d) treating existing accelerated erosion and deposition e) monitoring program. Any proposed monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004).	8.3.2.3	8-14
5. Soils and Contamination		
5. Soils and Contamination – *Describe Baseline Conditions*		
Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination.	6.1	6-1
5. Soils and Contamination - *Assess impacts*		
Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of: a) disturbing any existing contaminated soil b) contamination of soil by operation of the activity c) subsidence or instability d) soil erosion e) disturbing acid sulfate or potential acid sulfate soils.	8.3	8-8

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
5. Soils and Contamination - *Describe management and mitigation measures*		
Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including: a) erosion and sediment control measures b) proposals for site remediation – see *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998) c) proposals for the management of these soils – see *Acid Sulfate Soil Manual* (Acid Sulfate Soil Advisory Committee 1998) and *Acid Sulfate Soils Assessment Guidelines* (Acid Sulfate Soil Advisory Committee 1998).	8.3	8-8
6. Waste and Chemicals		
6. Waste and Chemicals - *Describe baseline conditions*		
Describe any waste or chemical operations related to the proposal.	8.5	8-21
6. Waste and Chemicals – *Assess Impacts*		
Assess the adequacy of proposed measures to minimise natural resource consumption and minimize impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals. Reference should be made to: the EPA's *Waste Classification Guidelines 2014 (as in force from time to time)* If the proposal is an energy from waste facility it must: • demonstrate that the proposed operation will comply with the NSW EPA's Energy from Waste Policy Statement; • describe of the classes and quantities of waste that would be thermally treated at the facility; • demonstrate that waste used as a feedstock in the waste to energy plant would be the residual from a resource recovery process that maximises the recovery of material; • detail procedures that would be implemented to control the inputs to the waste to energy plant, including contingency measures that would be implemented if inappropriate materials are identified; • detail the location and size of stockpiles of unprocessed and processed recycled waste at the site; • demonstrate any waste material (e.g. biochar, ash) produced from the waste to energy facility for land application is fit-for-purpose and poses minimal risk of harm to the environment in order to meet the requirements for consideration of a resource recovery order and /or exemption by the EPA; • detail procedures for the management of other solid, liquid and gaseous waste streams; • describe how waste would be treated, stored, used, disposed and handled on site, and transported to and from the site, and the potential impacts associated with these issues, including current and future offsite waste disposal methods; and identify the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*.	8.5	8-21
6. Waste and Chemicals – *Describe Management and Mitigation Measures*		
Outline measures to minimise the consumption of natural resources. Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste. Outline measures to support any approved regional or industry waste plans.	8.5	8-21

Table 4-3: EPA Assessment and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
7. Cumulative Impacts		
Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute. Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region. Identify infrastructure requirements flowing from the proposal (e.g. water and sewerage services, transport infrastructure upgrades). Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (e.g. travel demand management strategies).	10	10-1
List of Approvals and Licences		
Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).	14	14-1
Compilation of Mitigation Measures		
Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under EPA licences or approvals (e.g. outline of an environmental management plan).	12	12-1
The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.		
Justification for the Proposal		
Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts	15	15-1

Table 4-4: Transport for NSW Assessment Requirements and EIS Reference

Key Issues	EIS Reference	
	Section	Page No.
A Transport Impact Assessment which details all daily and peak traffic and transport movements likely to be generated (light and heavy vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development.	Appendix 12	Appendix 12
Details of the proposed operating hours and days for the development.	Appendix 12	Appendix 12
Details of the proposed staffing numbers along with shifts and numbers at different times of the day.	Appendix 12	Appendix 12
Details of the current daily and peak hour vehicle public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development.	Appendix 12	Appendix 12
An assessment of the operation of existing and future known transport networks including public transport, pedestrian and bicycle provisions and their ability to accommodate the forecast number of trips to and from the development.	Appendix 12	Appendix 12

Table 4-4: Transport for NSW Assessment Requirements and EIS Reference

Key Issues	EIS Reference	
	Section	Page No.
Details the type of heavy vehicles likely to be used (e.g. B-doubles) during the operation of the development and the impacts of heavy vehicles on nearby intersections.	Appendix 12	Appendix 12
Details of access to, from and within the site from the road network including intersection location, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements).	Appendix 12	Appendix 12
Impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site.	Appendix 12	Appendix 12
An assessment of the existing and future performance of key intersections providing access to the site (at a minimum, the intersection of Park Road/The Northern Road should be assessed), and any upgrades (road/intersections) required as a result of the development. The assessment needs to be supported by appropriate modelling and analysis to the satisfaction of Roads and Maritime Services.	Appendix 12	Appendix 12
An assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development.	Appendix 12	Appendix 12
Plans of any road upgrades or new roads required for the development, if necessary.	Appendix 12	Appendix 12
Demonstrate the measures to be implemented to encourage users of the development to make sustainable travel choices, including walking, cycling, public transport and car sharing.	Appendix 12	Appendix 12
Appropriate provision, design and location of on-site bicycle parking, and how bicycle provision will be integrated with the existing bicycle network.	Appendix 12	Appendix 12
Details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on the site.	Appendix 12	Appendix 12
Details of access and parking arrangements for emergency vehicles	Appendix 12	Appendix 12
Detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards	Appendix 12	Appendix 12
Details of any likely dangerous goods to be transported on arterial and local roads to/from the site, if any, and the preparation of an incident management strategy, if necessary.	Appendix 12	Appendix 12
The existing and proposed pedestrian and bicycle routes and end of trip facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principle.	Appendix 12	Appendix 12
Preparation of a draft Construction Traffic Management Plan which includes: • Details of vehicle routes, number of trucks, hours of operation, access management and traffic control measures for all stages of construction. • Assessment of cumulative impacts associated with other construction activities. • An assessment of road safety at key intersections in the vicinity of the site. • Details of anticipated peak hour and daily truck movements to and from the site. • Details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements. • Details of temporary cycling and pedestrian access during constructions. • An assessment of traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrians, cyclists and public transport operations.		

Table 4-5: NSW RFS Assessment Requirements and EIS Reference

Key Issues	EIS Reference	
	Section	Page No.
Complete a Bushfire Assessment Report	Appendix 7	
Include a classification of the vegetation on and surrounding the development (out to a distance of 140 metres from the boundaries of the property)		
Include an assessment of the slope of the land on and surrounding the development (out to a distance of 100 m)		

5. DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development is for the establishment and operation of a resource recovery facility that would accept, process and store construction and demolition (C&D) and commercial and industrial (C&I) waste. The development would be confined to an area in the north eastern portion of the site and would require cut and fill works to achieve required levels for construction of structural steel framed metal building and associated infrastructure. A detailed description of the proposed development is provided in this section of the EIS.

5.1 PROPOSED ACTIVITIES AND SITE USE

The proposal involves the establishment and operation of a resource recovery facility for the processing and recovery of construction and demolition (C&D) and commercial and industrial (C&I) waste. Up to 95,000 tonnes of material would be processed annually.

The facility would be located within the north eastern portion of the site, the majority of which has previously been disturbed by former tenants. This area of site is currently not being used and the remaining site area is vegetated. The proposed development has been designed to retain the existing vegetation outside the already disturbed areas of the site.

A structural steel framed metal clad building with an approximate floor area of 6775 m^2 is proposed. The building will be fully compliant with the Building Code of Australia and relevant Australian Standards. All processing operations would be undertaken within this building. This building would contain offices, meeting rooms and amenities with access to the main production area. The production building would also contain a workshop area bordered with a chain wire fence. Minor maintenance activities including routine maintenance of on-site vehicles and RRFT equipment would be undertaken in this area including minor repairs and welding.

The main building has been modified to include a truck loading area and enclose the previously covered external storage bunkers. This extension will result in all storage of waste to be confined within the building and an enclosed truck loading area. Two additional roller doors are required which will remain closed unless allowing entry or exit of a truck to the loading area. The southern roller door (RD10) will be opened to allow a truck to enter then closed while loading takes place, then the northern roller door (RD11) would be opened to allow the truck to exit and then closed.

The existing dwelling on site would be converted into an office and amenities building and require internal modifications only.

Two weighbridges would be installed and new car and truck parking areas, sealed internal driveways and site access would be established. Access to the site would be via a two way sealed driveway which would provide a one way direction of traffic around the building.

The incoming waste will mostly be sourced from infrastructure projects mainly within the Western Sydney growth area. Waste would be stored within designated storage bays within the building. A RRTF plant would be installed within the building that would separate waste materials which would be sent for further recycling off-site. Paper baling would take place within the building and bales stored in a designated area within the building.

The site contains adequate power supply and is connected to mains water. Solar panels would be installed on the roof of the new building to provide power for lighting purposes. An aerated wastewater treatment system (AWTS) would be established for the new amenities in the new building. Stormwater infrastructure would be installed including rainwater tanks to capture roof water and pits to collect surface runoff from the development area that would be directed to bioretention filter media areas and then a sediment pond where water monitoring at the outlet would be undertaken.

The site would be fully fenced and gated with security design features installed.

5.2 SITE LAYOUT PLANS

The proposed development would be confined within an area of approximately 50,000 m^2. This will be towards the north eastern section of the site. The remainder of the site will not be disturbed.

The overall site plan for the proposed development is available in Appendix 1. A full set of plans has been provided separately with the development application.

5.2.1 Enclosed Truck Loading Area Concept Plans

Outcomes of the public meeting held by teleconference on 15 December 2021, Ref: PPSSWC-80 – Penrith – DA20/0262 resulted in changes to the proposal to enclose all significant noise production activities. Modifications to the proposed building to fully enclose the aggregate storage bunkers and truck loading area on the western side of the building were suggested, with Council requesting a concept plan detailing these changes. The following concept plans were provided:

- A02-I: Part site plan with enclosed building;
- A03-F: Proposed Process building floor plan; and
- A04-E: Elevation section of enclosed loading and storage.

5.3 CONSTRUCTION WORKS

Construction works would involve cut and fill works, erection and fit out of an industrial building, internal sealed driveways and hardstand areas, a car parking and truck parking area, two weighbridges and internal fit out of the existing dwelling for use as an office building and installation of associated infrastructure. No retaining walls are proposed.

The main building will be a standard Colorbond shed with concrete slab and have a floor area of 6775 square metres. There would be eleven 6 m x 6 m roller shutter doors providing entry and exit access for trucks to arrive and unload inside the building then leave and also for on-site vehicles to move inside and outside the building. The building would be 8.2 m in height at the wall and 12.5 m in height at the apex. A ridge vent of approximately 600 x 600 mm would provide natural ventilation. Solar panels would be installed on the roof to supply power for lighting purposes. Internal storage bunkers would be constructed of steel frame and plate push walls of formed concrete up to 3.0 m high. A workshop would be situated within this building adjacent to the internal storage bays.

A production office would form part of the main building at the north western end and contain a reception area, lunchroom, meeting room, office and amenities. The office would be 4.4 m in height and be constructed of concrete tilt panel walls, aluminium windows and metal roofing with an awning over an outdoor seating area.

The existing dwelling would require internal modifications and would contain offices and amenities for the staff employed at the facility.

Six rainwater tanks would be installed at the site which would capture roof water for reuse. There would also be tanks supplied by mains water for emergency firefighting purposes. Stormwater infrastructure such as pits, bioretention filter media areas, and on-site detention basins would also be installed.

Construction and excavation will be restricted to approximately 25% of the total site area. This area would be fenced accordingly with the remainder of the site signposted as “No Go Zones”.

The following sequences of activities are anticipated during the construction works:

1. Site establishment – installing temporary fencing, signage, waste skip bins, erosion and sediment controls.
2. Relocation or protection of services – relocating and protecting electricity, gas and telecommunications infrastructure affected by the project if required.
3. Site preparation – demolish any existing infrastructure that requires removal, and removal and/or protection of existing trees.
4. Earthworks – undertake cut and fill works to establish required levels and minor excavations to establish footings and foundations for the new building and formwork for car parking area and driveways.
5. Structures – construction of new building, installation of weighbridges, rainwater tanks and required infrastructure.
6. Pavements –Establishing sealed car parking area and driveways.
7. Internal fit out and security – installing the RRTF plant in the building, constructing storage bays and general fit out of the building. Install security fencing and gates.
8. Commissioning – removal of temporary construction fencing and facilities, waste removal/recycling and commissioning of new infrastructure.
9. Landscaping.

Construction would take place in one stage and be undertaken within the hours of 7am–6pm Monday to Friday and 8.00am–4.00pm Saturday.

A temporary building would be used for amenities and offices during construction.

It is anticipated the timing for the construction works would be 12 to 18 months.

5.4 PLANT & PROCESS DESCRIPTION

The plant will be designed to process 95,000 tonnes of C&D and C&I waste materials collected from various businesses across the local and metropolitan Sydney area. The materials will be sorted through the plant in separate runs, the C&I and C&D will not be mixed. This will ensure maximum recovery of recyclables. To achieve this, the C&D waste and C&I waste would be processed on separate days. There would be a storage bunker provided inside the building for the

waste stream to be stored that is not being processed on that day.. This would allow storage of C&I waste until such time as processing can be undertaken in a separate run from C&D waste or vice versa.

The following provides the typical steps involved in the day time process that would be undertaken at the facility. Figure 5-1 provides a process flow diagram.

1. All trucks arriving at the site would be directed over the weighbridge and inspected for any abnormal contamination;

2. Trucks with conforming loads would be weighed on the weighbridge then directed inside the building. Non-conforming loads would be turned away via the turning bay adjacent to the weighbridge.

3. On days of C&D processing, loads of C&I material would be unloaded in a designated storage bunker for processing on a separate day. Loads of C&D material would be unloaded in the pre-sorting area inside the building for initial separation. Conversely, on days of C&I processing, loads of C&D material would be unloaded in a designated storage bunker for processing on a separate day, and loads of C&I material would be unloaded in the pre-sorting area inside the building for initial separation;

4. A front end loader would transfer the pre-sorted material to the infeed hopper/shredder at the start of the process or to the appropriate storage bunker.

5. The material would be fed into the system and conveyed to an electrical magnet for the removal of steel. Any ferrous material would be separated at this point and fall into a storage bin.

6. The waste stream would then be conveyed through a waste screen where aggregates would be removed and further screened into varying sizes and then directed to storage bunkers via the conveyor system.

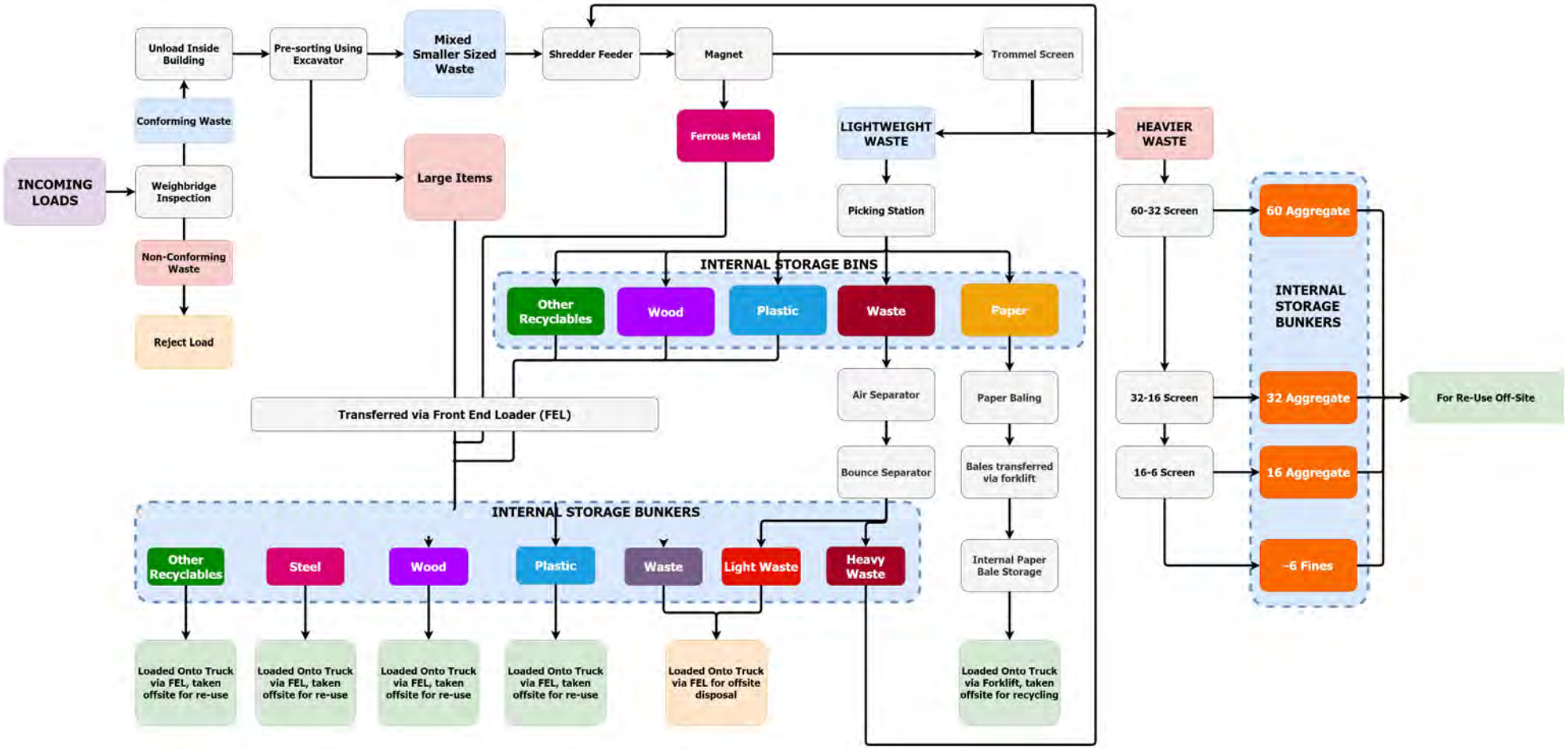
7. The waste stream would be directed to the manual picking station where it is separated into paper/cardboard, wood, plastic and other waste. Paper and cardboard is transferred to the paper baling area for baling. Bales are stored in a designated area within the building.

8. The remaining waste stream is conveyed where it is further separated into heavy and light wastes. The light waste is “solid recovered fuel” or SRF which is the waste that would be suitable for use in a waste to energy plant. This waste would be sent to landfill.

9. Recovered waste would be loaded into trucks for transport to various facilities for reuse or further processing. Trucks picking up aggregate would enter the building via roller door 10 (RD10), the door would close then the truck would be loaded in the truck loading area within the building. Roller door 11 (RD11) would then open and the truck would leave. RD11 would then be closed.

No retail sales will be made on site. There will be no public access to the premises.

Figure 5-1: Process Flow Diagram



5.4.1 Annual Tonnage

The facility would receive and process up to 95,000 per annum of Construction and Demolition (C&D) and Commercial and Industrial (C&I) Waste. The expected ratio of C&D to C&I is expected to be 7:3.

5.4.2 Storage

The facility would need approval to store a maximum of 9,000 tonnes of waste material on site at any one time. Storage of this material would be as follows:

- Incoming loads would be unloaded into a stockpile inside the building to be pre-sorted;
- There would be four large concrete walled bunkers within the building for the storage of waste, wood, steel and incoming material loads;
- Along the RRFT, there would be small bins or bunkers at the ferrous magnet, picking station and after the bounce separator where metal, paper/cardboard, wood, plastic and "other" material would be separated from the waste stream;
- At the waste screen, aggregate would be sized into -6, 16, 32 and 60 mm sizes which would directed by conveyor into aggregate storage bunkers within the building. Uncontaminated soil generated by the process would also be stored in a bunker;
- Paper bales would be stored inside the building adjacent to the baler.

5.4.3 Incoming Waste Materials

The recyclable material will be made up of the following waste streams. The waste type codes are provided also:

- Construction & Demolition
  - Wood (WOOD)
  - Gyprock – plaster board (PB)
  - Concrete (BC)
  - Brick (BC)
  - Aggregates, roadbase or ballast (AGG)
  - Asphalt (ASPH)
  - Steel (FE)

- Commercial & Industrial
  - Paper and cardboard (PAPER)
  - Plastic (PL)
  - Steel (FE)
  - Aluminium (AL)
  - Wood (WOOD)

No other waste would be accepted.

5.4.4 Recovered Products

Recovered products and their potential future destination after leaving the facility are detailed below. Licensed facilities listed are examples only:

- Baled paper – VISY.
- Aggregate of varying sizes – Supply under the recovered aggregate order 2014 for application to land as road making material, or in building, landscaping or construction work.
- Ferrous & non-ferrous metal – SIMS Metal.
- Wood – Supply to either landscape supply businesses for resale as mulch or supply to waste to energy plants.
- Plastic – VISY
- Non-recyclable waste – Licensed Landfill.

Note: Aggregates and soils are not combustible.

5.4.5 Equipment

Equipment and machinery required for the resource recovery facility includes:

- 2 x weighbridges;
- Resource Recovery and Transfer Facility (RRTF) consisting of control room, shredder, infeed hopper, conveyor belt, ferrous magnet, waste screens, picking station, air separator and bounce separator;
- Paper Baler;
- Mobile crusher;
- 30T Excavator;
- 20T Excavator;
- 35T Front end loader;
- Forklifts;
- Water misting system for the building and awning areas; and
- Concrete walled storage bunkers.

5.4.6 Workshop

A workshop would be located within the main production building for the purpose of routine maintenance activities for the on-site vehicles, RRTF equipment and associated systems. This would include minor repairs and welding. Minor quantities of chemicals such as oils would be stored in this area. The self-bunded diesel tank would be stored external to the building adjacent to this workshop. A kerbed and bunded area for re-fuelling with pump out sump pit would be provided as shown on site plans.

5.5 Operational Details

Existing site infrastructure would assist in the establishment of the proposed development.

5.5.1 Utility Connections

5.5.1.1 Water

The site is connected to mains water. Rainwater tanks would be installed for capture of roof water as part of the proposed development and would be topped up from the mains if needed. Tanks connected to the mains supply would be installed for emergency firefighting purposes.

5.5.1.2 Sewage and Wastewater

An aerated wastewater treatment system (AWTS) would be established. The existing septic system would be decommissioned. The site would not need to be connected to Sydney Water system for sewerage or tradewaste. The processes would not generate wastewater. Stormwater infrastructure would be established including pits to direct water to a bioretention filter media areas prior to settling ponds. A water monitoring program would ensure water quality is maintained to a suitable standard.

5.5.1.3 Electricity

The site currently is connected to 3 phase power and would need to be amplified to be adequate for the proposed facility. Solar panels would be installed on the roof of the new building to supply electricity for lighting purposes.

5.5.1.4 Telecommunications

Telephone extensions to the premise office exist on the site.

5.5.1.5 Gas, Petrol and Diesel

A 10,000 litre self bunded diesel tank would be required at the site for refuelling of on-site vehicles. LPG cylinders would be required for forklifts.

5.5.2 Hours of Operations

The proposed facility would operate to the following hours:

Monday – Friday 7am – 6pm
Saturday – 8am – 1pm
Sunday and public Holidays – No operation.

A typical daily schedule of activities (Monday to Saturday) and their hours of operation is provided below.

Table 5-1: Typical Daily Schedule – Monday to Saturday

Shift	Time	Staff on site	Activities	No. of Trucks
Day	7:00am to 6:00pm (Note: Saturday 8:00am to 1:00pm)	20	Waste Processing (C&D or C&I on alternate days) Incoming and outgoing truck loads	40 incoming 15 outgoing (55 trucks/day)
Afternoon	5:00pm to 10:00pm	*0-2**	No operations No truck loads accepted Maintenance only (as required)	0
Night	10:00pm to 7:00am	*0-2**	Maintenance only (as required)	0

*Staff to work as required – maintenance staff from day shift as overtime).

5.5.3 Employment

The proposed facility overall will provide for up to 26 full time employees (20 up to staff on site and 6 truck drivers) with potential for additional employment in the future.

The facility would operate over one shift. Typically the facility would operate six days per week with maintenance being undertaken in the afternoon or night, or on Sundays.

A site manager will be responsible for the overall management of the new RRTF operations and administration. Supporting the manager will be several full-time administrative positions, which will also be responsible for delivering on site operational targets and the required outcomes.

Typical staff numbers are detailed below:

Title	Day Shift 7am to 6pm	Afternoon Shift	Night Shift
Site Manager	1	0	0
Supervisor	1	0	0
Office	2	0	0
Loader Operators	2	0	0
Pickers	Up to 8	0	0
Cleaner	1	0	0
Forklift driver	1	0	0
Weighbridge Staff	1	0	0
Plant operator	1	0	0
Maintenance	2	*0-2**	*0-2**
Total on site	**20**	**2**	**2**
Truck Drivers	4-6	0	0
TOTAL STAFF NUMBERS	26		

*Maintenance staff on night shift will be overtime staff from day or afternoon shift.

The construction of the facility will also generate the temporary employment of up to 20 people.

5.5.4 Traffic

All trucks arriving at the RRTF would mainly consist of hooklift and skip bin trucks with some truck and dog trailers and possibly some semi-trailers. Outgoing material would also be transported in similar vehicles.

The facility would generate an estimated 55 truck trips per day. Truck deliveries and pick ups would be restricted to between the hours of 7am-6pm Monday to Saturday. Gates would be locked at night and no deliveries permitted.

5.5.5 Parking

A new 32 space car parking area and separate truck parking area would be established on site. These areas would be fully sealed.

5.5.6 Access Statement

An access statement is provided with the application and as Appendix 13.

5.6 EMISSIONS AND WASTE

5.6.1 Air and Odour

The proposed operations would generate dust air emissions. Dust mitigation measures have been designed into the proposed facility and include a water misting system that would minimise the emissions of dust.

Odour emissions would be negligible due to the nature of the materials accepted and the proposed processes to be undertaken on site.

An air quality impact assessment provides further details on air emissions, local air quality and details of proposed mitigation measures.

5.6.2 Noise and Vibration

Noise will be generated from the processes on the site. The typical sources of noise from the facility include:

- RRFT particularly screening of aggregates;
- On-site vehicles; and
- Truck movements.

The majority of noise sources would be minimised by the enclosed building. A noise impact assessment demonstrates compliance with criteria and presents additional mitigation measures.

5.6.3 Water and Wastewater

This site will not accept liquid wastes. Additionally, no processes on site will generate wastewater.

Water will be used onsite for:

- Dust Suppression in the water misting system;
- Office and amenities; and
- Firefighting purposes in the event of a fire.

The site is connected to mains and there would be tanks on site for firefighting purposes that are connected to mains supply. Rainwater tanks would collect roof water and can be plumbed into the office and amenities or used for dust suppression. This would be supplemented with mains water where required.

Stormwater infrastructure would include pits that would direct surface water from the development area to a bioretention filter media areas and then to settling ponds where water monitoring would be undertaken.

5.6.3.1 Wheel wash facility

A wheel wash facility was a requirement of EPA in the SEARs for the original concept plan. Due to the changes to the proposal, the facility has now been designed in accordance with current best practice within an enclosed building and all waste to be stored within covered storage bunkers. Trucks would remain on sealed surface for the duration of their visit to the site. No external stockpiling or unsealed surfaces would be included in the proposed development. Therefore a truck wheel wash is not considered warranted and is not included in the development.

5.6.3.2 Leachate

"Leachate" is defined under the NSW EPA Environmental Guidelines: Solid Waste Landfills, Second Edition 2016 as:

> ***Leachate:*** *the liquid that passes through, or is released by, waste. It arises from the inherent moisture content of the waste and from rainwater (and sometimes groundwater) percolating through or contacting the waste mass. Leachate may contain high levels of dissolved solids, ammonia, organic matter, and sometimes metals and other pollutants. These levels are typically well above background levels for undisturbed or slightly disturbed groundwater and surface water systems. The levels are also well above national quality guidelines for drinking water and other beneficial reuses of water.*

In this case, there would be no external waste storage or stockpiles. All waste would be received in covered trucks, unloaded, processed and loaded within the enclosed building. The elevation and section plans show the storage bunkers for recovered aggregates and soil would be walled on three sides and roofed, therefore rainwater penetration would be negligible and leachate would not be generated.

A stormwater runoff system will be installed to capture surface water on hardstand areas. This has been designed to manage pollutant loads and meet required Council targets and is shown in the Water Cycle Management Report provided in Appendix 5.

5.6.4 Land

There would be no waste or materials applied to the land. The development area would be a fully sealed surface such as concrete and/or asphalt and systems to manage potentially contaminated surface water would be installed, therefore the potential for contamination of land is low.

5.6.5 Waste

The proposed facility deals with waste. Waste would be brought onto site for processing for the purpose of generating reusable materials. All waste received at the site would consist of general solid (non-putrescible) waste. The end products would be sent to recycling plants for further processing or for reuse. There would be non-recyclable material generated as a consequence of the process and this waste would be sent to landfill.

A waste management report has been prepared to support this EIS with details of the waste types to be received, waste processing description, end products and estimated quantities.

5.7 CLEANER PRODUCTION ACTIONS

Cleaner Production Actions would be implemented at the site through a comprehensive Environmental Management Plan (EMP).

Cleaner production is a preventative environmental protection approach whereby industrial processes are designed to maximise output while minimising waste and emissions. Cleaner Production actions that have been incorporated into the design of the facility are outlined below:

5.7.1 Measures to minimise waste

The facility recycles waste. Minimising waste generated from the recycling process is in the environmental and financial interest of the facility. Operations on site will be continually optimised to minimise the generation of waste from the process.

Minor quantities of waste would be generated from the office and amenities areas. Recycling bins for office paper and cardboard would be provided and employees would be encouraged to recycle printer cartridges and other office items.

5.7.2 Proposals for use or recycling of by-products

The system has been designed to maximise the generation of reusable material through the comprehensive separation processes that produce high quality by-products. A potential future stage of this development would be the use of the light waste as “solid recovered fuel” or SRF in a waste to energy gasifier which has the potential to generate electricity to run the facility. This potential future stage is not included in this development application. Technologies are currently available for this recovered waste to be used to generate energy and demonstrates the potential to improve the environmental sustainability of the plant. Significant research would be needed into this possible future stage and it is not being considered as part of this development.

5.7.3 Proposed disposal methods for solid and liquid waste

The facility itself has been designed to process the incoming waste materials into reusable end products. In this way, solid and liquid waste generated is minimised. However, a small quantity of solid and liquid waste is inevitable.

Solid waste unable to be reused is expected to be classified as general waste (non-putrescible) and would be stored in a designated storage bay on site before being removed by a licensed waste contractor for disposal.

The process of separating C&D and C&I material requires no water. Therefore, no liquid waste from this process would be generated and a Tradewaste Agreement is not required.

Provisions to manage potential contaminated stormwater runoff are included in the design of the development. Sources of contaminated runoff would be limited to minor quantities potentially generated from sealed areas. Any runoff would drain to a bioretention system.

5.7.4 Air management systems

Cleaner production techniques to manage air emissions at the facility include:

- All processing and storage activities occur within a building; and
- A misting spray system within the building that would be automatically activated for the duration of dusty activities.

5.7.5 Water Management System

Water management systems to be implemented include:

- Office and amenities wastewater would be treated in a site specific designed onsite septic system (aerated wastewater treatment system (AWTS));
- The existing septic system would be decommissioned;
- The water misting system would not generate wastewater. This water is a fine mist that is encapsulates the dust rendering it too heavy to remain airborne. This water evaporates and would not generate any liquid waste.
- Stormwater falling on the main building roof and storage bay awning would be captured within rainwater tanks on site and reused.
- Stormwater falling on hardstand areas around clean areas of the site would be directed into a Bioretention filter media system before the cleaned water is released into sediment ponds. The system has been designed using the site's natural slope. Water monitoring points in the ponds would be used for sampling and testing as part of a water monitoring program to ensure the water discharge remains clean.
- A self-bunded diesel tank would be stored outside the building. The refuelling area would be located on the hardstand driveway area within a kerbed bund containing a pump out sump pit.

5.7.6 Soil contamination prevention

The work areas associated with the development will be fully sealed and as such offer limited pathways for contaminant migration into soils. Controls associated with surface water management will also be implemented to minimise the potential for contaminated water migration into soils.

5.8 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

Part C1.2.5 of Penrith Development Control Plan 2014 details requirements for safety and security (Principles of Crime Prevention through Environmental Design). New industrial complexes comprising 1,000m^2 or more floor space will be referred to the NSW Police Service. Therefore, measures to ensure compliance with requirements the Penrith DCP will be implemented and are detailed in this section.

CPTED is based on four design concepts including surveillance, access control, territorial reinforcement and space management/maintenance.

There is limited opportunity for the general public to access the site as it is a private industrial facility. Security fencing would be provided to the proposed development area with lockable gates at the entry driveways. The gates would be open during the day to allow deliveries but

locked at night. A gatehouse would be established due to the strict entry requirements that need to be enforced for the acceptance of incoming loads of materials. Therefore, cameras would be installed in these areas. There would also be clear internal signs to direct pedestrians to car park and office areas as well as one way travel for trucks.

The majority of DCP controls under Penrith DCP 2014 C1 Section 1.2.5 Part D do not apply to industrial developments. Therefore compliance of the site with the principles of CPTED is shown in the following table.

Table 5-2: Compliance of the proposal with the principles of Crime Prevention Through Environmental Design

Principle	Compliance
Natural Surveillance • Locating public services in areas of high activity • Clear sightlines exist between public and private places • Avoiding blind corners in pathways, stairwells, hallways and car parks • Ensuring that the range of land uses within a building increases opportunities for natural surveillance • Providing natural surveillance into communal and public areas • Locating entries that are clearly visible from the street • Designing fences that maximise natural surveillance from the street to the building and from the building to the street, and minimise opportunities for intruders to hide • Install security grilles, shutters and doors that allows natural observation of the street • Install effective lighting in public places that does not produce glare or dark shadows; and • Ensuring that landscaping does not obstruct natural surveillance or provides a place to hide or entrap victims	Yes. The site has been designed such that private and public areas are clearly defined through landscaping at the front of the site, fencing and gates for security purposes and lighting. For security & safety purposes, High resolution cameras that would record 24/7 inside and outside the building and site would be installed.

Table 5-2: Compliance of the proposal with the principles of Crime Prevention Through Environmental Design

Principle	Compliance
Access Control • Ensuring buildings are clearly identified by street number • Providing clear entry points • Creating landscapes and physical locations that channel and group pedestrians into target areas • Using vegetation as barriers to deter unauthorised access • Using building materials/security that reduces the opportunity for intruder access • Designing public spaces that attract rather than discourage people from gathering • Restricting access to internal areas or high risk areas such as loading or service areas • Ensuring there are appropriate security measures in place commensurate for the range of land uses within a building/development • Ensuring that parking areas are clearly identified by signage to prevent unintended access and to assist persons trying to find their car.	Yes. Clear entry points to the site would be established. Signage would identify car parking and office areas. Footpaths would be clearly marked providing direction for pedestrians to offices and safe walkways when on site. The development area would be fenced and gated with security gate house at the weighbridge where security cameras would be located. Landscaping around the boundary and clearly marked footpaths would limit access to the site.
Territorial Reinforcement • Having distinct transitions/boundaries between the public and private areas • Clearly defining spaces to express a sense of ownership and reduce illegitimate use/entry.	Yes. Physical barriers in the form of fences and gates will be provided. Landscaping will be provided. Signage is used to direct people to office areas and safe walkways on site.
Space Management • Creating a 'cared for' image through proper maintenance regimes • Rapid repair of vandalism and graffiti, the replacement of burned out pedestrian and car park lighting and the removal or refurbishment of decayed physical elements • Using materials that reduce the opportunity for vandalism • Encouraging design that promotes pride and a sense of place for the community.	Yes. Vandalism is unlikely to be an issue. Landscaping, pedestrian areas, signage, lighting and seating would be well maintained. CCTV cameras would be installed inside and outside the building. Locked gates and security fencing with a security gate house would be provided.

5.9 SITE REHABILITATION

This section outlines the approach that would be taken to site remediation and closure of the facility including the rehabilitation objectives and strategies and proposed plans for the final condition of the site. The final site condition would ensure the site's suitability for future uses.

5.9.1 Rehabilitation Objectives

Rehabilitation objectives for the site would depend on the proposed future use. If the future use requires the land to be restored to its condition pre-development, the objectives would include:

- Restore the land to pre-development condition;
- Allow for sustainable future land uses to occur;
- Establish a clear set of performance indicators to be met; and
- Improve linkages between any existing areas of remnant vegetation.

5.9.2 Rehabilitation Strategies

Strategies applied depend on the proposed future use of the site.

Rehabilitation activities for future agricultural and/or rural land use would include the following:

- Decommissioning of all surface infrastructure and removal from site if these are not required for proposed future use. These areas would be revegetated with species native to the local area.
- Growing media development in areas where revegetation is proposed would be undertaken.

Monitoring of rehabilitated areas would need to be ongoing and remedial maintenance undertaken as required.

5.9.3 Final Land Use and Landform

The land would require minor levelling for the establishment of the proposed infrastructure. This would not significantly impact on the final landform and once the removal of infrastructure has been completed, revegetation and establishment of native species could be undertaken. In this way, the land would be able to be used for future agricultural uses.

Preparation of a formal Rehabilitation Plan should be considered prior to closure of the business or sale of the land for alternate uses.

6. EXISTING ENVIRONMENT

6.1 GEOLOGY AND SOILS

6.1.1 Geological and Soil Landscapes

The '1:100,000 Penrith Geological Map Sheet 9030' describes the geological composition of the area as follows:

> *'WIANAMATTA GROUP Rw (undifferentiated)*
> *Rwb: Shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff.'*

The 'Soil Landscapes of Penrith 1:100,000 sheet' shows that the subject site is located in an area classified as 'Blacktown (bt)', which is described as follows:

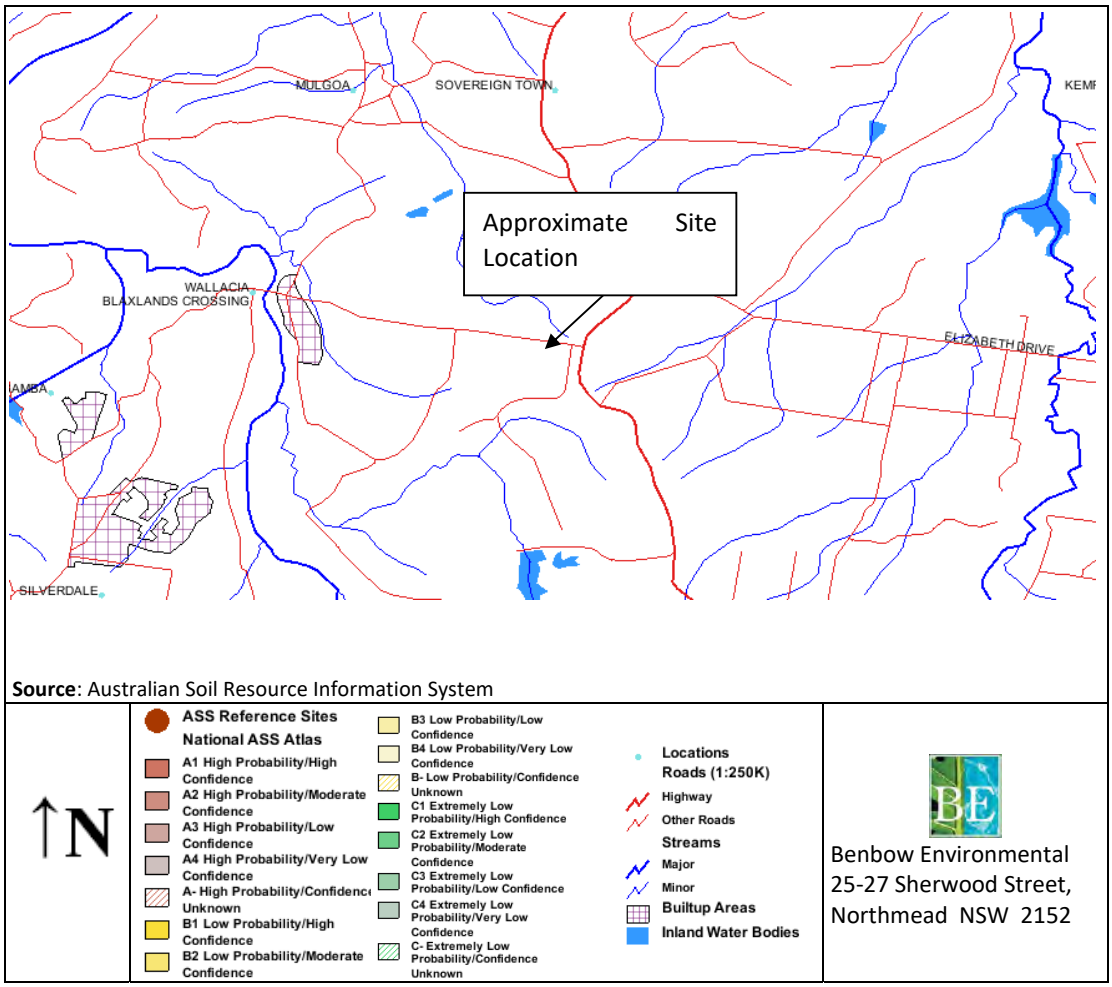
> *'Landscape—gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry schlerophyll forest).*
>
> *Soils—shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, red and brown podzolic soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to yellow podzolic soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.*
>
> *Limitations—localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.'*

6.1.2 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils and sediments that formed under waterlogged conditions. They contain iron sulfide (predominantly pyrite), when waterlogged, or in an anoxic environment, ASS remain benign. However, if drained, excavated or exposed to air by a lowering of the water table, the sulphides react with oxygen to form sulfuric acid, sometimes in large quantities (for every tonne of sulfidic material that completely oxidises, 1.6 tonnes of pure sulfuric acid is produced). ASS contains traces of metals such as iron, aluminium and arsenic. Once acid forms, it mobilises any metals held within the soil. Rainfall washes this mixture into the surrounding environment, polluting land and nearby waterways. Accumulation of acid and metals becomes toxic to plants and animals, especially aquatic organisms. Built structures are highly susceptible to ASS, as acid will slowly destroy concrete, steel, roads and building foundations.

A search using the Australian Soil Resource Information System indicates that the site is not in an area known to contain ASS. The search results are displayed in Figure 6-1.

Figure 6-1: Acid Sulfate Soil Map



Source: Australian Soil Resource Information System

6.1.3 Salinity

The site and surrounding areas is not shown as being affected by salinity on the NSW Planning Portal, eSpade or the Penrith LEP.

6.1.4 Existing Contamination

Historical site information indicated past pollution incidents in 2012 related to a Clean up notice issued by the NSW EPA and in 2019 related to an Order issued by Penrith City Council.

The 2012 Clean up notice raised issues relating to unauthorised storage of timber and plastic pallets on site, holes made by an excavator and burning at the site.

The 2019 Order related to unauthorised importation of fill materials.

The Limited Phase II ESA (Appendix 10) included a site inspection and focussed on determining whether the development area was suitable for the proposed use. Sampling and analysis of the proposed location of the building and stockpile of fill in this area was undertaken. Sample analysis showed no evidence of existing contamination in this area. Additional sampling and testing

requested by Council was also undertaken and found no evidence of contamination. This is included in Appendix 10.

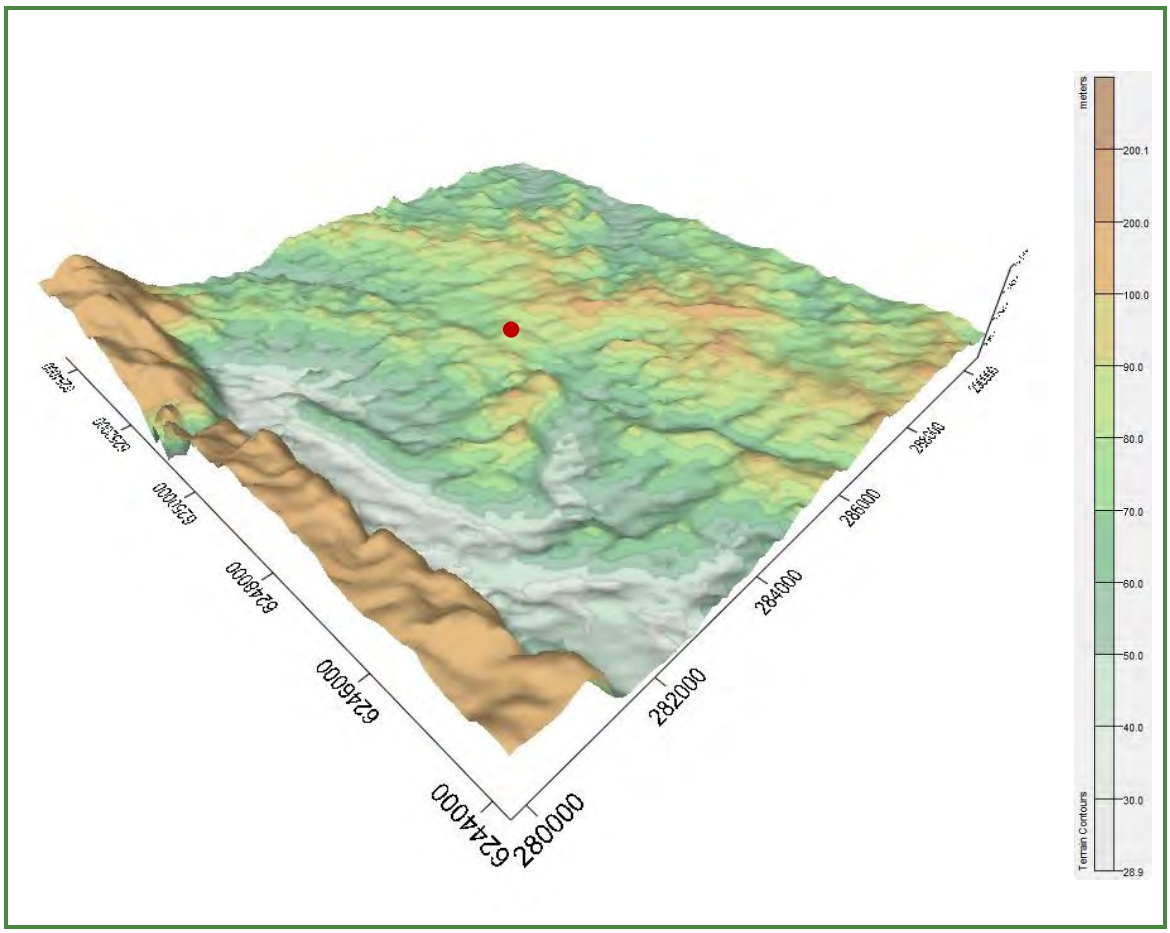
It is noted that an area south of this proposed development area is known to be potentially contaminated due to past activities. This will be the focus of a separate investigation that is currently being undertaken in consultation with Penrith City Council.

6.1.5 Topography

The overall site and surrounding terrain is relatively flat. The proposed operational area is flat and even. The south-western corner gently slopes towards a small dam across the south-western boundary line.

A three-dimensional view of the local topography surrounding the site has been provided in Table 6-2, with the terrain/vertical axis exaggerated by a factor of 10. It should be noted that this figure is an approximation of the actual terrain, based on information that has been digitised from local contour maps.

Figure 6-2: Local topography of site with a factor of 10 vertical exaggeration



6.2 HYDROLOGY

6.2.1 Waterways and Catchment

The site is located near major waterways. The Nepean River is approximately 3.5 km to the west of the site. The river supplies water to the majority of Sydney, as well as water for agricultural purposes. The Nepean River greatly reduced in flow when its major tributary, the Warragamba River, was dammed. Figure 6-3 displays the location of the river relative to the proposed development.

The Warragamba Dam is located approximately 7.6 km from the proposed development. This dam is fed by the Warragamba River. The erection of the dam subsequently allowed for the man-made Lake Burragorang to be formed downstream. The Warragamba River flows approximately 3.5 km until it joins with the Nepean River.

There is a small ephemeral watercourse that traverses the site in the southern portion of the site and runs from east to west during times of heavy rainfall. This is part of the Duncans Creek Catchment.

Figure 6-3: Nearest Waterway

Source: Google Maps 2020

6.2.1.1 Water Quality and River Flow Objectives

Water Quality Objectives (WQOs) and the River Flow Objectives (RFOs) identify the agreed environmental values and long-term goals for NSW's surface waters. Unfortunately, the NSW Water Quality Objectives website does not provide objectives for the Hawkesbury-Nepean catchment area. Public enquiries for this and other three catchments have been completed or substantially completed by the Healthy Rivers Commission (HRC).

The HRC was discontinued in 2004 and was replaced by the Natural Resources Commission (NRC). Outstanding Healthy River Commission recommendations have been incorporated by the NRC into Catchment Action Plans and Government programs. The Hawkesbury-Nepean Catchment Action Plan is discussed in the following section.

6.2.1.2 Catchment Management Plan

This section provides details about the Hawkesbury-Nepean Catchment Action Plan (CAP). There are no discharges to waterways associated with the proposed development, however this has been included for completeness. The CAP outlines certain priorities and strategies that must be undertaken in order to maintain the health and vitality of the ecosystem and are shown inTable 6-1. Figure 6-4 shows the Hawkesbury-Nepean Catchment map.

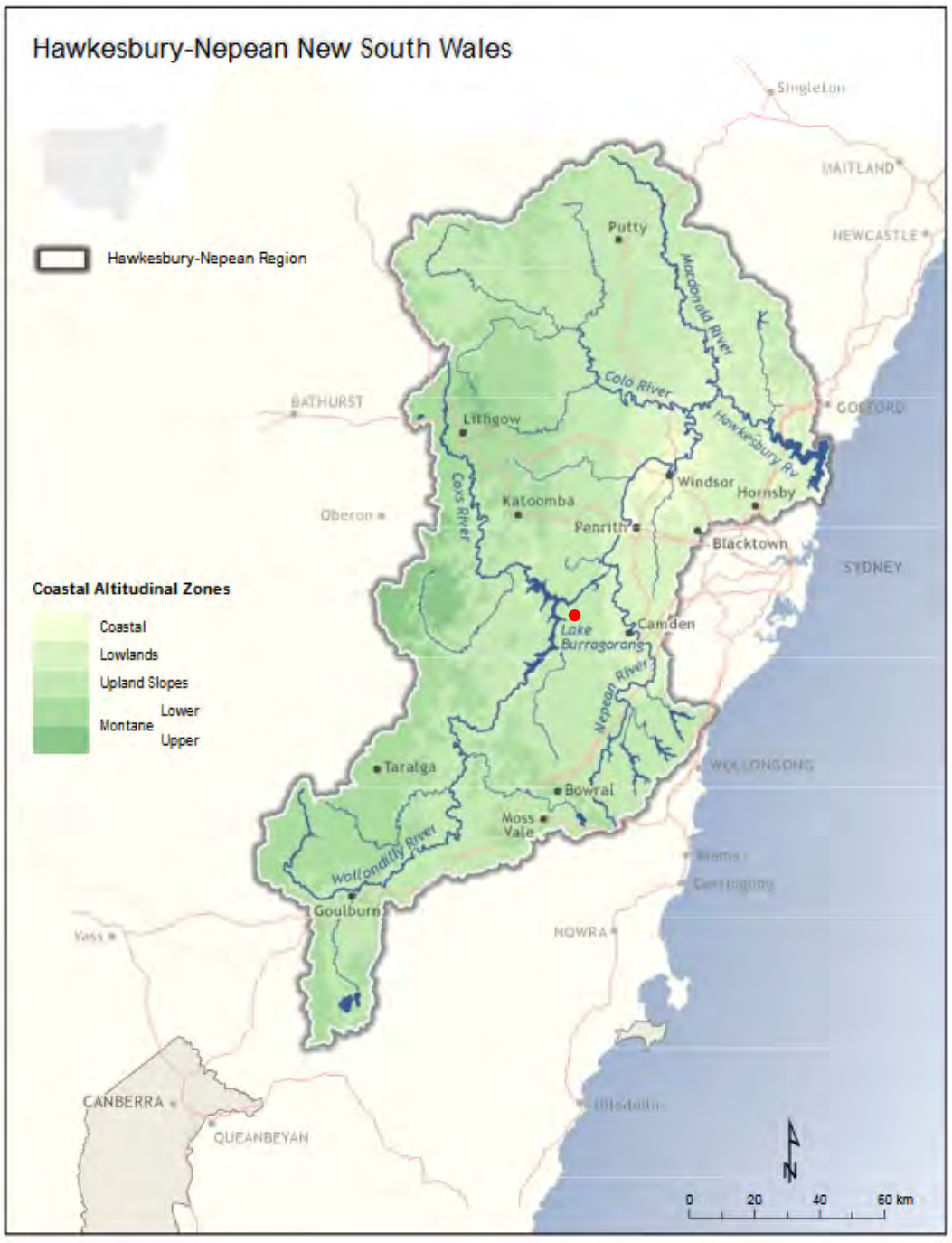
Table 6-1: CAP Goals and Strategies

	Community	Productivity	Biodiversity	Urban Liveability	Resilient Landscapes
Goals	Communities that relate to and care for their landscapes in many ways.	A region that supports productive enterprises that use natural assets sustainably.	A region that has diverse and abundant native wildlife.	Cities and towns that are more liveable due to protection, integration and enhancement of local ecosystem services.	A region that has communities and landscapes that can adapt and respond to change.
Strategies	**C1**: Support Aboriginal people to manage projects across culturally significant landscapes and values.	**P1**: Assist farmers and fishers to apply sustainable production practices.	**B1**: Maintain the diversity and health of natural systems.	**UL1**: Empower communities to understand and value ecosystem services and actively manage natural resources.	**RL1**: Integrate actions to achieve multiple outcomes. Build on previous investments for resilient outcomes.
	C2: Employ and/or support the skills of Aboriginal people to work with natural systems.	**P2**: Encourage the growth of enterprises which maintain environmental values.	**B2**: Maintain viable populations of native species, especially those found only in our region (endemic) and those under threat.	**UL2**: Create a more liveable and water sensitive city by implementing Water Sensitive Urban Design (WSUD)	**RL2**: Act to reduce the risks to highly vulnerable landscapes from climate changes.
	C3: Support people to work together to maintain and improve environments that are significant to them.	**P3**: Understand and maintain the flow of ecosystem services.	**B3**: Make connections across the landscape including the aquatic ecosystem.	**UL3**: Promote actions which support urban resilience through mitigation and adaptation to impacts of climate changes.	**RL3**: Apply best practice governance and business management. Continued improvement using the Standard for Quality NRM.

Table 6-1: CAP Goals and Strategies

	Community	Productivity	Biodiversity	Urban Liveability	Resilient Landscapes
	C4: Support groups with limited resources to allow them to manage their local environment.	**P4**: Support landholders in initiating projects that harness the value of ecosystem services.	**B4**: Reduce the risk of decline or extinction of native species.	**UL4**: Improve aquatic and terrestrial habitat condition, connectivity and recreational value in urban areas.	**RL4**: Develop appropriate evidence bases to support decision making.
	C5: Promote appreciation of natural environments for people from diverse cultural backgrounds.	**P5**: Restore ecosystem function to degraded areas.		**UL5**: Enhance and protect Sydney's natural places to support a liveable city.	**RL5:** Monitor outcomes and risks to support adaptive management.
	C6: In areas of high population, enhance, maintain and provide access to local places with scenic and natural qualities.	**P6**: Maintain sustainable agriculture in proximity to the Sydney market on fertile soils with access to water.		**UL6**: Use demonstration sites to show best practice and influence future actions.	**RL6**: Adapt to change through understanding changes in people and landscapes.

Figure 6-4: Hawkesbury-Nepean Catchment map



Source: NSW Government

↑N Not to scale	LEGEND: ● - Subject Site	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.2.2 Groundwater

The Australian Groundwater Explorer map shown in Figure 6-5 shows that there are no groundwater bores within 500 m of the subject site.

Figure 6-5: Groundwater bores near the proposed development

Source: Australian Groundwater Explorer, 2020

↑N Not to scale		Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

No groundwater was encountered during the geotechnical investigation provided in Appendix 8. Boreholes were drilled to a depth of between 2 to 3 metres.

6.2.3 Flooding

Maps from the Penrith Local Environmental Plan 2010 show that the site is not in a flood planning area. This is displayed below in Figure 6-6.

Figure 6-6: Flood Planning Map

Source: Penrith LEP Flood Planning Map

↑N Not to scale	LEGEND: Site border: Flood planning location:	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

However, it was noted from pre-lodgement advice that the site is located in a significant overland flow path which will have adverse impacts on the surrounding properties. The site as shown on Figure 6.1J of the Penrith Overland Flow Study, Report J2453/R2251 (August 2006) is located within the "PMF Hazard" and 20 year ARI Flood Hazard. This is replicated in Figure 6-7 below.

Note: PMF is the probable maximum flood which is defined as "the flood calculated to be the maximum that is likely to occur."

Flood information from Penrith City Council was obtained and this is provided in Attachment 4.

Figure 6-7: Extract of Figure 6.1J of Penrith Overland Flood Study

Source: Penrith LEP Flood Planning Map

↑N Not to scale	LEGEND: Site border: PMF Hazard 100 Year ARI Flood Hazard 20 Year ARI Flood Hazard Excluded Areas Including 100 Year ARI Flood Extent for Nepean River and South Creek	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.3 HERITAGE

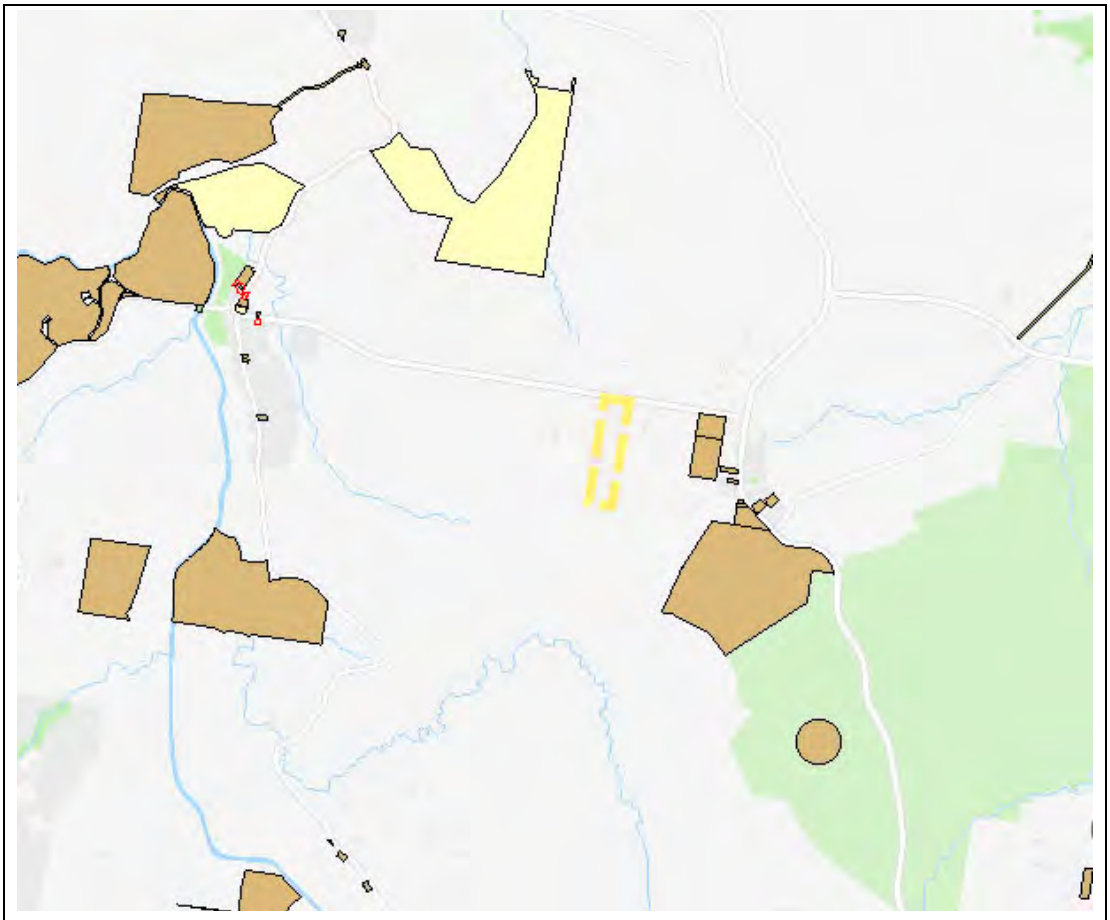
Under the s 10.7 certificate, the land does not contain an item of environmental heritage.

The site is not listed as being a heritage item or containing heritage items (either European or Aboriginal) under the Penrith LEP 2010.

A search of the NSW State Heritage Register also concluded there are no heritage listed sites within the immediate vicinity of the subject site.

Figure 6-8 shows the proposed site location and listed heritage items in its vicinity. The nearest item listed, "Luddenham showground", is approximately 650 m east of the site. Due to the nature of the proposed use and the distance from the site, there would be no significant impacts on this or any other item. Consequently, no further heritage studies were justified.

Figure 6-8: Heritage item map



Source: NSW Planning Portal 2020

N Not to scale	LEGEND: Site border: Aboriginal Place of Heritage Significance Conservation Area - General Conservation Area - Landscape Heritage Conservation Area Item - Aboriginal Item - Archaeological Item - General Item - Landscape	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.3.1 Aboriginal Heritage

A search of the local heritage register indicated no Aboriginal heritage locations have been identified or uncovered on or in the vicinity of the site. A background Aboriginal Heritage Review and Evaluation (including AHIMS), site Inspection to identify if Aboriginal Heritage constraints apply to the project was undertaken.

6.3.2 European Heritage

No European heritage locations have been identified or uncovered on or in the vicinity of the site as stated in the local heritage register.

6.4 FLORA AND FAUNA

The majority of the site is densely vegetated with cleared and disturbed areas evident in the north east area of the site and sparsely vegetated and grassed areas on the north east area with frontage to Park Road. Council pre-lodgement notes identified that the site is mapped as containing:

- Cumberland Plain Woodland - a Critically Endangered Ecological Community under both State and Federal legislation;
- Shale Plains Woodland which is listed as a critically endangered ecological community under State legislation; and
- *Dillwynia Tenuifolia*, a vulnerable plant species under the Threatened Species Conservation Act 1995.

6.4.1 Flora and Fauna Targeted Search

A targeted search was undertaken using data from the BioNet Atlas of NSW Wildlife website to identify any threatened species in the area surrounding the proposed development. The search criteria included all valid records, from the past five years, of entities threatened in NSW (listed under the *Threatened Species Conservation Act 1995*) and entities threatened nationally (listed under the *Environment Protection and Biodiversity Conservation Act 1999*) within a selected area. The results from the search are listed in Table 6-2.

There are five (5) endangered species within the 10 km proximity of the site. This includes two (2) species of plants and three (3) species of animals. However, there are no endangered species on the site and the operations occurring on site will not impact the species to any degree. The proximity of the endangered species to the site can be seen in Figure 6-9.

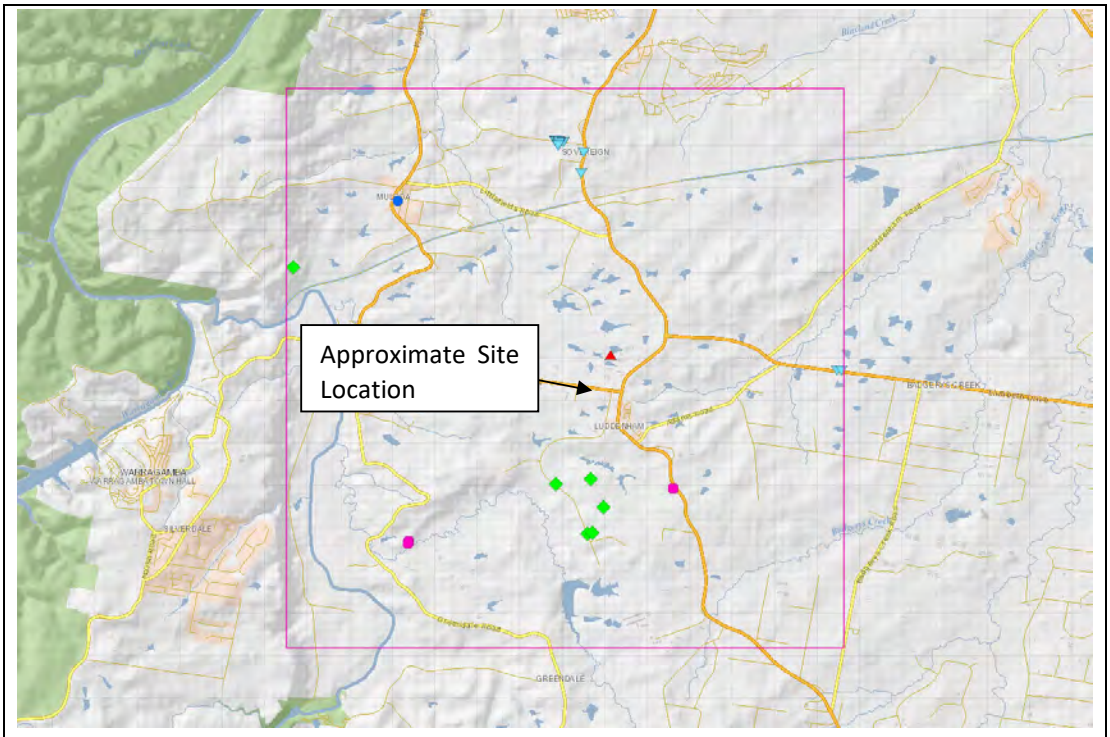
Table 6-2: List of threatened species in the selected area

Kingdom	Scientific Name	Common Name	NSW Status	Sightings
Animalia	*Litoria aurea*	Green and Golden Bell Frog	Endangered	1
Animalia	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Vulnerable Protected	6
Animalia	*Hieraaetus morphnoides*	Little Eagle	Vulnerable Protected	5
Animalia	*Lophoictinia isura*	Square-tailed Kite	Vulnerable Protected Sensitivity Class 3	2
Animalia	*Callocephalon fimbriatum*	Gang-gang Cockatoo	Vulnerable Protected Sensitivity Class 3	1

Table 6-2: List of threatened species in the selected area

Kingdom	Scientific Name	Common Name	NSW Status	Sightings
Animalia	*Lathamus discolor*	Swift Parrot	Endangered Protected Sensitivity Class 3	1
Animalia	*Ninox connivens*	Barking Owl	Vulnerable Protected Sensitivity Class 3	1
Animalia	*Tyto novaehollandiae*	Masked Owl	Vulnerable Protected Sensitivity Class 3	1
Animalia	*Tyto tenebricosa*	Sooty Owl	Vulnerable Protected Sensitivity Class 3	2
Animalia	*Daphoenositta chrysoptera*	Varied Sittella	Vulnerable Protected	1
Animalia	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	Vulnerable Protected	6
Animalia	*Phascolarctos cinereus*	Koala	Vulnerable Protected	1
Animalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	Vulnerable Protected	7
Animalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	Vulnerable Protected	2
Animalia	*Myotis macropus*	Southern Myotis	Vulnerable Protected	6
Animalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	Vulnerable Protected	6
Animalia	*Meridolum corneovirens*	Cumberland Plain Land Snail	Endangered	6
Plantae	*Pultenaea parviflora*	-	Endangered	43
Plantae	*Pimelea spicata*	Spiked Rice-flower	Endangered	3

Figure 6-9: Endangered flora and fauna sightings



Source: BioNet Atlas of NSW Wildlife, 2020

↑N Not to scale	LEGEND: Green and Golden Bell Frog Swift Parrot Cumberland Plain Land Snail Pultenaeqa parviflora Spiked Rice-flower	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

A full BDAR was undertaken by Narla Environmental to support this EIS and can be viewed as Appendix 2

6.4.2 Environmentally Sensitive Land

The Penrith LEP 2010 identifies the site as being on "Environmentally Significant Land".

As per the LEP, the objectives of environmentally significant land is to:

- Maintain bushland, wetlands and wildlife corridors of high conservation value;
- Identify areas of significance for revegetation to connect to or buffer bushland, wetlands and wildlife corridors;

- Protect rare and threatened native flora and native fauna; and
- Ensure consideration of the significance of vegetation, the sensitivity of the land and the impact of development on the environment prior to the giving of any development consent.

Figure 6-10 shows environmentally significant land in relation to the site. The environmentally significant land is restricted to the southern perimeter of the site. The proposed development area (in the north of the site) will not have any impact to this land and the objectives of the LEP will be upheld.

Figure 6-10: Environmentally significant land map

Source: NSW Planning portal 2020

N Not to scale	LEGEND: Site border: Environmentally sensitive land:	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.4.3 Bushfire Prone Land

The Penrith City Council LEP identifies the site as being on bushfire prone land.

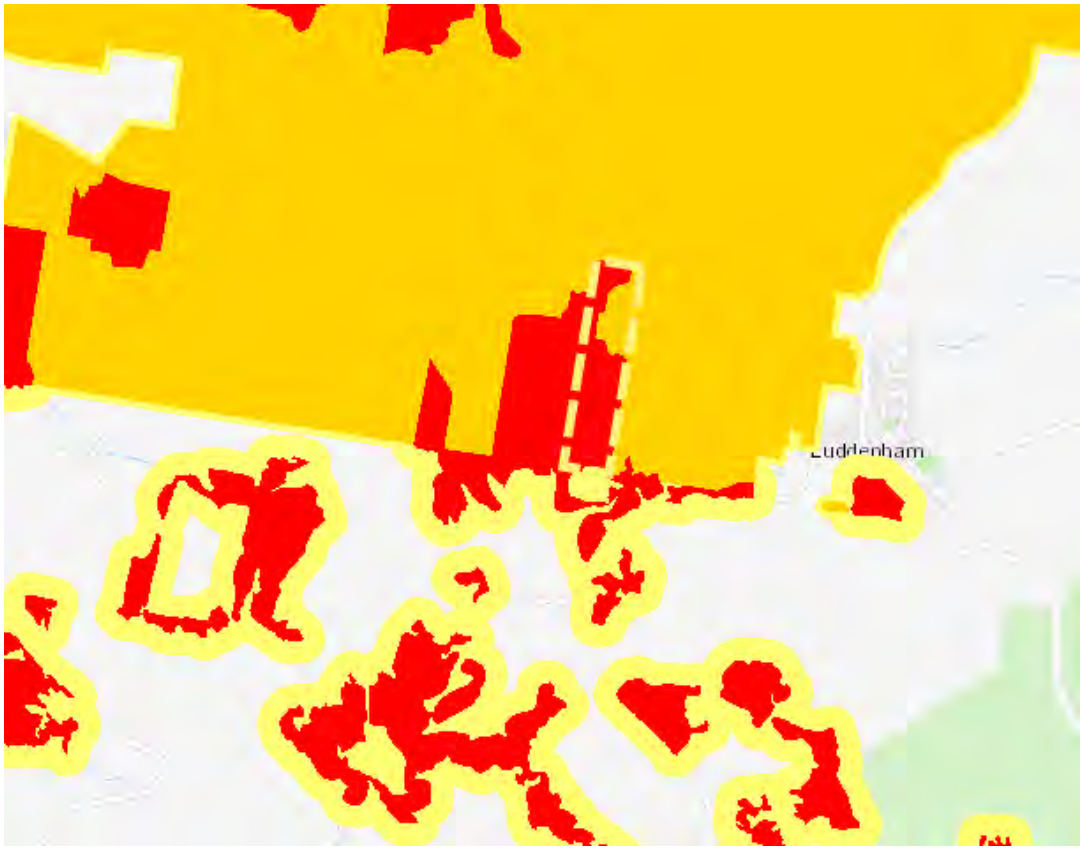
The site consists of vegetation category 1 and 3; category 3 land is in the north-eastern portion of the site, category 1 across the remainder of the site.

As per the NSW Rural Fire Service, vegetation is classified upon its risk of bushfire. Table 6-3 displays the categories and their requirements.

Table 6-3: Bushfire prone land vegetation category and risk

Vegetation category	Description
Vegetation Category 1	The highest risk for bush fire. It is represented as red on the bush fire prone land map and will be given a 100m buffer. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production. Vegetation Category 1 consists of: Areas of forest, woodlands, heaths (tall and short), forested wetlands and timber plantations.
Vegetation Category 2	A lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. It is represented as light orange on a bush fire prone land map and will be given a 30-metre buffer. This vegetation category has lower combustibility and/or limited potential fire size due to the vegetation area shape and size, land geography and management practices. Vegetation Category 2 consists of: Rainforests, lower risk vegetation parcels such as remnant vegetation, land with ongoing land management practices that actively reduces bush fire risk, discrete urban reserve/s, parcels that are isolated from larger uninterrupted tracts of vegetation and known fire paths, shapes and topographies which do not permit significant upslope fire runs towards development suitable access and adequate infrastructure to support suppression by firefighters and vegetation that represents a lower likelihood of ignitions because the vegetation is surrounded by development in such a way that an ignition in any part of the vegetation has a higher likelihood of detection.
Vegetation Category 3	Medium bush fire risk vegetation. It is higher in bush fire risk than category 2 (and the excluded areas) but lower than Category 1. It is represented as dark orange on a Bush Fire Prone Land map and will be given a 30-metre buffer. This category consists of: Grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands.

Figure 6-11: Bushfire prone land map



Source: NSW Planning portal 2020

↑N Not to scale	LEGEND: Site border: Vegetation Category 1 Vegetation Category 2 Vegetation Category 3 Vegetation Buffer	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

The proposed development area is within the vegetation category 3 portion of the site and a Bushfire Assessment (Appendix 7) has been undertaken.

6.4.4 Land with Scenic and Landscape Values

The subject site is mapped as land with scenic and landscape values under the Penrith LEP as shown on Figure 6-12.

Clause 7.5(3) of Penrith LEP states that:

> *Development consent must not be granted for any development on land to which this clause applies unless the consent authority is satisfied that measures will be taken, including in relation to the location and design of the development, to minimise the visual impact of the development from major roads and other public places.*

Visual amenity issues are discussed in Section 9.2.

Figure 6-12: Map showing land with scenic and landscape values

Source: NSW Planning portal 2020

↑N Not to scale	LEGEND: Site border: Land with Scenic and Landscape Values Vistas of heritage items **Cadastre** Cadastre 12/05/2014 © Penrith City Council	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.5 NOISE AMENITY

6.5.1 Nearest Receptors

Table 6-4 lists the nearest sensitive receptors relative to the site and Figure 6-13 displays the location of these receptors. As only a portion of the site is being developed, the distance from development has been calculated from the development borders rather than the site borders.

Table 6-4: Table of nearest receptors

Receptor ID	Address	Direction from Site	Lot and DP	Approximate distance to proposed development	Easting	Northing	Type of receiver
R1	334 Park Road Wallacia	W	Lot 1 DP1145597	120 m	285021.638	6249439.302	Residential
R2	322 Park Road Wallacia	W	Lot 1 DP1145716	225 m	284933.078	6249512.917	Residential
R3	323-341 Park Road Wallacia	NW	Lot 8 DP666928	170 m	285037.927	6249646.635	Residential
R4	343-351 Park Road Wallacia	NNW	Lot 71 DP594632	175 m	285134.703	6249714.806	Residential
R5	353-361 Park Road Wallacia	N	Lot 72 DP594632	220 m	285292.865	6249747.295	Residential
R6	363 Park Road Luddenham	NE	Lot 6 DP651102	200 m	285481.825	6249581.294	Residential
R7	364 Park Road Luddenham	E	Lot 4 DP653236	115 m	285403.646	6249481.174	Residential
R8	386 Park Road Luddenham	E	Lot 1 DP557920	245 m	285485.226	6249150.151	Residential
R9	384 Park Road Luddenham	E	Lot 2 DP557920	275 m	285490.185	6248944.237	Residential
R10	45 Willowdene Avenue Luddenham	S	Lot 3 DP248069	565 m	285042.472	6248548.515	Residential
R11	115 Willowdene Avenue Luddenham	SW	Lot 4 DP248069	720 m	284827.59	6248489.29	Residential
R12	288A Park Road Wallacia	WSW	Lot 1 DP1195400	610 m	284516.692	6249018.95	Residential
R13	32 Willowdene Avenue Luddenham	SE	Lot 32 DP771596	865 m	285871.683	6248638.714	School
R14	288A Park Road Wallacia	W	Lot 1 DP1195400	445 m	284654.005	6249225.993	Industrial
R15	380 Park Road Luddenham	E	Lot 1 DP215057	185 m	285441.875	6249297.194	Industrial

Note: distances measured from the boundaries of the site development area

Figure 6-13: Potential sensitive receptors

Source: Six Maps NSW, 2020

N Not to scale	LEGEND: Receptor: + R1 Development border: Site border:	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.5.2 Existing Acoustic Environment

The level of background noise varies over the course of any 24-hour period, typically from a minimum at 3.00am to a maximum during morning and afternoon traffic peak hours. Therefore, the NSW EPA Noise Policy for Industry (2017) requires that the level of background and ambient noise be assessed separately for the daytime, evening and night time periods. The Noise Policy for Industry defines these periods as follows:

- **Day** – the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays;
- **Evening** – the period from 6pm to 10pm; and
- **Night** – the remaining periods.

6.5.2.1 Measurement Locations

Unattended long-term noise monitoring was undertaken from 17th March 2020 to 29th March 2020 at one representative location at 344 Park Road, Wallacia.

The attended and noise logging locations are shown in Figure 6-14 below.

Figure 6-14: Noise logging location

Source: Google Maps 2020

N Not to scale	**Legend**: Noise logging location Site boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.5.2.2 Measured Noise Levels

6.5.2.2.1 Long-Term Unattended Noise Monitoring Results

The data was analysed to determine a single assessment background level (ABL) for each day, evening and night time period, in accordance with the NSW EPA Noise Policy for Industry. That is, the ABL is established by determining the lowest tenth-percentile level of the L_{A90} noise data over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night assessment periods is based on the median of individual ABL's determined over the entire monitoring period.

The results of the long-term unattended noise monitoring are displayed in Table 6-5.

Table 6-5: Unattended Noise Monitoring Results at Logger Location, dB(A)

Date	Average L_1			Average L_{10}			ABL (L_{90})			L_{eq}		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
17/03/2020	65	62	57	57	55	48	45	43	40	55	53	47
18/03/2020	65	62	61	57	56	52	42	45	39	55	53	52
19/03/2020	65	63	61	58	56	53	41	44	40	55	53	52
20/03/2020	-	-	61	-	-	55	-	-	43	-	-	53
21/03/2020	65	59	59	57	52	51	41	40	39	54	50	50
22/03/2020	63	61	56	55	53	47	40	40	40	53	51	46
23/03/2020	65	60	60	57	53	51	41	41	39	55	50	53
24/03/2020	65	60	60	58	53	51	41	39	37	55	50	51
25/03/2020	-	-	59	-	-	50	-	-	38	-	-	50
26/03/2020	63	61	60	56	54	51	40	41	39	53	52	51
27/03/2020	65	61	-	57	54	-	41	45	-	55	52	-
28/03/2020	64	-	57	56	-	47	41	**-**	**37**	54	**-**	**47**
29/03/2020	62	-	53	54	-	46	38	-	40	53	-	45
Average	**64**	**61**	**59**	**57**	**54**	**50**	*	*	*	*	*	*
Median (RBL)	*	*	*	*	*	*	**41**	**41**	**39**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**54**	**52**	**51**

Note: - indicates values that has not been considered due to adverse weather conditions.
* Indicates values that are not relevant to that noise descriptor.
Value in bold indicates relevant noise descriptor.

6.5.2.2.2 Short Term Operator Attended Noise Monitoring Results

Given that the results of the unattended noise monitoring are affected by all ambient noise sources such as local fauna, road traffic and industrial sources, it is not possible to determine with precision the exact existing industrial noise contribution based on unattended monitoring alone. Therefore, the attended noise monitoring allows for a more detailed understanding of the existing ambient noise characteristics and a more meaningful final analysis to be undertaken. The results of the short-term attended noise monitoring are displayed in Table 6-6.

Table 6-6: Attended Noise Monitoring Results, dB(A)

Location / Time	Noise Descriptor				Comments
	L_{Aeq}	L_{A90}	L_{A10}	L_{A1}	
344 Park Road, Wallacia 3.16 pm	54	45	57	65	*Passing trucks <69 dB(A)* *Plane <62 dB(A)* *Birds <57 dB(A)* *Passing cars <60 dB(A)* *Barking dog <50 dB(A)* *Wind <53 dB(A)* *Insects <45 dB(A)* *Motorised pesticide sprayer <44 dB(A)* *Noise dominated by frequent traffic on Park Road, insect noise and bird noise. Dog barks consistently and constant distant traffic. A few small planes overhead.*

6.5.3 Meteorological Conditions

Wind and temperature inversions may affect the noise emissions from the site and are to be incorporated in the assessment when considered to be a feature of the area.

In this section, an analysis of the 2019 weather data has been conducted to establish whether significant winds are characteristic of the area.

6.5.4 Wind Effects

Wind is considered to be a feature where source-to-receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30% or more of the time in any assessment period in any season.

6.5.5 Wind Rose Plots

Wind rose plots show the direction that the wind is coming from, with triangles known as “petals”. The petals of the plots in the figures summarise wind direction data into 8 compass directions i.e. north, north-east, east, south-east, etc. The length of the triangles, or “petals”, indicates the frequency that the wind blows from that direction. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes.

Thus, the segments of a petal show what proportion of wind for a given direction falls into each class. The proportion of time for which wind speed is less than 0.5 m/s, when speed is negligible, is referred to as calm hours or “calms”. Calms are not shown on a wind rose as they have no

direction, but the proportion of time consisting of the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axis, which denote frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are similar in size. The frequencies denoted on the axes are indicated beneath each wind rose.

6.5.6 Local Wind Trends

Seasonal wind rose plots for this site utilising Badgerys Creek AWS data have been included in Figure 6-15, Figure 6-16 and Figure 6-17 for day, evening and night periods respectively.

Figure 6-15: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Day time

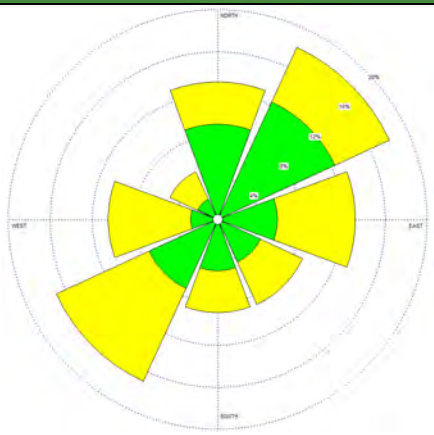
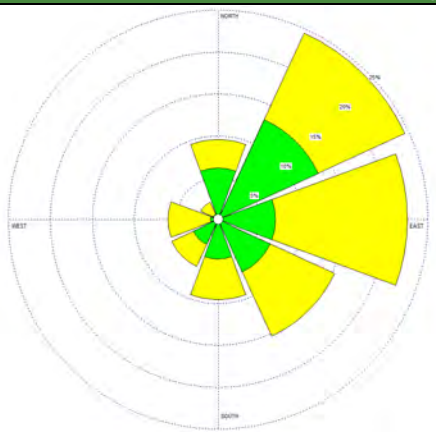
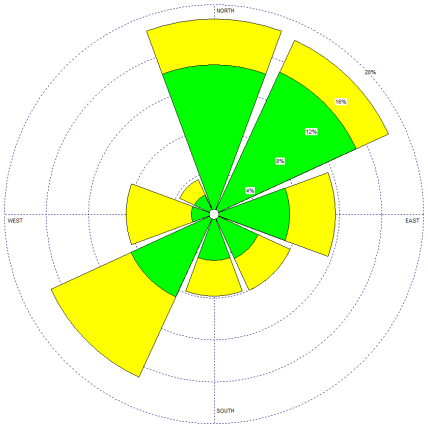
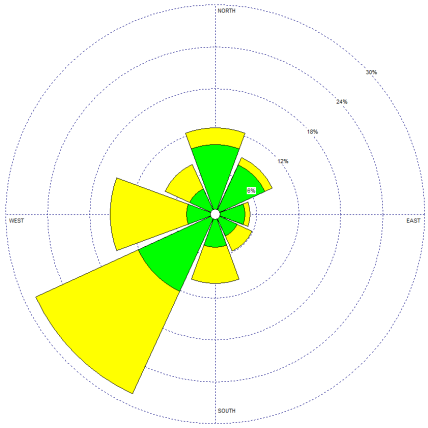
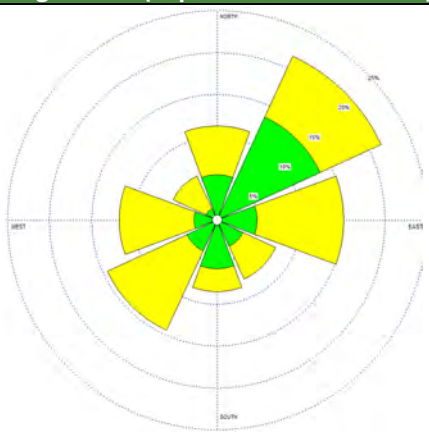
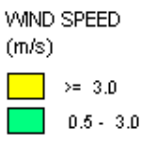
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 3.15 m/s Calms Frequencies: 5.47% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 3.27 m/s Calms Frequencies: 4.09% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.62 m/s Calms Frequencies: 6.62% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 3.05 m/s Calms Frequencies: 6.72% Axis Frequencies: 6%, 12%, 18%, 24%, 30%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 3.70 m/s Calms Frequencies: 4.20% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Figure 6-16: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Evening time

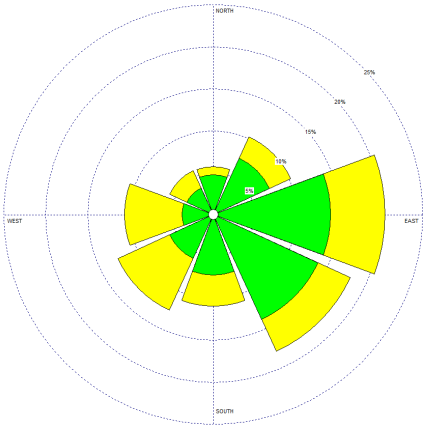
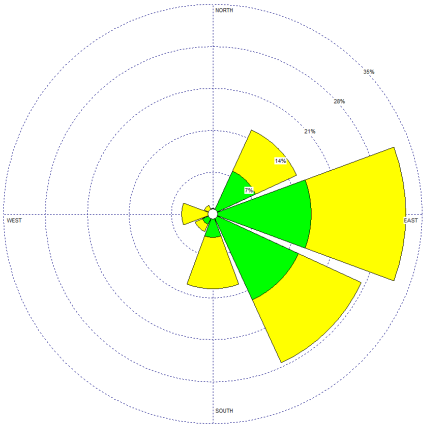
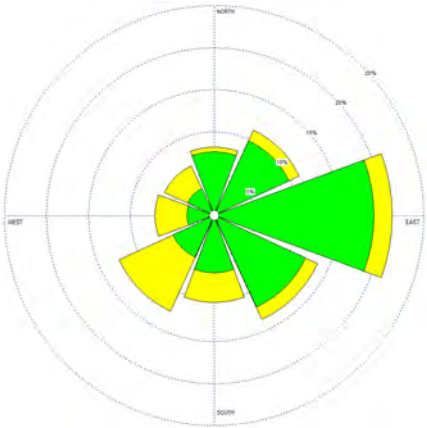
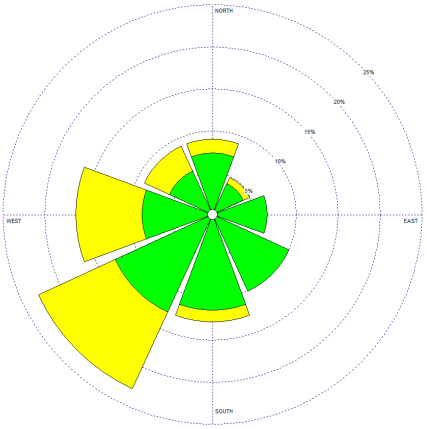
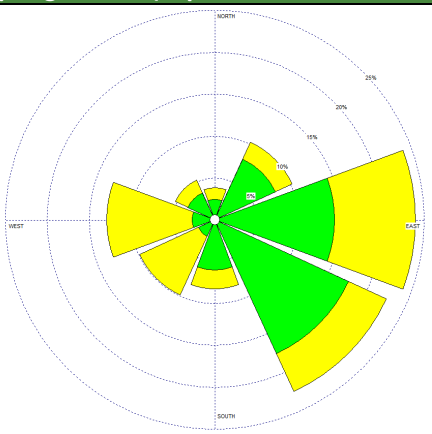
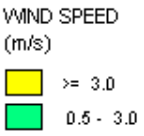
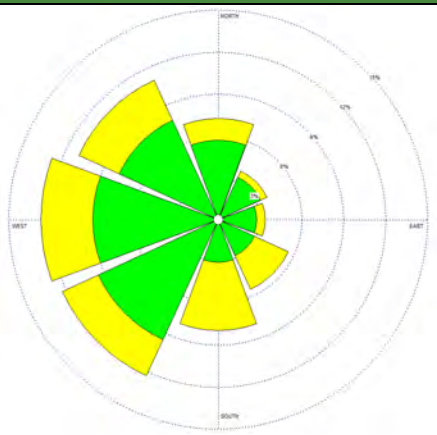
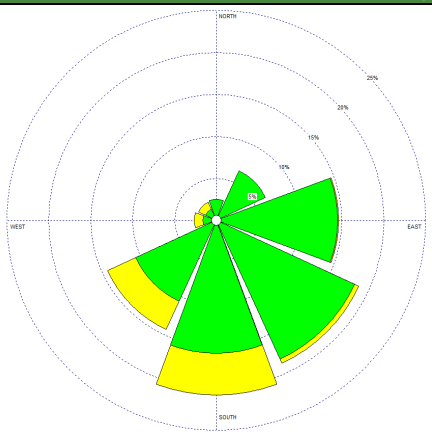
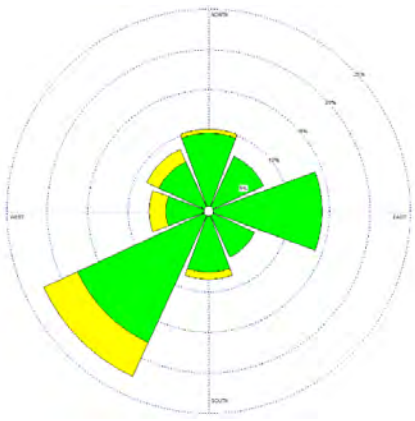
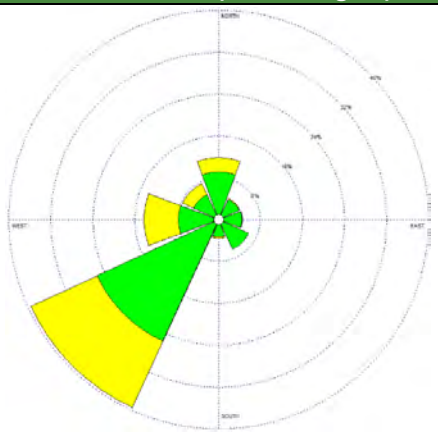
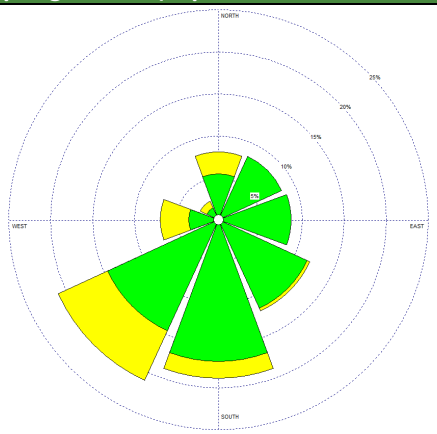
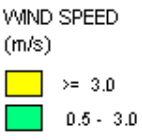
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.63 m/s Calms Frequencies: 5.91% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 4.47 m/s Calms Frequencies: 1.32% Axis Frequencies: 7%, 14%, 21%, 28%, 35%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.13 m/s Calms Frequencies: 9.51% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 2.32 m/s Calms Frequencies: 8.70% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.96 m/s Calms Frequencies: 3.30% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Figure 6-17: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Night time

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 1.76 m/s Calms Frequencies: 13.48% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 1.47 m/s Calms Frequencies: 17.55% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 1.49 m/s Calms Frequencies: 15.34% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 2.26 m/s Calms Frequencies: 7.97% Axis Frequencies: 8%, 16%, 24%, 32%, 40%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 1.74 m/s Calms Frequencies: 13.80% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Appendix D2 of the Noise Policy for Industry (EPA, 2017), refers to utilising the Noise Enhancing Wind Analysis (NEWA) program on the NSW EPA website to determine the significance of source-to-receiver winds.

Table 6-7 below contains the noise wind component analysis from the NEWA software. Wind speeds are taken up to 3 m/s and wind direction is taken from source-to-receiver, plus and minus 45 degrees, as per appendix D2 of the Noise Policy for Industry.

It can be seen from Table 6-7 that there are two instances where during a period/season, more than 30% of wind speeds are less than 3 m/s in the plus and minus 45 degree arc from source to receiver.

Therefore, based on the information presented from the weather data, source-to receiver wind speeds of 3 m/s or are present for more than 30% of the time during the winter night time period. Therefore, wind effects have been included in the assessment.

Table 6-7: Noise Wind Component Analysis 2019 Badgerys Creek

Receiver	Day				Evening				Night			
	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring
R1	14.3	13.8	7.2	9.0	27.0	22.0	9.8	25.5	17.7	3.4	0.5	7.9
R2	14.6	13.6	7.1	8.8	26.3	22.3	11.4	26.1	19.3	4.6	0.5	8.2
R3	10.9	11.2	5.6	8.0	19.9	21.5	11.1	20.3	20.0	8.4	0.7	10.6
R4	7.3	8.5	4.0	6.0	14.6	18.5	7.9	17.3	16.0	8.3	0.7	9.5
R5	10.4	13.6	10.9	9.5	13.4	26.4	22.6	19.5	29.5	35.3	24.2	30.9
R6	7.3	12.4	15.7	7.7	5.1	17.1	27.2	9.9	21.0	29.8	31.5	26.4
R7	6.9	12.9	16.7	7.6	4.8	16.0	27.2	7.1	20.0	28.2	32.4	26.3
R8	9.7	16.2	23.4	11.3	2.3	6.8	23.9	2.7	2.9	9.8	23.8	8.3
R9	14.0	20.7	25.9	17.1	2.0	9.0	23.9	2.5	3.4	10.6	25.5	9.0
R10	23.9	20.0	19.0	20.7	7.8	8.4	13.6	9.3	6.6	5.8	15.7	7.6
R11	23.5	19.6	16.4	22.5	13.1	8.4	9.2	12.6	8.2	4.9	12.0	7.7
R12	19.5	12.9	6.9	13.5	24.7	12.0	4.6	19.2	9.4	0.1	0.6	5.1
R13	11.8	18.5	26.1	14.9	1.8	9.0	23.4	2.2	3.3	10.4	25.8	9.0
R14	16.9	12.5	6.2	11.0	28.0	15.5	6.8	21.7	11.1	0.4	0.4	5.5
R15	6.1	14.2	21.4	8.9	2.8	9.5	26.9	3.0	5.1	11.3	24.4	10.3

Noise enhancing meteorological conditions occur for 30% or more of the period and season

6.6 BACKGROUND AIR QUALITY

Background air quality parameters were obtained from the NSW EPA air quality monitoring station in Camden. This station is located approximately 18 km south of the subject site and is considered appropriately representative. Although Bringelly monitoring station is 9km from the subject site it does not have $PM_{2.5}$ data available. The relevant assessable pollutant parameters available from the monitoring station are $PM_{2.5}$ and PM_{10}.

Data was obtained for 2015 as it was considered the most representative year. A summary of this data is provided below in Table 6-8.

Table 6-8: Summary of 2015 Data for $PM_{2.5}$ and PM_{10} from Camden Air Quality Monitoring Station.

Pollutant	Averaging period	Concentration (µg/m^3)
$PM_{2.5}$	Maximum 24 hr average for 2015	24.96
	2nd highest 24 hr average for 2015	20.70
	3rd highest 24 hr average for 2015	17.96
	Annual average for 2015	6.44
PM_{10}	Maximum 24 hr average for 2015	**62.42**
	2nd highest 24 hr average for 2015	34.90
	3rd highest 24 hr average for 2015	32.66
	Annual average for 2015	14.06

Note: Average values are calculated from hourly data available on https://www.environment.nsw.gov.au/. Bold values exceed the *Approved Methods* criteria.

6.7 CLIMATE

This section provides the meteorological conditions on the existing environment relevant to the proposed development. Data has been collected from the Bureau of Meteorology (BoM) Badgerys Creek AWS, Station No. 067108, is approximately 5.3 km south-east of the site, and as such, is seen as representative of the site.

6.7.1 Temperature

The mean annual maximum and minimum temperatures for Badgerys Creek AWS are 24.0°C and 10.9°C respectively. The lowest temperatures occur in July, at a mean minimum of 4.1°C, and the maximum temperatures occur in January, reaching a maximum monthly mean of 30.3°C. This data is displayed in Table 6-9.

Table 6-9: Temperature statistics for Badgerys Creek AWS

Month / Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum monthly temperature (°C)	30.3	28.9	26.9	24.1	20.8	17.8	17.5	19.2	22.6	24.9	26.6	28.7	24.0
Mean minimum monthly temperature (°C)	17.3	17.1	15.3	11.5	7.6	5.6	4.1	4.7	7.7	10.5	13.5	15.5	10.9

Note: Data was collected by the BoM between 1995 and 2019.

6.7.2 Rainfall

The mean annual rainfall for the Badgerys Creek AWS is 658.1 mm. The largest amount of rainfall occurs in February, which experiences a mean rainfall 95.3 mm. The smallest mean rainfall occurs in July, which experiences an average of 22.6 mm of rain for the month. The most days where rainfall occurs is in March, which encounters an average of 7.5 days of rain. The smallest number of days where rainfall occurs is in August, where, on average, rainfall is only evident on 3.3 days of the month. This data is presented in Table 6-10.

Table 6-10: Rainfall Statistics for Badgerys Creek AWS

Months / Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	76.2	95.3	83.1	47.5	35.9	60.5	22.6	34.7	34.9	52.1	67.6	53.6	658.1
Decile 5 (Median) Rainfall (mm)	51.4	79.4	57.3	27.8	17.0	47.7	20.0	20.1	31.3	42.9	50.5	42.2	639.0
Mean No. of Days of Rain ≥ 1 mm	7.1	7.3	7.5	5.6	3.7	5.5	3.7	3.3	4.7	5.5	6.7	6.2	66.8

Note: Data was collected by the BoM between 1995 and 2019.

6.7.3 Wind

Seasonal wind rose plots for this site utilising Badgerys Creek AWS 2015 data have been included in Figure 6-18. Annual average wind speeds of 2.28 m/s and a calms frequency of 7.22% were estimated. Annual winds from the south-west were found to be dominant and were present for approximately 25% of the time.

The average summer wind speed was 2.31 m/s, with a calms frequency of 6.45%. North-east and westerly winds were found to be the most dominant at a frequency of around 18% each.

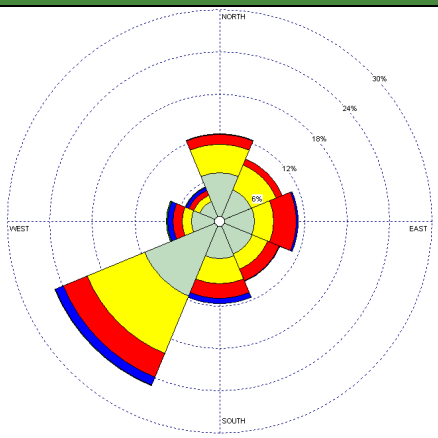
In autumn, dominant winds were blowing from the north-east (~28%). The average autumn wind speed was 2.28 m/s with a calms frequency of 7.29%.

The winter season data showed the prevalence of winds from the north-east, which accounted for ~35% of winds. Followed by winds from the south accounting for ~17% of wind directions. The average winter wind speed was determined to be 2.18 m/s with a calms frequency of 8.65%.

In the spring time, average wind speeds of 2.34 m/s with a frequency of calms of 6.92% were recorded. Winds were from the north, south and south-east were similar is distributions accounting for ~12-14% each. The rest of the wind directions were found to be present at frequencies less than 12%.

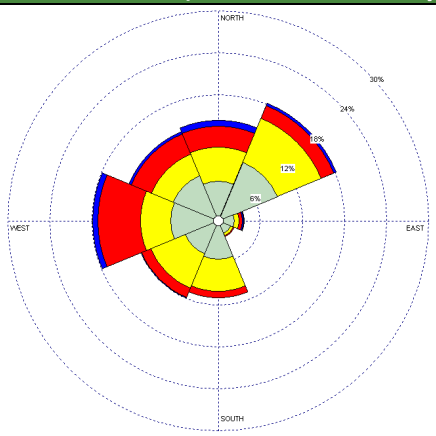
Figure 6-18: Wind Rose Plots for the Referenced Meteorological Station – BOM Badgerys Creek AWS ID 067108 (2015)

All Seasons



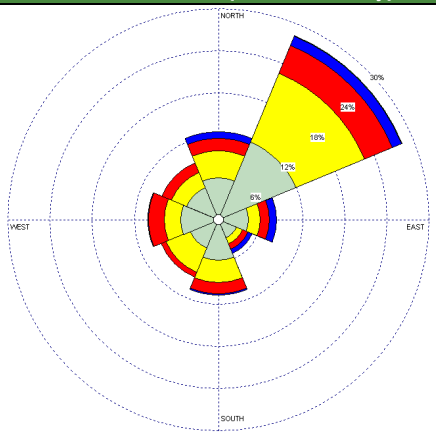
Average Wind Speed: 2.28 m/s
Calms Frequency: 7.22%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Summer Season (December – February)



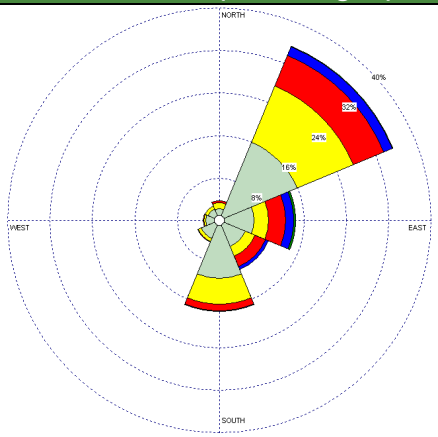
Average Wind Speed: 2.31 m/s
Calms Frequency: 6.45%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Autumn Season (March – May)



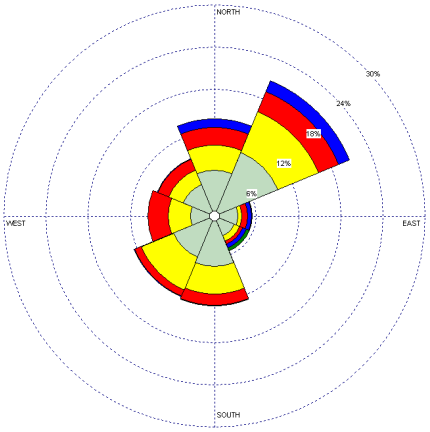
Average Wind Speed: 2.28 m/s
Calms Frequency: 7.29%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Winter Season (June – August)



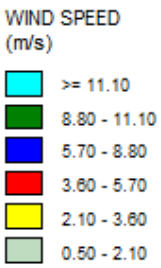
Average Wind Speed: 2.18 m/s
Calms Frequency: 8.65%
Axis Frequencies: 8%, 16%, 18%, 24%, 32%, 40%

Spring Season (September – November)



Average Wind Speed: 2.34m/s
Calms Frequency: 6.92%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Legend



7. IDENTIFICATION AND PRIORITISATION OF ISSUES

The identification and prioritisation of the potential environmental impacts of the proposed development were fundamental steps in preparing the EIS.

This process involved the following stages:

1. Review of the proposal and existing site operations

Initial meetings with the proponent were undertaken to discuss the details of the proposal. This established a preliminary model for the proposal, potential materials and processes required and a concept site design. An inspection of the site and surrounding areas was undertaken which lead to identification of potential sensitive receptors.

2. Identification of planning requirements

Review of planning instruments that apply to the land was undertaken to determine any planning constraints and zoning rules affecting the property.

3. Guidelines and reference material

Past reports for the existing site were reviewed and relevant NSW government/ industry guidelines.

4. Preparation of Scoping Report

A Scoping Report was prepared based on the preliminary ideas that outlined the proposal and potential environmental impacts.

5. Consultation with regulatory authorities & stakeholders

Consultation with Penrith City Council in a pre-lodgement meeting determined Council requirements and expectations. Secretary's Environmental Assessment Requirements for the EIS from the DP&E were obtained. This included feedback from NSW EPA and RFS. The proposal was re-designed based on this feedback and this included establishment of a building to enclose operations and the implementation of a Resource Recovery and Transfer Facility (RRTF) in place of mobile crushing and screening equipment. Storage of materials either within the building or in enclosed covered storage bays was selected over storage in external stockpiles. Additionally the nature of incoming materials was to initially include VENM and ENM. Now, waste materials proposed to be accepted include C&D and C&I waste. No VENM or ENM would be accepted at the site. Furthermore, the proposal was initially incorrectly labelled an "extractive industry" and is now more appropriately defined as a "resource recovery facility".

These decisions led to an improved concept design with more stringent environmental controls and revised the objectives of the Proposal.

7.1 SUMMARY OF POTENTIAL ISSUES

The statutory requirements and past reports in conjunction with the government consultation process enabled the identification of the potential issues associated with the proposal. These are listed below in alphabetical order:

- Air quality;
- Chemical management;
- Contamination;
- Cumulative impacts;
- Fire and incident management;
- Flooding;
- Flora and Fauna/Biodiversity;
- Hazards and risk;
- Heritage;
- Human health and safety;
- Noise and vibration;
- Soil and land;
- Strategic context;
- Traffic and transport;
- Visual amenity;
- Waste management; and
- Water.

SEARs (document reference 1227) were provided on 5 June 2018 by the DP&E (refer to Attachment 1) and provides general requirements for the EIS as well as key issues to assess. The DP&E stated that the EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following key issues must be addressed:

- Strategic context;
- Suitability of the site;
- Waste management;
- Hazards and risk;
- Air quality;
- Noise and vibration;
- Soil and water;
- Traffic and transport;
- Fire and incident management;
- Biodiversity;
- Visual; and
- Heritage.

EPA's key information requirements for the proposal include an adequate assessment of:

- The facility must be enclosed;
- Waste Management;
- Waste Types;
- Water Management;

- Wheelwash;
- Water flow diagram & water balance;
- Air Quality;
- Noise;
- Fit and proper person;
- Occupier of the Premises; and
- Other – including details of any workshop of garaging of waste vehicles, and details of any fuel storage areas on the premises.

NSW Rural Fire Service advised the following:

- A bushfire assessment report needs to be prepared which identifies the extent to which the proposed development conforms or deviates from the relevant provisions of Planning for Bush Fire Protection 2006;
- The subject site is mapped bushfire prone and the development can be classified under 'Other developments' as per Section 4.3 of Planning for Bush Fire Protection 2006;
- The bushfire assessment report shall include classification of the vegetation on and surrounding the development (out to a distance of 140 metres from the boundaries of the property) and an assessment of the slope of the land on and surrounding the development (out to a distance of 100 metres).

The Transport for NSW requires a Transport and Traffic Impact Assessment and a draft Construction Traffic Management.

Council identified supporting documents to be provided in their initial pre-lodgement notes and provided additional written advice. A summary includes:

- Site Plans including survey plan, floor plans and elevations and sections.
- Environmental Impact Statement
- Stormwater Concept Plan (with report and calculations)
- Waste Management Plan
- Overland Flow Flood Report
- Water Sensitive Urban Design (WSUD) Strategy
- Landscape Plan
- Traffic and Access Report
- Flora and fauna assessment report
- The impacts of noise, dust and vibration on animals in the immediate vicinity is to be considered
- A Wastewater Report
- An air quality impact assessment
- A Water Quality Management Plan
- Contamination Assessment (SEPP 55) – Phase 2
- A Remediation Action Plan is required where remediation is required
- A noise impact assessment
- Operational Plan of Management

Further written advice was obtained from Council on 20 April 2020. This was received in the final stages of the EIS preparation and key issues raised were all taken into account, including:

- Site suitability and compatibility of proposed development with surrounding rural area;
- Survey drawing;
- Site plan, floor plans & elevation and sections plans, Schedule of External Materials and Finishes
- Signage Details (if proposed)
- Stormwater concept plan
- Environmental Impact Statement
- Waste Management Plan
- WSUD strategy
- Traffic and Parking Assessment Report
- Contamination Assessment
- Access statement
- Operational Plan of Management
- Acoustic Report / Statement
- Landscape Plan
- Wastewater report.

WaterNSW provided the following written advice:

> *'There are no WaterNSW assets or land located within close proximity to the subject site, however your request has been forwarded to the Water Regulation Team within WaterNSW to assess any requirements relating to water licensing.'*

Environment, Energy and Science Group (EES) (former OEH) stated:

> *'At this stage of the process, EES has no comment.'*

Based on all the above considerations, potential issues have been prioritised as follows:

- Noise and vibration
  A noise impact assessment is required due to the large number of noise generating sources proposed and the proximity to sensitive receptors.

- Air quality and odour
  An air quality assessment is required due to the potential for dust to be generated from the processes and stockpiling of material. Therefore, a quantitative assessment has been undertaken for dust. Odour has not been assessed as the site will not be receiving any odour generating wastes.

- Traffic and transport
  A full traffic assessment has been undertaken due to the potential for traffic increases to impact on the existing road network. Furthermore, the site is located adjacent to the Outer Sydney Orbital which may impact on future road and rail development.

- Strategic Context
  A detailed justification for the proposal and suitability of the site was undertaken. The proposal also needed to be assessed against all relevant planning strategies, environmental planning instruments and development control plans.

- Waste management & Types
  The proposed facility would accept and process waste materials. Waste Management was identified as a key issue by NSW EPA. Therefore, a waste management report has been provided.

- Flora and Fauna / Biodiversity
  Preliminary findings determined that land contains significant vegetation outside the development footprint. Council require a BDAR.

- Hazards and Risks (including Chemical Management and Fire & Incident Management and Bushfire)

  No hazardous chemicals are to be used in the process. Chemical management has been assessed. Quantities of chemicals are relatively minor and do not trigger SEPP 33, therefore a preliminary hazard analysis is not required.

  Fire is a potential environmental issue as the site will contain some combustible materials. Therefore, the fire risk has been assessed and required fire protection equipment has been identified.

  A bushfire assessment is required.

- Water
  The proposed waste processing operations would not require water. Water use on site would be limited to ancillary activities such as in the water misting system for dust suppression and in the office/amenities areas. Roof water would be captured in rainwater tanks and would supply the water for site use. Additionally, there is potential for contamination of surface waters from sediment runoff from hardstand areas. Therefore, a concept design for stormwater has been undertaken including:

  - Civil and stormwater engineering design;
  - Bulk earthworks and site grading;
  - Internal driveways;
  - Stormwater management concept plan;
  - Onsite detention and water quality MUSIC Modelling;
  - Erosion and sediment control plan; and
  - Water Cycle Management (WCM) report.

  The site is in an area of Probably Maximum Flood Hazard Extent and the development has been designed to account for overland flooding.

- Soil
  The proposed construction will require some minor excavation to establish footings and foundations for the proposed building. Further, stockpiles of materials remain on site from previous tenants. Therefore, a limited Phase II Environmental Site Investigation and additional sampling and testing requested by Council has been undertaken.

  Evidence of activities undertaken and stockpiles on site required sampling and analysis to determine whether this material was suitable for use on site under Order 10 issued by

Council on 16 January 2019. This area is outside the proposed development area at the site and would not be disturbed as part of the proposal.

- Visual amenity
  The existing site is in a rural area. A new building would be constructed and trucks would frequent the site. The site contains significant vegetation. A landscaping plan has been developed. Visual amenity of the site is discussed in detail in this EIS.

- Heritage
  A search of relevant registers found that the site does not contain any heritage items. A due diligence Aboriginal Archaeological assessment was undertaken by Narla Environmental. A detailed assessment was not considered warranted.

- Cumulative Impacts
  Due to the size and nature of the proposed development, controlling for direct environmental impacts would minimise any cumulative impacts from the proposed development. Cumulative impacts are briefly discussed.

- Human Health and Safety
  Incoming materials are inert and therefore a detailed assessment is not warranted. A brief discussion is provided.

8. ENVIRONMENTAL IMPACTS AND SAFEGUARDS

8.1 AIR QUALITY

An Air Quality Impact Assessment has been undertaken for the proposed development. A full copy of the AQIA is provided as Appendix 9.

8.1.1 Dust Assessment Criteria

TSP, PM_{10} and $PM_{2.5}$ emissions were modelled for the operation of the proposed resource recovery facility in accordance with the "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (EPA 2016). Odour is not considered as a potential emission that would be generated from the proposed development given the nature of the incoming waste materials and therefore was not assessed.

8.1.2 Dust Control Measures

The following mitigation measures will be implemented at the subject site for the purposes on minimising emissions of dust:

- All dust generating activities including loading, unloading, screening, crushing, sorting and storage of materials are conducted within a building;
- All storage bunkers located within the building (no external storage);
- All front end loaders operate within the building; and
- Water misting system focused at local points of dust emissions, as well as applied throughout the entire inside plant;

These measures were considered in the assessment.

8.1.3 Dispersion Model and Emission Data

The air dispersion model AERMOD was used for the prediction of off-site dust impacts associated with the air emissions from the proposed operations.

The AQIA uses emission data adopted from the National Pollutant Inventory's *Emission Estimation Technique Manual for Mining* (2012) and the *Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals* (2014). The relevant NPI documents do not include data for estimating emission of $PM_{2.5}$.

The *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emissions Factors* (2006) gives a ratio of 0.15 $PM_{2.5}/PM_{10}$ for 'Aggregate Handling and Storage Piles' which was used to estimate $PM_{2.5}$ emissions for from aggregate processing activities.

The US EPA AP-42 *Appendix B.2 Generalized Particle Size Distributions* (1996) data for 'Mechanically Generated Processed Ores and Non-metallic Minerals' gives a ratio of 0.35 $PM_{2.5}/PM_{10}$ which was used to estimate $PM_{2.5}$ emissions from fines processing activities.

In addition, where there is no TSP data available in the NPI a generic PM_{10} to TSP ratio of 0.51 has been assumed to estimate TSP emission factors, as materials are made up of a variety of products (bricks, concrete, timber, metal, glass).

8.1.4 Predicted Impacts

Annual TSP, PM_{10} and $PM_{2.5}$ emissions at all receptors are predicted to comply with the *Approved Methods* criterion.

The maximum predicted impacts for 24-hour averaging periods for PM_{10} and $PM_{2.5}$ exceeded the relevant criteria. The background concentrations for PM_{10} and $PM_{2.5}$ for 24-hour averaging periods are considered elevated, with levels of at 24.96 µg/m^3 and 62.42 µg/m^3 respectively in comparison to the *Approved Methods* criteria of 25 µg/m^3 and 50 µg/m^3.

In cases of elevated background concentrations, the NSW EPA requires a demonstration that no additional exceedances of the impact assessment criteria will occur as a result of the proposed site activities.

Contemporaneous addition of the predicted daily increments of PM_{10} and $PM_{2.5}$ with daily measured background levels for 2015 showed no additional exceedances due to proposed site activities.

With the proposed site activities and dust controls in place, it is considered that emissions to air from the site's operation are unlikely to cause harm to health or the environment.

8.2 NOISE

A full Noise Impact Assessment has been undertaken for the proposed development and is provided in Appendix 6. This section summarises the noise impact assessment. Section 6.5 details the nearest sensitive receivers and existing acoustic environment.

8.2.1 Operational Noise Impact Assessment

8.2.1.1 Project Specific Noise Levels

The project noise trigger levels for the site have been established in accordance with the principles and methodologies of the NSW Noise Policy for Industry (EPA, 2017).

The table below presents the rating background level, project intrusive noise level, recommended amenity noise level, and project amenity noise level. The project noise trigger level is the lowest value of intrusiveness or project amenity noise level after conversion to $L_{Aeq\ 15\ minute}$, dB(A) equivalent level. Sleep disturbance trigger levels associated with operational activities are presented in Table 8-1 below.

Table 8-1: Project Noise Trigger Levels (PNTL) for Operational Activities, dB(A)

Receiver	Type of Receptor	Time of day	Rating background noise level	Project intrusiveness noise level $L_{eq\ 15\ minute}$	Recommended amenity noise level $L_{Aeq\ period}$	Project amenity noise level $L_{Aeq\ 15\ minute}$ [1]	PNTL $L_{Aeq\ 15\ minute}$	Sleep Disturbance L_{Amax}
R1-R12	Residential – Rural	Day	41	**46**	50	48	**46**	-
		Evening	41	46	45	**43**	**43**	-
		Night	39	44	40	**38**	**38**	**52**
R13	School	When in use	-	-	$L_{Aeq\ 1hr}$ = 50 (external)	50 [2]	**50**	-
R14-15	Industrial Premises	When in use	-	-	70	68	**68**	-

Notes:
1) These levels have been converted to $L_{Aeq\ 15\ minute}$ using the following: $L_{Aeq\ 15\ minute} = L_{Aeq\ period}$ + 3 dB (NSW Noise Policy for Industry Section 2.
2) This value has been conservatively assumed that $L_{Aeq\ 15\ minute}$ is equivalent to $L_{Aeq\ 1hr}$.

8.2.1.2 Predicted Impacts

Noise levels at the nearest receptors have been calculated and results of the predictive noise modelling considering operational activities are shown in Table 8-2. The modelled scenario is predicted to comply with the $L_{eq(15\ minute)}$ project specific criteria at all sensitive receptors.

Table 8-2: Predicted Noise Levels – Operational Activities dB(A) Day and Evening

Receptor	Project Criteria $L_{eq(15\ minute)}$	Scenario 1
	Day	Predicted $L_{eq(15\ minute)}$
R1	46	46 ✓
R2	46	40 ✓
R3	46	39 ✓
R4	46	39 ✓
R5	46	38 ✓
R6	46	41 ✓
R7	46	45 ✓
R8	46	44 ✓
R9	46	42 ✓
R10	46	35 ✓
R11	46	31 ✓
R12	46	36 ✓
R13	50	31 ✓
R14	68	34 ✓
R15	68	44 ✓

✓Complies × Non-compliance

Table 8-3: Predicted Noise Levels – Operational Activities dB(A) Evening and Night

Receptor	Project Criteria $L_{eq(15\ minute)}$	Project Criteria L_{Amax}	Scenario 2a		Scenario 2b	
	Night		Predicted $L_{eq(15\ minute)}$	Predicted L_{Amax}	Predicted $L_{eq(15\ minute)}$	Predicted L_{Amax}
R1	38	52	35 ✓	41 ✓	37 ✓	43 ✓
R2	38	52	31 ✓	37 ✓	33 ✓	39 ✓
R3	38	52	29 ✓	35 ✓	31 ✓	37 ✓
R4	38	52	28 ✓	34 ✓	31 ✓	37 ✓
R5	38	52	26 ✓	32 ✓	28 ✓	34 ✓
R6	38	52	28 ✓	34 ✓	30 ✓	36 ✓
R7	38	52	32 ✓	38 ✓	34 ✓	40 ✓
R8	38	52	34 ✓	40 ✓	35 ✓	41 ✓
R9	38	52	31 ✓	37 ✓	33 ✓	39 ✓
R10	38	52	24 ✓	30 ✓	28 ✓	34 ✓
R11	38	52	23 ✓	29 ✓	26 ✓	32 ✓
R12	38	52	24 ✓	30 ✓	27 ✓	33 ✓
R13	50	N/A	20 ✓	N/A	23 ✓	N/A
R14	68	N/A	27 ✓	N/A	30 ✓	N/A
R15	68	N/A	35 ✓	N/A	36 ✓	N/A

✓Complies × Non-compliance

8.2.1.3 Recommended Mitigation Measures

If the assumptions listed in Section 7.1.3 of the Noise Impact Assessment are carried out, noise levels would be met at all surrounding receivers.

Controls important to note are the following:

- All front-end loaders operated on site are to be no greater than 111 kW in power, and produce no higher sound power level than 102 dB(A);
- The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A);
- The walls must have an R_w of at least 36 dB, double corrugated steel has been modelled;
- The roof must have an R_w of at least 32 dB, corrugated steel with miwo has been modelled;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended;
- Pedestrian doors should also be kept close when not in use;

The following noise control measures are recommended in order to proactively further reduce noise levels at surrounding receivers:

- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site;
- Enforcement of low on-site speed limits; and

- Regular maintenance of plant.

8.2.2 Road Traffic Noise Impact Assessment

Up to 55 trucks are proposed to enter and exit the Park Road site per day which equates to 2 truck movement per 15 minute period. The trucks will enter and exit through the one driveway from Park Road.

The proposed number of truck movements will comply with the day criteria of $L_{Aeq\ (1\ hour)}$ 55 dB at any residential receptor. Truck movements will not occur during the evening and night periods. The additional truck movements will not result in an increase in road traffic noise at any residential receptor. A full road noise assessment is not considered warranted.

Step 3 of Section 3.4.1 of the RNP identifies possible reasonable and feasible control measures when exceedances of either the outlined criteria. As no exceedances are predicted, the proposed vehicle movements comply with the RNP, and no additional mitigation strategies are recommended.

8.2.3 Construction Noise Impact Assessment

8.2.3.1 Construction Noise Impacts

Construction activities are proposed to include the following:

- Site establishment;
- Civil works to level the property to proposed heights;
- Concreting works of the building base, hardstand areas and driveways; and
- Structure works for the proposed building.

The current residential dwelling and associated sheds are proposed to be kept, therefore no demolition works are proposed.

8.2.3.2 Construction Predicted Noise Levels

Results of the predictive noise modelling of the construction activities are shown in Table 8-4. Compliance with the noise criteria is predicted at all receptors, during all construction scenarios. Noise levels are also predicted to be well below the highly noise affected criteria of 75 dB(A).

Table 8-4: Noise Modelling Results Associated with Construction Activities for L_{eq}, dB(A)

Receiver	Criteria: PSNL ($L_{eq,15\ minute}$ dB(A))	Predicted Levels: Scenario (Standard Hours) (L_{eq}, dB(A))			
	Standard Hours	1	2	3	4
R1	51	45 ✓	48 ✓	45 ✓	47 ✓
R2	51	40 ✓	42 ✓	40 ✓	41 ✓
R3	51	39 ✓	41 ✓	38 ✓	40 ✓
R4	51	38 ✓	40 ✓	38 ✓	39 ✓
R5	51	40 ✓	40 ✓	39 ✓	40 ✓
R6	51	41 ✓	44 ✓	42 ✓	42 ✓
R7	51	45 ✓	47 ✓	45 ✓	46 ✓
R8	51	43 ✓	47 ✓	46 ✓	45 ✓
R9	51	41 ✓	45 ✓	43 ✓	43 ✓
R10	51	34 ✓	38 ✓	36 ✓	35 ✓
R11	51	31 ✓	36 ✓	32 ✓	32 ✓
R12	51	35 ✓	37 ✓	34 ✓	35 ✓
R13	55	31 ✓	33 ✓	31 ✓	32 ✓
R14	75	37 ✓	39 ✓	37 ✓	38 ✓
R15	75	47 ✓	48 ✓	45 ✓	48 ✓

8.2.3.3 Construction Noise Mitigation Measures

Construction activities should only take place during standard **construction** hours as follows:

Monday to Friday:	7am to 6pm
Saturday:	8am to 1pm
Sunday and Public Holidays:	No works permitted

8.2.4 Statement of Potential Noise Impacts

Benbow Environmental has been engaged by Greenfields Resource Recovery Facility to prepare a noise impact assessment for a resource recovery facility at Lot 5, DP 655046 (344 Park Road, Wallacia). The site will have a processing capacity of 95,000 tonnes per year.

The principal noise sources associated with the site include noise from a shredder and mobile crusher, screening equipment, conveyors and aggregate transfer as well as mobile plant including truck movements, excavators and front end loaders.

The noise impact assessment was undertaken in accordance with the following guidelines:

- NSW Noise Policy for Industry (EPA, 2017);
- Interim Construction Noise Guideline (DECC, 2009); and
- NSW Road Noise Policy (RNP) (DECCW, 2011).

Assessment criteria for noise emissions from the subject site were used to determine whether the potential noise impacts from the site were within the derived limits or in exceedance of the guidelines.

The nearest receivers and noise criteria were identified. The site operations were modelled using the predictive noise software, Sound Plan V7.3.

The activities proposed by the proponent were found to be within the framework of the NSW EPA Noise Policy for Industry.

The operational noise levels were predicted to comply with the $L_{Aeq(15\ minute)}$ project specific criteria and L_{AMax} sleep disturbance criteria at all receptors for all scenarios, for all weather conditions.

If the assumptions listed in section 7.1.3 of the noise impact assessment are carried out, noise levels would be met at all surrounding receivers.

Controls important to note are the following:

- All front-end loaders operated on site are to be no greater than 111kW in power, and produce no higher sound power level than 102 dB(A);
- The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A).
- The roof must have an R_w of at least 32 dB, corrugated steel with miwo has been modelled;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended;
- Pedestrian access doors should also be kept close when not in use;

Further proactive noise management practices are described in Section 7.3 of the noise impact assessment.

Compliance with the guidelines set out in the NSW Road Noise Policy was predicted at all considered receptors.

Construction noise is predicted to comply with the Interim Construction Guidelines at all surrounding receivers.

8.3 SOIL AND WATER

A hydrology assessment and civil design set were completed by Indesco, and are provided as Appendix 5. A combined Phase I and Limited Phase II Environmental Site Assessment (ESA) as well as additional sampling and testing requested by Council was undertaken to determine the contamination status of the proposed development area and is available as Appendix 10. A

geotechnical investigation is provided in Appendix 8. These reports have been used to support this qualitative soil and water assessment and are referenced throughout this section.

8.3.1 Soil

The proposed building works and site development would involve cut and fill earthworks for levelling for the building footprint and foundations that would result in disturbance to soil during construction.

Once the facility is operational, processing activities would be undertaken within an enclosed building and the development area would be a fully sealed surface. A self bunded diesel storage tank would be located on the sealed hardstand area external to the building. Materials to be processed and stored within bays are inert. The risk of contamination to soil and land is mainly related to contaminated stormwater seeping into the ground. The management of risks to soil and the potential for contamination of soils from the proposed development are discussed in this section.

8.3.1.1 Soil Characteristics of the Site

The general soil characteristics of the site are described in section 6.1 and are non-acidic generally consisting of a clay loam topsoil over a light to medium clay.

8.3.1.1.1 Acid Sulfate Soils

The site is not in an area known to contain acid sulfate soils.

8.3.1.1.2 Existing Contamination

A limited Phase II Environmental Site Assessment was undertaken for the proposed development area of the subject site. The scope of this assessment included soil sampling of the area proposed to be disturbed for building foundations and waste classification of the existing stockpiled materials within the proposed building envelope.

The findings from the Limited Phase II ESA are summarised below:

- Hazardous materials or potentially contaminating substances were not observed during the site visit or soil sampling conducted on 3rd March 2020;
- Inspection of the sites structures, grounds, stockpiles, storage and waterbodies yielded no hazardous material presence;
- Results of seven (7) soil samples conducted on the stockpiled materials (2,000 – 3,000 T) from the eastern perimeter were well under *The Excavated Natural Material Order (2014)* criteria. However, due to the presence of sulfidic ores fractionally above the limit of reporting, these materials cannot be classified as Excavated Natural Material (ENM). This material is likely to comply with the NSW EPA *The Recovered Aggregate Order (2014)*. Additional testing will determine whether the material satisfies the requirements under the recovered aggregate order and can be used for purposes listed under the corresponding exemption; and
- Results of four (4) surface soil samples indicate that all tested analytes and contaminants of concern were below the adopted NEPM criteria for the site.

All results from surface soil samples are well below the adopted criteria and can be considered uncontaminated. The proposed development area on the site does not appear to be contaminated or suspected of previous contamination. Further investigations of the site in regard to a Detailed Phase II Contamination Assessment are not considered warranted.

Additional sampling and testing was requested by Council. This has been undertaken and included in Appendix 10. Results indicated no all samples were below adopted NEPM criteria and no evidence of contamination was found.

8.3.1.2 Potential Pollutants

Pollutants may result from the proposed site activities such as:

- Pollutants within Incoming wastes – the nature of wastes to be accepted are restricted to C&D and C&I waste and are predominantly inert.
- Litter or windblown waste.
- Chemicals stored and used – Chemicals are limited to diesel and LPG gas.
- Truck movements may generate oil, grease, sediment, elevated pH and possibly heavy metals.

The potential pollutants to soil and waters associated with the above activities include:

- Heavy metals (e.g: lead, cadmium, chromium, copper and zinc);
- Total suspended solids (TSS);
- Elevated pH;
- Total recoverable hydrocarbons (TRH);
- BTEX (Benzene, toluene, ethylbenzene and xylene); and
- Polycyclic Aromatic Hydrocarbons (PAH).

Potential pathways are restricted due to the processing operations being enclosed within a building, storage of materials on a sealed surface and bunding of the refuelling area.

Proposed activities, potential pollutants and pathways are summarised in the following table.

Table 8-5: Potential pollutants and pathways

Activity	Potential pollutants	Potential pathways
Processing and storage of incoming waste and recovered materials	• Total suspended solids • Elevated pH • Windblown litter	Stormwater runoff High winds
Diesel storage & refuelling	• Total recoverable hydrocarbons • BTEX; • PAH	Spills and leaks
Truck activity	• Heavy metals • Total suspended solids • BTEX • PAH	Spills and leaks resulting in discharge of contaminated water

8.3.1.3 Potential Impacts to Soil and Land

8.3.1.3.1 Construction Works

Construction work involves cut and fill works and the construction of buildings requiring footings which requires disturbance to soils. If fill is required to be imported, this will need to be accompanied by a written report certifying the quality of the fill and where it comes from.

The Limited Phase II ESA report and additional sampling and testing indicated all samples were uncontaminated. An unexpected finds protocol is included in the Construction Environmental Management Plan (CEMP) to deal with any potentially contaminated soil encountered during excavation works.

8.3.1.3.2 Operational Works

Potential pollutants from use of the resource recovery facility are detailed in Section 8.3.1.2.

Potential impacts to soil from the proposed development and mitigation measures to be implemented are summarised in the table below.

Table 8-6: Potential Risks to Soil and Mitigation Measures

Potential Contaminant and Source	Potential Impact on Soil	Safeguards and Mitigation Measures
Processing & Storage: • Total suspended solids • Elevated pH • Windblown litter	Contaminated stormwater runoff seeping into the ground Litter	• All processing and storage within enclosed building • Water misting system • Sealed surfaces • Bioretention filter media areas
Diesel storage & refuelling spills and leaks: • Total recoverable hydrocarbons • BTEX; • PAH	Stormwater contaminated with total recoverable hydrocarbons seeping into the ground	• Self bunded storage tank • Spill kits • Sealed surfaces • Bioretention filter media areas
Truck activity • Heavy metals • Total suspended solids • BTEX • PAH	Truck movements at the site resulting in release of wastewater containing oil, grease, heavy metals and total suspended solids seeping into the ground	• Sealed surfaces • Bioretention filter media areas

The inert nature of the materials, and the safeguards designed into the development, there is expected to be negligible impacts from the proposed development on soil. There is expected to be negligible stormwater contamination into subsoils from the proposed activities with these limitations of the use of the site in place. An EMP for the management of the site will provide the detailed work practices to ensure mitigation measures are adequately implemented.

8.3.2 Water

Potential impacts to water from the proposed development include sediment/contaminant runoff into stormwater. Additionally, groundwater and groundwater dependent ecosystems may be impacted by contaminants seeping into the groundwater.

8.3.2.1 Water Supply and Use

The site is connected to mains water. Five (5) 34,000 L and one (1) 27,000 L rainwater storage tanks will surround the building to capture roof water during rain events. The Water Cycle Management Report prepared by Indesco demonstrates that 4 x 34kL rainwater tanks comply with the objectives of the WSUD Strategy. The two additional tanks will hold water for ancillary use on site such as for the water misting system. The water misting sprays will be located inside the building. The spray is a fine mist that evaporates quickly and will not contribute to additional water runoff.

Water storage tanks would be connected to the mains and used for emergency firefighting purposes.

A water balance diagram for the proposed development is provided in Figure 8-1.

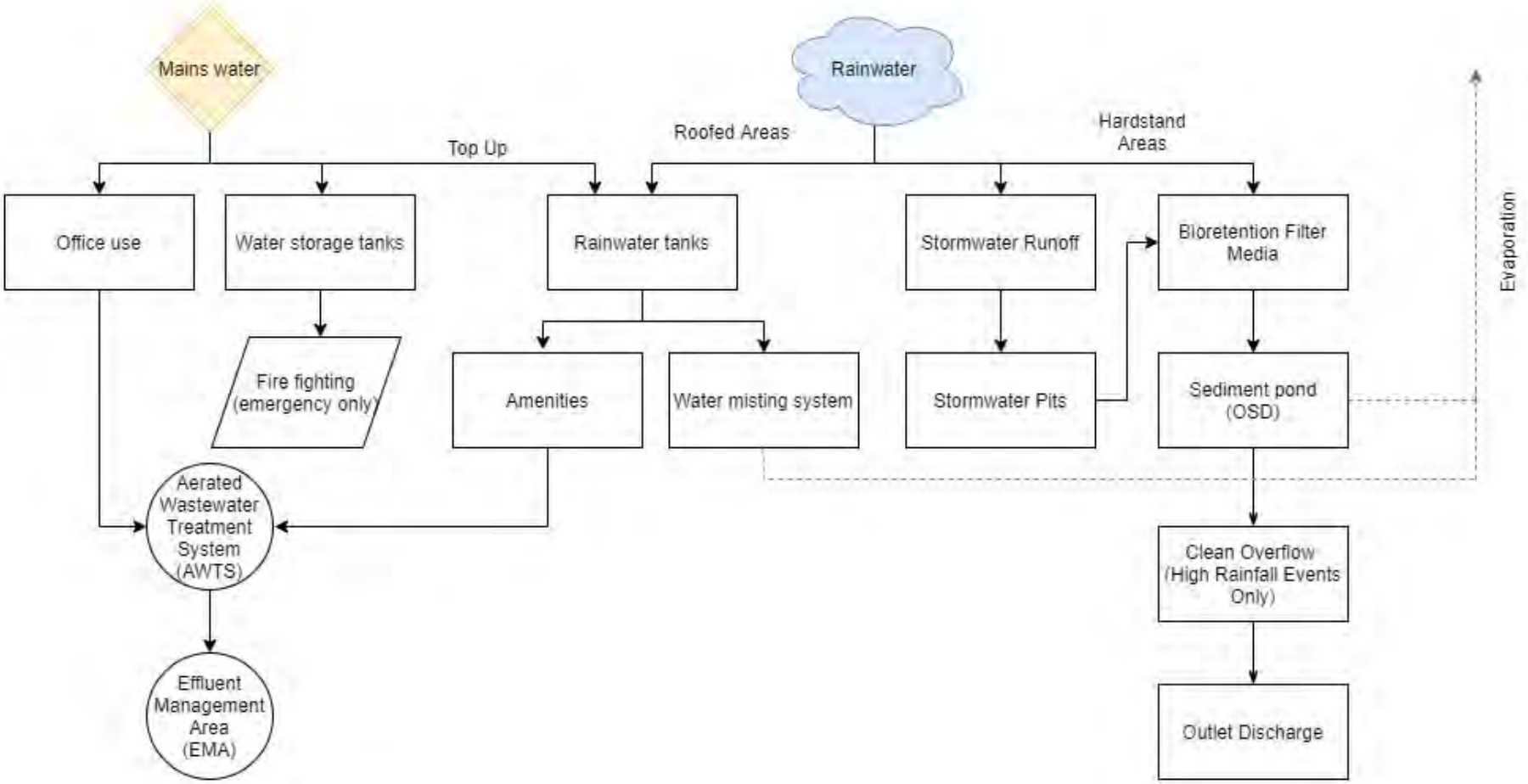
8.3.2.2 Wastewater

A wastewater management report has been prepared by Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd and is included in Appendix 4.

There will be no wastewater generated during material handling processes on site and a tradewaste agreement is not required. Waste generated during onsite processes is solid and inert and therefore involves no wastewater discharge.

Liquid waste generated from the office and amenity blocks will flow into the proposed Aerated Wastewater Treatment System (AWTS) for secondary treatment. Water will then be distributed to an Effluent Management Area (EMA) that will be fully grassed with fences erected to prevent vehicle access. Secondary treated wastewater will be applied to the EMA via an irrigation sprinkler system.

Figure 8-1: Site water balance diagram



8.3.2.3 Surface water, Stormwater

Surface water and stormwater is generated from rainfall only.

All waste processing activities and storage will be undertaken within the proposed building. This will prevent rain and surface waters coming into contact with pollutants of concern during waste processing activities. Surface waters will not enter the building and therefore cannot migrate into stormwater.

A stormwater concept plan is provided in Appendix 5. Post development flows will be attenuated to at least pre-development rates for the range of events up to the 1% AEP event. Stormwater that falls on the external hardstand surface drains into stormwater pits would be directed to purpose built stormwater pipelines and into one of two onsite detention basins (OSD). Both OSDs include bioretention filter media areas which filter out suspended solids before the water is discharged into the basin where the water will typically evaporate. During high rainfall events the clean overflow water will drain into creeks shown in the catchment plan provided in Appendix 5. The proposed OSDs will be monitored for pollutants of concern. The pollutants of concern associated with the development are detailed in Section 8.3.1.2.

8.3.2.4 Groundwater

Groundwater is not proposed to be extracted nor used for the proposed development. Groundwater was not encountered at the site in any of the boreholes drilled as part of the geotechnical report.

Groundwater impacts are expected to be negligible as stormwater will not come in contact with waste or other sources of potential pollution. Furthermore all stormwater from the proposed development will be managed was described in the previous section, such that minimal quantities of stormwater will seep through the hardstand.

8.3.2.5 Leachate

"Leachate" is defined by the NSW EPA in the Environmental Guidelines: Solid Waste Landfills, Second edition 2016 as:

> ***Leachate:*** *the liquid that passes through, or is released by, waste. It arises from the inherent moisture content of the waste and from rainwater (and sometimes groundwater) percolating through or contacting the waste mass. Leachate may contain high levels of dissolved solids, ammonia, organic matter, and sometimes metals and other pollutants. These levels are typically well above background levels for undisturbed or slightly disturbed groundwater and surface water systems. The levels are also well above national quality guidelines for drinking water and other beneficial reuses of water.*

Generally, leachate relates to liquid that percolates through landfills. In this case, there would be no external waste storage or stockpiles. All waste would be received in covered trucks, unloaded, processed and loaded within the enclosed building. Therefore rainwater penetration would be negligible and leachate would not be generated.

The stormwater runoff from external hardstand areas of the site would be managed through a treatment system consisting of on-site detention basins, bioretention filter media and gross

pollutant traps SPEL Vortceptors designed to manage pollutant loads to meet required Council targets. This is shown in the Water Cycle Management Report provided as Appendix 5.

8.3.2.6 Flooding

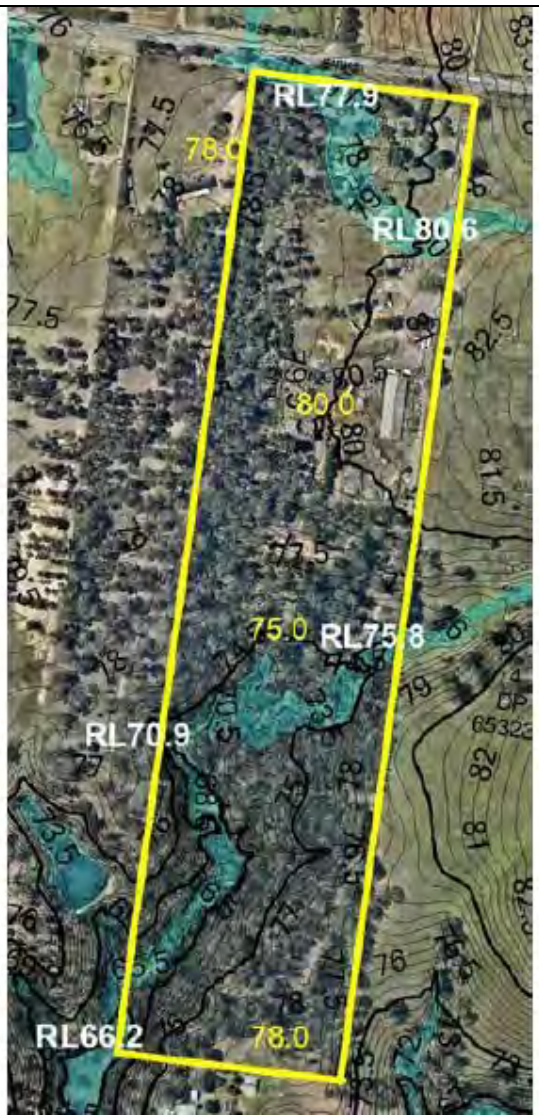
The Section 10.7 certificate indicates that the land or part of the land is subject to flood related development controls in the Penrith LEP 2010. The site is not located on flood prone land (as per Penrith LEP 2010), however portions of the site have the potential to be affected by overland flooding.

As discussed in Section 6.2.3, the subject site is located within the "PMF Hazard" and 20 year ARI Flood Hazard. PMF is the probable maximum flood which is defined as "the flood calculated to be the maximum that is likely to occur." The proposed development area is located in the north-eastern portion of the site (among the PMF Hazard zone).

Correspondence from Penrith City Council (Ref: ECM 9073801) in Attachment 4 obtained in March 2020 showed the 1% AEP flood overland flow paths on site (Figure 8-2). The 1% AEP (or 1 in 100 year flood) is the likelihood a flood is to occur in a given year. These flood flow paths are located to the north and south of the proposed development and operational areas.

As per the Penrith Development Control Plan 2014, new industrial developments should be at least 0.5 m above the 1% AEP flood or buildings should be flood proofed to 0.5 m above the AEP.

Figure 8-2: Overland flood flow path on site



Source: Penrith City Council (Ref: ECM 9073801)

↑N Not to scale	LEGEND: 1% AEP overland flood flow path	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Overland flooding has the potential to impact the proposed development where appropriate flood controls are not in place. The proposed operational area will suit overland flow as it consists of sealed hardstand material and is slightly graded east-west, away from the building and development area. The site has been designed to manage overland flooding as shown in the stormwater concept plan provided in appendix 5.

8.3.2.7 Water Legislation

8.3.2.7.1 Water Act, 1912

Licences for water conservation, irrigation, water supply or drainage as well as changing the course of a river can be applied for under the *Water Act 1912*.

The proposed development does not involve works for water conservation, irrigation, water supply or drainage and does not involve works that would change the course of a river, therefore, the *Water Act 1912* does not apply.

8.3.2.7.2 Water Management Act, 2000

The *Water Management Act 2000* (WMA Act) provides requirements for the extraction of water, water use, floodplain and drainage management, the construction of works such as dams and weirs, and undertaking activities on or near water sources in NSW. Approvals for the extraction and use of water and for the construction of works relating to water use can be obtained under the Act.

A watercourse traverses the site and from inspection of topographical maps available appears to be >100 m from the development area. However this is unclear from maps showing the watercourse. Additionally, there has been no feedback received from WaterNSW's Water Regulation Team in regards to water licensing. Therefore, the development it is unlikely approval under this act is required pending advice from WaterNSW.

8.3.2.7.3 Water Sharing Plans

Two water sharing plans apply to the area where the subject site is located. These are:

- Water Sharing Plan for the Greater Metropolitan Region Unregulated River Sources; and
- Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources.

These do not apply to the proposed development.

8.3.2.8 Potential Pollutants

The nature of the materials to be stored at the site is inert. There would be one (1) 10,000 L self-bunded diesel tank and minor chemical use only. Truck movements on site may generate oil, grease, sediment and possibly heavy metals. The potential pollutants to waters from the handling and storage of these materials include:

- Heavy metals (e.g: lead, cadmium, chromium, copper and zinc).
- Total suspended solids (TSS);
- Elevated pH;
- Total recoverable hydrocarbons (TRH);
- BTEX (Benzene, toluene, ethylbenzene and xylene); and
- Polycyclic Aromatic Hydrocarbons (PAH).

Proposed activities, potential pollutants and pathways are summarised in the following table.

Table 8-7: Potential pollutants and pathways

Activity	Potential pollutants	Potential pathways
Processing and storage of C&D/C&I waste, concrete, bricks, wood etc.	• Total suspended solids • Elevated pH	Stormwater runoff
Diesel storage & refuelling	• Total recoverable hydrocarbons • BTEX; • PAH	Spills and leaks
Trucks	• Heavy metals • Total suspended solids • BTEX • PAH	Spills and leaks resulting in discharge of contaminated water

8.3.2.9 Potential Impacts to Waters

8.3.2.9.1 Construction Works

The construction phase of the proposed development has the potential to impact surface and stormwater. There will be excavation work involving cut and fill works and the construction of buildings requiring footings. Without appropriate erosion and sediment controls, Excavated fill materials can potentially move off site or into stormwater when coming into contact with migrating surface waters.

An Erosion and Sediment Control Plan (ESCP) provided in the civil and stormwater drawing set would be implemented. Where excavated fill is not stored in a container (i.e. skip bin), sediment/silt fences are to be installed at their stockpile bases. Sediment fences should be checked regularly during construction, and especially after rain events, to ensure integrity and efficiency.

Groundwater is not expected to be impacted by construction works associated with the proposed development.

8.3.2.9.2 Operational Works

In identifying potential impacts to waters, aspects of the proposed development to be considered include:

- All processing operations and storage would be undertaken within the building.
- The operational area will consist of sealed hardstand.
- Stormwater pits, bioretention filter media areas, sediment detention basins and settling ponds
- Diesel would be stored in a self-bunded tank located on external sealed surface to the building. Kerb bunding would be provided to the refuelling area with a pump out sump pit. Spill kits would be provided.

Surface and stormwater have the potential to become contaminated during processing activities on site. Dust, sediments and chemicals have the potential to contaminate waters if improperly managed.

Potential impacts to water from the proposed development and recommended safeguards are summarised in the table below.

Table 8-8: Potential Risks to Water and Mitigation Measures

Potential Contaminant and Source	Potential Impact on Water	Safeguards and Mitigation Measures
Processing & Storage: • Total suspended solids • Elevated pH • Windblown litter	Contaminated stormwater runoff seeping into the ground Litter	• All processing and storage within enclosed building • Water misting system • Sealed surfaces • Bioretention filter media areas
Diesel storage & refuelling spills and leaks • Total recoverable hydrocarbons • BTEX; • PAH	Stormwater contaminated with total recoverable hydrocarbons seeping into the ground	• Self-bunded storage tank • Spill kits • Sealed surfaces • Bioretention filter media areas
Truck movements • Heavy metals • Total suspended solids • BTEX • PAH	Truck movements resulting in release of oil, grease, heavy metals and total suspended solids seeping into the ground	• Sealed surfaces • Bioretention filter media areas

Potential impacts to water from the proposed development include the release of sediments and contaminants into stormwater or nearby waterways. Groundwater and groundwater dependent ecosystems may also be impacted by contaminants seeping into the groundwater.

To prevent impacts to stormwater and groundwater from migrating surface waters, the following mitigation measures are to be included in the proposed development:

- Installation of stormwater system including:
  - Catchment pits;
  - Drainage lines/pipes;
  - 2 x Onsite Detention Basins (OSD) with Bioretention filter media areas and gross pollutant traps SPEL Vorceptors.

- Maintenance of all stormwater infrastructure;
- Construction erosion and sediment controls implemented and maintained;
- Water monitoring program for water quality testing of OSDs;
- Staff trained in spill response and emergency procedures, and firefighting techniques;
- Regular workplace inspection and high standard of housekeeping; and
- Preparation and implementation of a Construction Environmental Management Plan (CEMP) and operational Environmental Management Plan (EMP).

With the above controls in place the potential risk to waters is considered low.

8.3.2.10 Water Monitoring Program

A water monitoring program will be implemented for water quality testing of bioretention filter media area waters released to sediment detention basins. This program should be undertaken during the initial 12 months of operation to obtain baseline data for future reference, and will be developed as part of the EMP.

8.4 FLORA AND FAUNA (BIODIVERSITY)

A biodiversity development assessment report (BDAR) has been undertaken by Narla Environmental for the proposed development and is provided in Appendix 2. The purpose of the BDAR was to identify the potential impacts of the proposed development on biodiversity values. A summary of findings is provided below:

- The proposed development has been purposefully designed to minimise impacts on biodiversity values, as it has been positioned within a mostly cleared area of the subject property. Removal of vegetation has been largely avoided and is within an area with the least biodiversity values that avoids higher quality bushland in the western and southern portions of the subject property.

- The proposed development is expected to impact on native vegetation within the subject land including one (1) plant community type (PCT): PCT 724 – Broad-leaved Ironbark – Grey Box – Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plan, Sydney Basin Bioregion. Two (2) ecosystem credits for PCT 724 is to be offset in order to mitigate impacts. Details include:

- No threatened species are predicted to be impacted as a result of the proposed development.

- No serious and irreversible impacts (SAII) to ecological communities or species are predicted as a result of the proposed development.

- The 0.3 ha of native vegetation that requires removal for the proposed development is not expected to impact on groundwater dependent ecosystems.

The report provided a number of impact mitigation and minimisation measures to be implemented before, during and after construction to avoid and minimise impacts from the project. These are summarised as follows:

- Locate any temporary structures for construction within areas containing no native vegetation.
- Include in the Construction Environmental Management Plan measures for the management of soil, surface water, weeds and pollutants as well as site-specific measures, including the procedures outlined below:
  - ► An arborist to establish tree protection zones and provide advice regarding non-destructive methods or use of tree sensitive construction methods.
  - ► Assign an suitably qualified project ecologist to:
    - Undertake required targeted searches for threatened flora prior to vegetation clearing;
    - Undertake an extensive pre-clearing survey, delineating habitat-bearing trees and shrubs to be retained/removed; and
    - Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced flora.
- Preparation of a Vegetation Management Plan (VMP) to outline the extent, nature, method and timeframes for vegetation modification required to establish and/or maintain the APZ within the Subject Land. The VMP would include on-going habitat management including APZ, weed management and native flora plantings and maintenance.
- Maintain the small portion of APZ to the west of the proposed resource recovery facility to IPA standards.
- Any woody debris (fallen trees and logs) are to be relocated to an area of native vegetation.
- Temporary fencing should be erected around retained native vegetation that may incur indirect impacts on biodiversity values due to construction works.
- Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained.

The proponent will enter a portion of the undeveloped area of the property into a Biodiversity Stewardship agreement which will conserve the two threatened ecological communities surrounding the subject land.

8.5 WASTE GENERATION AND MANAGEMENT

A waste management report has been prepared to support the development application and is provided as Appendix 3. A summary of the report is provided in the following sub-sections.

8.5.1 Resource Recovery Facility

The proposal is for a resource recovery facility designed to process 95,000 tonnes of C&D and C&I waste materials collected from various businesses across the local and metropolitan Sydney area. The materials will be processed through the RRTF in separate runs, the C&I and C&D will not be mixed, this will ensure maximum recovery of recyclables. To achieve this, the C&D and C&I waste streams would be processed on separate days.

The facility would have the capacity to store up to a maximum of 9,000 tonnes of waste at any one time within storage bunkers and an internal incoming material stockpile located within the building. There would be no external storage of waste.

The recovered materials generated include wood, plastic, scrap metal, paper & cardboard and aggregates. Recovered aggregates would be sent off site for application to land under the recovered aggregates order and exemption. The other recovered material would be sent on for further processing at licensed recycling facilities.

Any non-recyclable waste would be sent to landfill.

8.5.2 Waste Classification and Management

The following sections provide a summary of the classification of the incoming waste materials and how this would be managed as ongoing waste at the facility. Waste generated from demolition and construction activities are also addressed.

8.5.2.1 Ongoing Waste

The expected type, quantity, onsite management and offsite destination of wastes associated with the facility are outlined in the following tables. The estimated maximum quantity is a gross estimation based averages of waste generated in NSW. The quantity for each waste type may vary significantly depending on the source that generated the waste.

Two tables are provided and include details of incoming waste (waste accepted at the site for processing) and recovered waste (materials recovered from the processing and separation of waste on site). The recovered waste includes any non-recyclable material from the process and any waste generated from ancillary activities.

Table 8-9: Incoming Waste Types, Quantities and Management

Waste Stream	Estimated Incoming Quantity	Waste Classification	Management
C&D Waste	66,500 tpa (based on 70% of 95,000tpa)	General Waste (Non-putrescible)	Mixed C&D waste would be sorted through the RRTF separately from C&I waste. The waste stream will undergo initial inspection, infeed hopper, removal of steel, screening, picking and further screening, air separation, baling and storage.
C&I Waste	28,500 tpa (based on 30% of 95,000 tpa)	General Waste (Non-putrescible)	Mixed C&I waste would be sorted through the RRTF separately from C&D waste. The waste stream will undergo initial inspection, infeed hopper, removal of steel, screening, picking and further screening, air separation, baling and storage.

Table 8-10: Recovered Waste Types, Quantities and Management

Waste Type	Estimated Maximum Quantity	EPA Waste Classification[1]	Management
Aggregates	38,950 tonnes per annum	General soil waste (non-putrescible)	This screened into varying standard sizes and directed to the designated storage bay. Transported offsite to for reuse in construction projects under the Recovered Aggregates Order 2014.
Fines (-60 aggregate)		General soil waste (non-putrescible)	The smallest aggregate size that is screened through the process. Transported offsite to for reuse in landscape supplies.
Ferrous and Non-ferrous metal	7,600 tonnes per year	General solid waste (non-putrescible)	This waste is removed from the incoming load in the pre-sorting area or within the process at the ferrous magnet and transferred to a designated internal storage bay. Transfer offsite to a metal merchant for further processing. E.g. Sims Metal
Cardboard & Paper	9,500 tonnes per annum	General solid waste (non-putrescible)	This waste is removed from the incoming load in the pre-sorting area or within the process at the picking station and transferred to a baler where it is baled and stored in a designated area within the building. Bales are transferred offsite for further processing at, a licensed recycling facility. E.g. Visy Recycling
Wood	14,250 tonnes per annum	General solid waste (non-putrescible)	Large pieces of wood is removed from pre-sort area and stored in an internal storage bunker. Wood is also removed from the process at the picking station. Wood is transferred offsite for reuse at waste to energy plants or shredded for biofiltration or mulch. E.g. Landscape supply businesses, waste to energy plants.
Plastic	5,700 tonnes per annum	General solid waste (non-putrescible)	Plastic is separated from the waste stream at the picking station and stored in a designated bin. It is transferred offsite to a licensed recycling facility for further processing. E.g. Visy Recycling
Heavies	N/A Recycled back into system	General solid waste (non-putrescible)	This is the heavy fraction of waste that gets through the system without being separated. It is put back through the system to be reprocessed.

Table 8-10: Recovered Waste Types, Quantities and Management

Waste Type	Estimated Maximum Quantity	EPA Waste Classification[1]	Management
Light (SRF)	9,500 tonnes per annum	General solid waste (non-putrescible)	This material has the potential to be used as Solid Recovered Fuel (SRF) in future, but at this stage is sent to landfill with the non-recyclable waste.
Non-recyclable waste	9,500 tonnes per annum	General solid waste (non-putrescible)	General waste that cannot be recycled is stored removed at various points in the system. It is stored within a designated storage bunker inside the building and sent to a licensed landfill.
Office & Amenities Waste	10 tonnes per year	General solid waste (Putrescible)	This waste is ancillary to the process. A 3m^3 skip bin would be provided for any office and amenities waste generated on site. This would be serviced by a licensed waste contractor and sent to landfill as required.
Office Recyclables	24 tonnes per year	General solid waste (non-putrescible)	This waste is ancillary to the process. It is transferred offsite to a licensed recycling facility for further processing. E.g. Visy Recycling

8.5.2.2 Demolition Waste

Demolition of the small existing metal shed is proposed. This is approximately 45 m^2 in area. The dwelling and associated infrastructure would remain. Estimations of the waste generated as a result of the demolition phase and how this will be managed is provided in the following table.

Table 8-11: Expected Demolition Waste

Waste Type	Estimated Maximum Quantity (tonnes)	EPA Waste Classification[1]	Management
Excavation (eg soil, rock)	1	General solid waste (non-putrescible)	Reused on site
Greenwaste	0	General solid waste (non-putrescible)	N/A

Table 8-11: Expected Demolition Waste

Waste Type	Estimated Maximum Quantity (tonnes)	EPA Waste Classification[1]	Management
Bricks	0	General solid waste (non-putrescible)	N/A
Concrete	0.5	General solid waste (non-putrescible)	Placed in designated skip bin and transported to an authorised recycling facility EG: SUEZ Kemps Creek.
Timber	0	General solid waste (non-putrescible)	N/A
Plasterboard	0	General solid waste (non-putrescible)	N/A
Metals: Scrap Colorbond	2	General solid waste (non-putrescible)	Placed in designated skip bin and transported to SUEZ Kemps Creek.
Other	0	N/A	N/A

8.5.2.3 Construction Waste

Construction works would involve establishment of a concrete hardstand area, car park, internal roadways, construction of a large building and associated infrastructure. Estimations of construction waste and how this will be managed is detailed in the table below.

Table 8-12: Expected Construction Waste

Waste Type	Estimated Maximum Quantity (tonnes)	EPA Waste Classification[1]	Management
Excavation (eg soil, rock)	>2,500	General solid waste (non-putrescible)	Reused on site for cut and fill purposes.
Greenwaste	10	General solid waste (non-putrescible)	Reused on site for landscaping purposes
Bricks	0	General solid waste (non-putrescible)	N/A
Concrete	60	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Timber	2	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Plasterboard	2	General solid waste (non-putrescible)	Placed in designated skip bin and transported to an authorised recycling facility EG: SUEZ Kemps Creek.
Metals: Scrap Colorbond	40	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Other	5	N/A	Placed in designated skip bin and removed by a licensed waste contractor.

8.5.2.4 Waste Storage

The maximum storage capacity and waste type for each bunker is shown on site plans. Waste storage details are provided below.

Area 1: Incoming material stockpile

The incoming material would be unloaded into a stockpile inside the building to be pre-sorted. This material would be temporarily stored for pre-sorting then loaded into the infeed hopper for processing in the RRFT. It is estimated this stockpile would store a maximum of 600 tonnes of waste.

The waste classification for the materials is General Solid waste (Non-putrescible).

Area 2: Internal storage bunkers

There would be four large walled bunkers within the building for the storage of waste, wood, steel and "other" materials. The storage bays would be constructed of steel frame and plate push walls up to 2.5 m high. This area would store up to 3,000 tonnes of waste or recovered materials. The maximum storage volume of each bunker is:

Bunker 1: C&I storage – 350 m^3
Bunker 2: Steel storage – 380 m^3
Bunker 3: Wood storage – 380 m^3
Bunker 4: Other waste materials storage – 370 m^3

The waste classification for these materials is General Solid waste (Non-putrescible).

Area 3: RRFT bins/bunkers

At various points along the RRFT, there would be small bins or bunkers where steel, paper/cardboard, wood, plastic and "other" material would be separated from the waste stream. These bins/bunkers would store up to 500 tonnes of recovered materials.

Waste Screen Bin x 1 bin of 5 to 10 m^3 capacity
Picking Bins x 4 bins, each 5 to 10 m^3 capacity
Air Separator Bunkers x 2 bunkers each 90 m^3 capacity
Bounce Separator Bunkers x 2 bunkers at 120 m^3 and 95 m^3 capacity

The waste classification for these materials is General Solid waste (Non-putrescible).

Area 4: Internal storage bunkers (Aggregates)

At the waste screen, aggregate would be sized into -6, 16, 32 and 60 mm sizes which would be directed by conveyor into storage bunkers located along the western side of the building. This area would store up to 4,000 tonnes of recovered materials.

Soil storage bunkers: 308 m^3
60 Aggregate bunker: 225 m^3
32 Aggregate bunker: 295 m^3
16 Aggregate bunker 245 m^3
-6 Fines bunker 155 m^3

Note: Aggregates are a coarse to medium grained particulate material used in construction including sand, gravel, crushed stone, slag and recycled concrete. The classification for all

aggregate material in accordance with the NSW EPA Waste Classification Guidelines is: General Solid waste (Non-putrescible).

Area 5: Paper bale storage area

Paper bales would be stored inside the building adjacent to the baler. This area would store up to 500 tonnes of baled material.

The waste classification for this material is General Solid waste (Non-putrescible).

8.5.2.5 Receipt and handling

The way waste is managed on site is described as follows:

- All incoming waste loads are brought to site in covered trucks.
- Waste is inspected at the weighbridge and during unloading. An incoming waste procedure is provided in Section 8.5.2.5 of the Waste Management Report that explains the procedure that takes place if non-conforming material is found. Inspections are to be conducted in accordance with Standard 1 of the NSW EPA *Standards for managing construction waste in NSW* 2019.
- Trucks unload all waste within the unloading area inside the building.
- The building's water misting system is activated upon unloading and during any processing of waste to suppress emissions of dust. Pre-sorting is to be undertaken in accordance with Standard 2 of the NSW EPA *Standards for managing construction waste in NSW* 2019. There will be no mixing of inspected and sorted construction waste with construction waste that has not been inspected and sorted (Standard 3).
- Once pre-sorted, waste types are stored in designated storage bays according to the particular waste type. Storage management will be conducted in accordance with Standard 4 of the NSW EPA *Standards for managing construction waste in NSW* 2019.
- The remaining unsorted waste would be loaded into the infeeder for processing through the RRFT system. At various points in the system, recovered materials would be separated into bins or storage bays by the system or by hand picking.
- Recovered materials would be loaded onto trucks and transported to licensed facilities or for reuse in construction projects.
- Residual waste unable to be reused is sent to a licensed landfill facility.
- All truck loads leaving the site are covered.
- Records of all incoming and outgoing loads would be maintained in accordance with Waste Levy Guidelines.

Overall, waste management practices that would be in place at the facility are considered adequate and comply with S48 of the *Protection of the Environment Operations Regulation 1997*, which states the facility must store and manage waste in an environmentally safe manner.

Management of waste on site will also be in line with the *Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities* (EPA December 2012) as it includes the following practices:

- Visually screening designated waste areas and receptacles from public places (in building);
- Ensuring waste is stored adequately and cannot escape receptacles and storage areas; and
- Ensuring easy access to each waste storage area for collection services.

The facility would not accept liquid wastes, hazardous wastes, special waste including asbestos and waste tyres nor restricted solid waste. A procedure to deal with any unauthorised waste types inadvertently delivered to the site is provided in Section 5 of the waste management report.

8.6 HAZARDS AND RISKS

8.6.1 Chemicals and Dangerous Goods Storage

The site will store minor quantities of chemicals and/or dangerous goods. One (1) self-bunded 10,000 L diesel tank will be located on site for refuelling vehicles and machinery. LPG cylinders will be used on forklifts. Other stored chemicals will mostly be used for maintenance purposes and include degreasers, oils and lubricants as well as welding gases. These chemicals will be stored in designated areas within the main building.

Table 8-13: Chemical Storage

Product Name	Un No.	ADG/GHS	GHS Signal Word	Quantity Storage Capacity	Storage Type	Storage Location
Diesel		ADG: non-dangerous good (Combustible Liquid C1) GHS: Aspiration Hazard: Category 1; Carcinogenicity: Category 2; Flammable Liquids: Category 4; Hazardous to the Aquatic Environment – Long-term hazard: Category 2	DANGER	10,000 L	Self-bunded storage tank	Outside
Degreaser	Not regulated	ADG: Not classified as Dangerous goods. GHS: Eye Damage/ Iritation: Category 2A Skin Corrosion/Irritation: Category 2	DANGER	200 L	20 Litre or 200 Litre containers	Workshop area inside main building
Oils	Not regulated	ADG: Not classified as a dangerous good. GHS: Not classified	No signal word	Up to 1,000 Litres	20 Litre or 205 Litre	Workshop area inside main building
Grease	Not regulated	ADG: Not classified as a dangerous good. GHS: Not classified	No signal word	Up to 100 kg	20kg containers	Workshop area inside main building

Table 8-13: Chemical Storage

Product Name	Un No.	ADG/GHS	GHS Signal Word	Quantity Storage Capacity	Storage Type	Storage Location
WD-40	1950	ADG: Class 2.1 Flammable gas GHS: Aerosols Category 1, Gas under Pressure (compressed gas), Lactation Effects, Acute Aquatic Hazard Category 1, Chronic Aquatic Hazard Category 1.	DANGER	20 kg	300 – 400 gram cans	Workshop area inside main building
Liquefied Petroleum Gas	1075	ADG: Class 2.1 Non-flammable, non-toxic gas GHS: Flammable gases: Category 1 gases under pressure: Liquefied gas	DANGER	150 Kg	6 Cylinders	Chained within designated area
Argon gas	1006	ADG: Class 2.2 GHS: Classified as hazardous. Gases under pressure (compressed gas), Not classified as a health hazard. Not classified as an environmental hazard	WARNING	6 Cylinders	Cylinder	Chained within designated area
Oxygen gas	1072	ADG: Class 2.2 Non-flammable, non-toxic gas Sub-Class 5.1 Oxidising agent GHS: Classified as hazardous. Oxidising gases: Category 1, Gases under pressure: Compressed gas, Not classified as a health hazard. Not classified as an environmental hazard	DANGER	6 Cylinders	Cylinder	Chained within designated area
Acetylene gas	1001	ADG: Class 2.1 Flammable gas GHS: Classified as hazardous. Flammable gases: Category 1, Gases under pressure (dissolved gas), Not classified as a health hazard. Not classified as an environmental hazard	DANGER	6 Cylinders	Cylinder	Chained within designated area

Safety Data Sheets (SDS) of all the listed chemicals would be maintained within a chemical register on site.

Chemical management requires the facility to comply with the requirements of the *Work Health and Safety Regulation 2017*. Notification to SafeWork Australia is not required as chemical quantities do not exceed the manifest quantities.

Requirements in Australian Standards also need to be applied when a site stores more than minor quantities of a hazardous substance/chemical belonging to one of the nine Classes of Dangerous Goods. The basis of chemical management safeguards for these classes are described in the following Australian Standards:

- AS 1940–2017 *The storage and handling of flammable and combustible liquids;*
- AS/NZS 1596:2014 *The storage and handling of LP Gas;* and
- AS 4332–2004 *The storage and handling of gases in cylinders.*

Storage of all hazardous chemicals would comply with the above standards. General controls that need to be met for adequate chemical management at the site are as follows:

- Provision of adequate fire protection services;
- Provision of spill kits near chemical storage area;
- Site securely locked when not in operation;
- Up to date environmental and safety management procedures and systems; and
- Personnel regularly trained and competency tested in matters regarding the use of firefighting equipment.

8.6.2 Preliminary Risk Screening

A preliminary risk screening of the proposed development in accordance *with State Environment Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33) has been undertaken, with results provided below. The quantities of dangerous goods do not exceed the threshold quantities for applying SEPP 33. Therefore, a Preliminary Hazard Analysis (PHA) is not required.

Table 8-14: SEPP 33 Preliminary Risk Screening

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored	Triggers SEPP 33
Class 1.2	5 tonne	Explosives	None	None	No
Class 1.3	10 tonne	Explosives	None	None	No
Class 2.1	10 tonne or 16 m^3 if stored above ground 40 tonnes or 64 m^3 if stored underground or mounded	Flammable Gases	LPG Acetylene	300 kg	No

Table 8-14: SEPP 33 Preliminary Risk Screening

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored	Triggers SEPP 33
Class 2.2	Not Relevant	Non-flammable, non-toxic gases	Welding gases: Argon, Oxygen	300 kg	Not relevant
Combustible Liquid C1	Not relevant	Combustible liquid with flashpoint of 150°C or less	Diesel stored in self-bunded tank	10,000 L	Not Applicable
Combustible Liquid C2	Not relevant	Combustible liquid with flashpoint exceeding 150°C	None	None	Not Applicable
Class 2.3	5 tonne	Anhydrous ammonia	None	None	No
	1 tonne	Chlorine and sulphur dioxide stored as liquefied gas in contains <100 kg	None	None	No
	2.5 tonne	Chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg	None	None	No
	100 kg	Liquefied gas kept in or on premises	None	None	No
	100 kg	Other toxic gases	None	None	No
Class 3	Assessed by reference to figures 8 & 9 of applying Sepp 33	Flammable liquids PG I, II and III	None	None	No
Class 4.1	5 tonne	Flammable Solids	None	None	No
Class 4.2	1 tonne	Substances liable to spontaneous combustion	None	None	No
Class 4.3	1 tonne	Substances which, in contact with water, emit flammable gases	None	None	No
Class 5.1	25 tonne	Ammonium nitrate – high density fertiliser grade	None	None	No
Class 5.1	5 tonne	Oxidising substances	None	None	No
Class 5.1	2.5 tonne	Dry pool chlorine – in containers <30 kg	None	None	No
Class 5.1	1 tonne	Dry pool chlorine – in containers >30 kg	None	None	No
Class 5.1	5 tonne	Any other Class 5.1	None	None	No
Class 5.2	10 tonne	Organic peroxides	None	None	No
Class 6.1 PGI	0.5 tonne	Toxic substances	None	None	No
Class 6.1 PGII & III	2.5 tonne	Toxic substances	None	None	No

Table 8-14: SEPP 33 Preliminary Risk Screening

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored	Triggers SEPP 33
Class 6.2	0.5 tonne	Infectious substances	None	None	No
Class 7	All	Radioactive Material	None	None	No
Class 8 PGI	5 tonne	Corrosive substance	None	None	No
Class 8 PGII	25 tonne	Corrosive substance	None	None	No
Class 8 PGIII	50 tonne	Corrosive substance	None	None	No

8.6.3 Fire

The site is located on bushfire prone land (Vegetation categories 1 and 3), and Bushfire Hazard is discussed in Section 8.6.3.3.

8.6.3.1 Fire Risk Assessment

8.6.3.1.1 Hazard Identification Charts

In order to identify and characterise the nature of potential fire events, a series of Hazard Identification Charts have been compiled. The compiled charts are provided overleaf. The charts, for the purpose of this study, only assess the potential fire events of the proposed development. Each chart consists of four columns:

Column 1: *Functional/Operational Area*
The process area of the Site involved with the potential event is listed e.g. Flammable Liquid Store.

Column 2: *Possible Initiating Event*
The events that are considered to be likely or realistic are listed. Where the possible consequences are similar, the events are listed together and individually numbered.

Column 3: *Possible Consequences*
The outcomes from an event occurring are listed e.g. Fire, Explosion.

Column 4: *Prevention/Protection Measures*
The measures designed into the function/operation of the particular area of the site are listed. The measures include for example safeguards, design features, management methods and operator training.

Table 8-15: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
1. Main building	• Recyclable paper and cardboard and plastic subjected to sufficient heat to catch alight.	• Fire engulfs stockpile of paper/cardboard and consumes the stockpile. • Fire fighting water is generated which escapes into the stormwater system. Fire unable to be immediately controlled and engulfs larger tonnages of stored waste materials.	• A hot-work permit system would be established • A first response fire crew would be established on site. • No smoking is permitted on site except in a designated low risk area. • Site would have BCA compliant fire services.
2. Baling	• Failure of a bearing causes excess heat. • Failure of an electrical motor causes a fire.	• Fire within the machinery, substantial fuel available.	• Operators always present during the process. • Building ventilation causes air flow within the machinery that would provide cooling. • Preventative maintenance programme. • First response fire services available. • Operators trained in use of these services.
	• Oil leakages collect under the machinery and soak cardboard/paper with oil allowing an exothermic reaction to occur with sufficient heat to cause ignition.	• Fire external to the machinery sufficient fuel available to cause rapid spread of fire to cardboard and paper.	• Preventative maintenance programme. • Routine cleaning of machinery. • Oil leakages promptly attended to. • Operations under surveillance cameras so release of smoke would be observed.
3. Diesel fuel	• Spillage occurs onto a vehicle, hot surface vaporises the fuel and a fire erupts	• Fire is unable to be contained and causes rupture of the diesel storage tank, pool fire occurs.	• Diesel tank is bunded. Pool fire would be contained to the bunded area and be able to be contained. • Fire extinguishers stored nearby in accordance with AS 1940–2017 and fire immediately controlled. • Site has trained first response fire crew. Fire services on-site would comply with BCA.

8.6.3.1.2 Fire Safety in Waste Facilities

NSW Fire and Rescue have released a new fire safety guideline, Fire Safety in Waste Facilities, Feb 2020.

The site will meet the stockpile requirements of the NSW Fire Safety in Waste Facilities. The majority of the stockpiles are in bunkers, referred to as "pens" in the guideline, aka surrounded by 3 masonry walls.

The mixed waste will have 6m access around the stockpile as per the requirements for sprinklered buildings.

The following section details the fire protection equipment required by the NSW Fire Safety in Waste Facilities guidelines, the National Construction Code and best practice.

8.6.3.1.3 Fire prevention and protection strategy

This section outlines the fire protection strategy including fire protection equipment provided at the Site.

8.6.3.1.3.1 Ventilation

Natural ventilation would be provided in accordance with the BCA.
This would be more than adequate for the type of activities being undertaken.

8.6.3.1.3.2 Ignition Sources

There would be a non-smoking policy throughout the site.

8.6.3.1.3.3 Security and Signage

The site would be locked and secure to prevent unauthorised access to the site outside of operating hours. The site has security monitoring.

8.6.3.1.3.4 Provision for Escape

Site operators are trained and practice simulations of emergency evacuation procedures.

8.6.3.1.3.5 Fire Detection

The main system for fire detection would be the staff on the site as they would be able to quickly detect any leaks of materials, via visual or odour recognition, which may lead to an increased fire risk. Once such situations are detected appropriate first response action would be taken.

8.6.3.1.3.5.1 Alarms

The following alarms would be in place:

- Offices
  - Satisfy the requirements of BCA and AS 3786 *Smoke alarms using scattered light, transmitted light or ionization* and AS 1670 *Fire detection, warning, control and intercom systems – System design, installation and commissioning – Fire* for common areas.

A thermo imaging system would be provided that both relays images and visual pictures to remote monitoring locations as well as mobile phones.

The system would activate the monitors recommended to be installed at hose reels and hydrants.

8.6.3.1.3.6 Fire Protection Equipment

The fire protection consists of fire extinguishers, hose reels and hydrants. Hose reels and hydrants would be fitted with monitors. Conveyors would be fitted with deluge sprinklers.

8.6.3.1.3.6.1 Fire Hydrants

Section E1.3 of the BCA states:

> *(a) A fire hydrant system must be provided to serve a building-*
> *(i) having a total floor area greater than 500 m^2; and*
> *(ii) where a fire brigade is available to attend a building fire.*

The NSW Fire Safety in Waste Facilities guideline requires 3 hydrants for the building.

8.6.3.1.3.6.2 Fire Hose Reels

Section E1.4 of the BCA states:

> *(b) A fire hose reel system must be provided-*
> *(i) to serve the whole building where one or more internal fire hydrants are installed; or*
> *(ii) where internal fire hydrants are not installed, to serve any fire compartment with a floor area greater than 500 m^2.*

The two nearest hose reels to the chemical storage area are to be equipped with foam induction and 20 L containers of foam. The fire contractor would provide training in the use of foam.

Additional hose reels will be needed in the extension to the warehouse.

8.6.3.1.3.6.3 Sprinkler System

The NSW Fire Safety in Waste Facilities guideline requires an automatic sprinkler system for building compartments with greater than 1000sqm. Therefore the proposed building will require a sprinkler system.

8.6.3.1.3.7 Management Practices

A Fire and Emergency Response Procedure will be implemented for the site. This procedure identifies fire hazards to human health and the environment. The document is comprehensive. It is used during induction of site personnel and contractors.

Training a fire crew with live fire training is recommended.

A procedure to guide the operators to inspect for lithium batteries is warranted. An instruction note needs to be sent to customers warning them of the fire risks caused by the casual disposal of lithium batteries.

8.6.3.1.4 Fire Water Run-off Containment

Section 7.9.1 of the *Fire Safety Guidelines* state;

> *The waste facility should have effective and automatic means of containing fire water run-off, with primary containment having a net capacity not less than the total hydraulic demand of installed fire safety systems.*

The building would be bunded/graded which would contain fire water run-off.

Two onsite detention basins would also be available for fire water containment.

8.6.3.2 Assessment of Fire Threat

There is a potential fire risk from diesel use on the site and combustible waste materials. However, the diesel storage is fully compliant with AS1940 and as such, the risk of a fire starting is low. The handling and management of the diesel, if undertaken with care, is also extremely unlikely to start a fire. The malfunctioning of equipment also presents another possible fire risk. However, proper maintenance of the equipment should eliminate any serious risk of fire.

Provisions for mitigating fire risk due to combustible waste materials have been provided. It should be noted that the aggregate and soils that will be stored in the covered storage bunkers are not combustible. No combustible waste materials would be stored outside the building.

The Emergency Plan, which will be completed in accordance with AS3745–2010, will need to provide work practice procedures to reduce this risk to a low level. No further assessment is considered warranted.

The following safeguards and recommendations would be adhered to at the site to control potential fire risks:

- Fire detection systems are installed and operated in accordance with AS 1670.1:2004.
- Diesel is to be stored and transferred in accordance with AS 1940-2017.
- Fire services at the site are to be maintained in accordance with AS 1851–2012.
- Emergency lighting and exit signage are to be provided in accordance with the BCA and AS 2293–2005.
- Specific on site personnel are to be trained in specific site procedures, emergency procedures and the use of hose reels. Hose reels near to the tank farm would have foam available.

- Strict control of ignition sources to be enforced on site.
- Maintenance and housekeeping practices provided in accordance with AS/NZS 4745:2012.
- At each of the hose reels, a monitor directed at a section of the waste materials stored on the floor of the warehouse.
- At each of the hydrants, within the building a monitor able to be swivelled.
- The flow of water to these devices would be initiated by the thermal imaging system.
- For the hydrants the ability to inject foams.
- Along the conveyors, deluge nozzles sufficient in number to cover the width and length of the conveyors.
- The installation of a thermal imaging system with automatic triggering of water from the monitors. A monitor is to be installed on the bucket of a front end loader if this equipment is required to be used during a fire event.
- Automatic sprinkler system.

8.6.3.3 Bushfire Hazard

The proposed development is in bushfire prone land. A bushfire report that assesses bushfire risk and asset protection zones (APZ) in accordance with the NSW Rural Fire Service guidelines is provided in Appendix 7.

Changes to the APZ have been made in consultation with Council and the Rural Fire Service. An email confirming acceptance of the following APZ without any change to the BAL requirements was received on 4 February 2022 and is presented at the end of Appendix 7. The agreed APZ is:

- North for a distance of 16 metres
- East for a distance of 12 metres
- South for a distance of 16 metres
- West for a distance of 16 metres

9. SOCIAL IMPACTS AND SAFEGUARDS

This section addresses the most significant social impacts that could result from the proposed development, which are human health, traffic issues, visual impacts and heritage.

9.1 HUMAN HEALTH

Potential health impacts from the proposed development have been assessed with reference to the *Health Impact Assessment Guidelines* (enHealth, 2001). Identified issues concerning human health are related to the following operational aspects: generation of inhalable and respirable dust (including silica dust), potential receipt of asbestos waste within incoming loads, high internal noise levels and harmful consequences of a potential fire or chemical spill incident occurring on site.

9.1.1 Generation of Dust

The generation of particulate matter in the form of inhalable and/or respirable dust (including silica dust) can cause health impacts to workers who are exposed to the airborne contaminants, either at high levels or for prolonged periods of time. Potential health effects include irritation to upper and lower respiratory tract and detrimental impacts to pulmonary function. Control practices that will be in place to minimise the risk of exposure to employees include a water misting system to suppress dust at high risk areas and the use of appropriate PPE, as well as workplace housekeeping practices.

Potential health impacts associated with external release of dust are considered to be low based on the results from the Air Quality Impact Assessment (Appendix 9), which show that levels of particulate matter at nearest sensitive receptors are expected to be below the Approved Methods environmental criteria which is well below the occupational exposure limits.

9.1.2 Asbestos Waste

The proposed development would receive C&D and C&I waste (general solid waste non-putrescible), however on the rare occasion other waste types may enter the subject site inadvertently. For example: in the case of asbestos containing material being found within the loads accepted at the proposed facility.

Asbestos can cause asbestosis, lung cancer and mesothelioma. Asbestos is a risk when asbestos fibres become airborne. Therefore it is critical the site's EMP include an *incoming waste procedure*, developed to confirm the type of C&D wastes arriving on site and to deal with any unexpected or non-conforming wastes (e.g. hazardous wastes like asbestos) mixed with accepted waste types. An *incoming waste procedure* is provided in the Waste Management Report (Appendix 3). If found during inspection at the weighbridge, the entire load would be rejected and immediately leave the site. If the suspect material is found while unloading, it would need to be segregated from other material using temporary barricades. Inspection by suitably qualified person and possible laboratory testing undertaken to determine the nature of the material and any action required. The *incoming waste procedure* would need to be implemented from the first load accepted at the facility. The staff would need to be trained in this and all other environmental procedures in accordance with Draft Protocol for managing asbestos during

resource recovery of construction and demolition waste" (NSW EPA, 2014) and any other training requirements listed in the EMP.

9.1.3 Generation of Noise

High internal noise levels can potentially cause health impacts (e.g. hearing loss) to workers who are exposed to it on a daily basis. Control practices that will be in place to minimise the risk of exposure to employees include the use of appropriate PPE and undertaking systematic equipment maintenance.

Potential health impacts associated with external environmental noise are considered to be low based on the results from the Noise Impact Assessment (Appendix 6), which show that noise impacts at nearest sensitive receptors are expected to comply with the relevant environmental criteria, which is well below the occupational exposure limits.

9.1.4 Fire and Chemical Spill Risk

The main concerns to human health resulting from a potential fire on site are death, burns as well as inhalation of smoke and other air pollutants. Fire related issues are addressed in detail in Section 8.6.3. Where appropriate, control measures have been recommended. With adequate fire services and equipment in place the risk of a fire occurring on site is considered to be low.

Potential adverse impacts to health could also result from unintended human contact with hazardous chemicals, upon their accidental release within the building and/or externally to the site, through their release into the stormwater system. The possibility of such an event occurring is considered to be low due to the minor quantities and nature of chemicals to be stored and the safeguards proposed to reduce the risk of any material spill. All chemicals will be safely stored in accordance with the relevant Australian Standard. Bunding for storage of diesel and spill clean-up equipment would be available on site to contain and clean up potential chemical spills should these occur. Only minor quantities of chemicals would be stored – diesel, lubricants, grease, cleaning. Therefore, the potential health impacts from the accidental release of or exposure to hazardous chemicals are considered to be minor for on-site workers and further insignificant for the local community.

9.1.5 Employee Health and Safety

All employees would undergo appropriate training as part of site induction and be provided with appropriate Personal Protective Equipment (PPE) for their role, such as ear plugs (if required), high visibility clothing and safety boots. The employer would ensure the operation is conducted as approved and appropriate resources are available for work safety. The proposed development would be required to comply with the following Acts and Regulations relating to health and safety:

- Work Health & Safety Act 2011; and
- Work Health & Safety Regulation 2017.

Employees would be trained in the appropriate safety procedures applicable to their role including use of firefighting equipment.

9.2 VISUAL IMPACTS

The site is identified as land with scenic and landscape values as discussed in Section 6.4.4.

The following clause from Penrith LEP 2010 pertains to scenic protection land:

> ***7.5 Protection of scenic character and landscape values***
> *(1) The objectives of this clause are as follows—*
> *(a) to identify and protect areas that have particular scenic value either from major roads, identified heritage items or other public places,*
> *(b) to ensure development in these areas is located and designed to minimise its visual impact.*
> *(2) This clause applies to land identified as "Land with scenic and landscape values" on the Scenic and Landscape Values Map.*
> *(3) Development consent must not be granted for any development on land to which this clause applies unless the consent authority is satisfied that measures will be taken, including in relation to the location and design of the development, to minimise the visual impact of the development from major roads and other public places.*

Visual impacts of the proposed development are therefore assessed from identified heritage items, major roads and other public places.

9.2.1 Site Context

The nearest items of heritage are more than 600m to the east and south east, and over 1.2 km to the north west. The subject site is not visible from these items of heritage.

Park Road is the major road that provides access to the site. The adjacent neighbouring land on the east of the site is preserved for the Outer Sydney Orbital. The proposed development would be visible from both of these vantage points.

There are no public places from which the subject site is visible. The surrounding land is privately owned and used for rural-residential purposes. The nearest residence is located approximately 100 metres to the west of the proposed truck parking area. Dense vegetation exists between this residence and the proposed development area.

9.2.2 Existing Visual Conditions

The site currently contains a residential brick and tile dwelling and two small metal sheds. These are set back approximately 190 metres from Park Road. The dwelling and smaller shed will remain while the other shed would be demolished as part of the proposal. An unsealed driveway provides site access and there are power poles located at the site frontage. A rural type 1m high fence exists with gates preventing vehicle access.

Further south of the existing dwelling is a cleared and filled area. Stockpiles are located along the eastern boundary of this cleared area. This cannot be seen from Park Road. The stockpile of fill is visible from the property adjacent to the site's eastern boundary which is the location of the preservation corridor for the Outer Sydney Orbital and future M9 motorway.

The frontage to Park Road consists of sparsely vegetated areas, some grassed areas with densely vegetated areas along the western boundary. This obscures the dwelling from view towards the west along Park Road. The southern half of the site contains dense vegetation which adequately screens views of the site from the south, south west and south east.

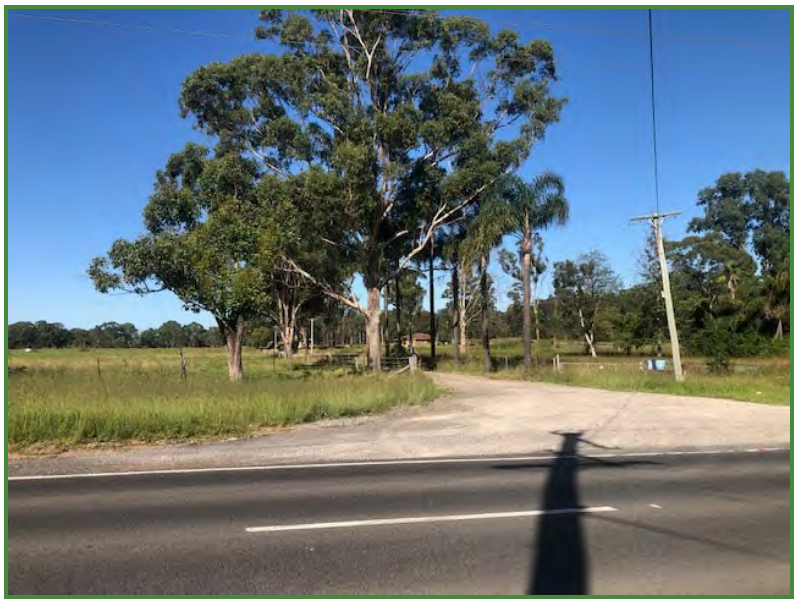
The following photographs provide views of the site from Park Road.

Photograph 1: View of the existing site entrance from Park Road showing the unsealed driveway and existing vegetation.

Photograph 2: View of the site from Park Road showing the dense vegetation that exists at the frontage and along the western boundary of the site.

Photograph 3: View from Park Road. The existing brick dwelling can be seen to the centre right of the photograph. The proposed building would be located behind and to the left of this dwelling.

Photograph 4: View from Park Road along the eastern boundary of the site. Established vegetation would be enhanced with additional native plantings along this side of the site. The brick dwelling can be seen towards the centre of the photograph.



Photograph 5: View of the property to the east of the subject site at 364 Park Road, Luddenham. A poultry shed located on a property further east can be seen (380 Park Road, Luddenham). The proposed building would be similar in nature to this existing poultry shed but set further back from the road and therefore further screened by existing vegetation and additional landscaping.

9.2.3 Proposed Visual Conditions

The proposed development and construction of the purpose-built building, internal roads, parking areas and associated infrastructure will change the visual perspective of the site from the Park Road (view looking south) and from the adjacent premises to the east of the site (location of the future M9 Motorway).

The main building would be set back approximately 240 metres from the frontage to Park Road and would be located behind the existing dwelling. The proposed building takes the form of a large rural shed with low roof profile and standard Colorbond wall and roof cladding with a wall height of 8.2 metres and height to the apex of 12 metres. The scale and configuration is not dissimilar to other rural buildings that accommodate agricultural businesses. Standard green and brown non-reflective Colorbond material is proposed to complement the colours of the natural vegetation and background of the property. The end of the building faces the street. Building 3D visual images have been provided with the Site Plans. An example is provided below.

Figure 9-1: Building 3D visual image

The existing unsealed driveway would be upgraded to two lane sealed driveway. Car and truck parking areas would be located in front (north) of the existing dwelling. A small area of native vegetation requires removal. This is located toward the centre of the site and is not visible from any viewpoints outside the boundaries of the site. A landscape plan would be implemented with plantings of native species to be established along the eastern boundary of the development area and around car and truck parking areas that would screen these areas from Park Road and the property to the east of the site. Further revegetation of a 1 ha area of disturbed land would be undertaken as part of the landscaping.

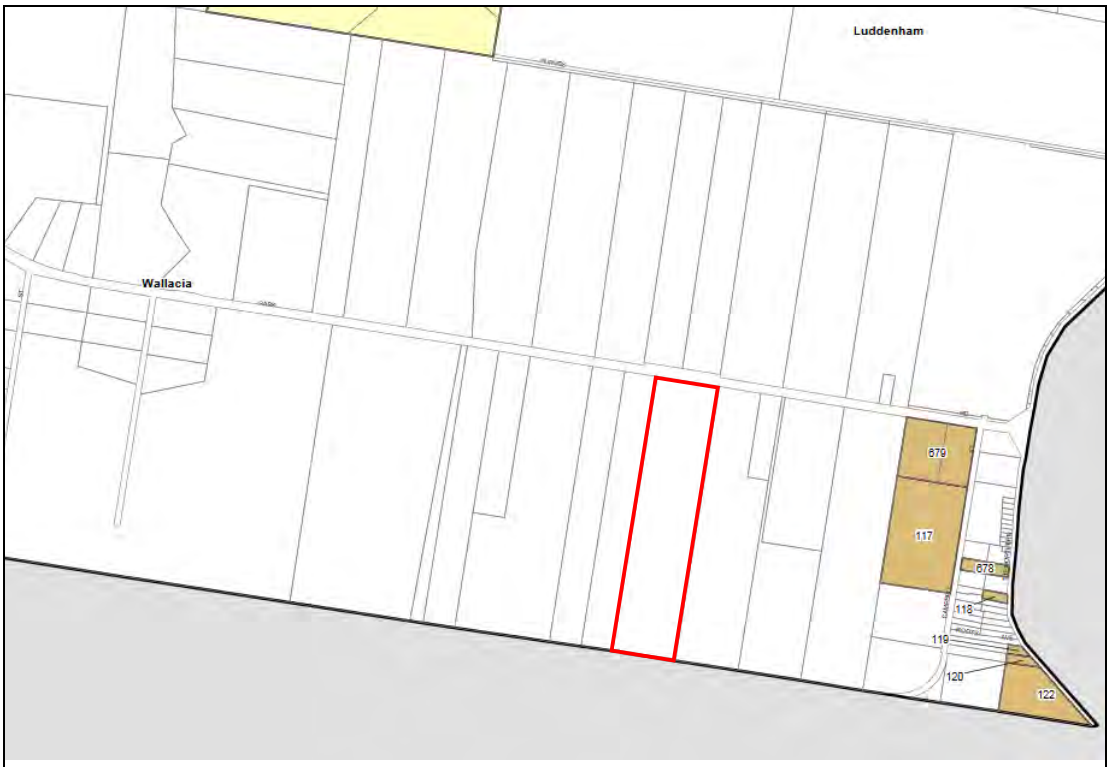
The subject site is not visually prominent. The proposed development has been designed with visual amenity of the existing rural area in mind and the building is set well back from the vantage point of Park Road. Additional landscaping and existing established trees and vegetation at the site would adequately screen the proposed development from the adjoining property to the East which is the location of the future M9.

There will be negligible impact on Scenic and Landscape values of the site as a result of the proposal. Landscaping is expected to improve current site views from vantage points of Park Road and the future M9.

9.3 HERITAGE

Figure 9-2 displays heritage sites near the proposed development. As shown, the proposed development is not a heritage site. Additionally, the proposed development is not adjacent to any heritage sites.

Figure 9-2: Penrith LEP 2010 Heritage Map



Source: Penrith LEP 2010

↑N Not to scale	LEGEND: Site boundary Heritage site	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

9.3.1 Due Diligence Aboriginal Archaeological Assessment

Narla Environmental conducted a Due Diligence Aboriginal Archaeological Assessment (Appendix 11) in accordance with the requirements of the Due Diligence Code of Practice for the Protection of Aboriginal Objects (DECCW 2010). The assessment included a site Inspection to identify any potential Aboriginal archaeological constraints that may exist within the development area and provide recommendations to avoid or mitigate impacts to any known or suspected sites, objects or areas that have archaeological sensitivity in accordance with the requirements of the National Parks and Wildlife Act 1974 (NPW Act).

The outcomes of the due diligence process are summarised as follows:

- Proposed earthworks and vegetation clearing have potential to disturb Aboriginal objects.
- A search of the Aboriginal Heritage Information Management System (AHIMS) found no documented Aboriginal archaeological sites or objects.
- Searches of the State Heritage Register, Penrith LEP and DCP found no recorded Aboriginal or historic items within the subject property.
- No other sources of information are available for the Aboriginal heritage of the site.
- A mapped first order watercourse and unmapped dam are located on the site. There is a higher probability of Aboriginal objects occurring within 200 m of water, however, first order

watercourses are often associated with infrequent and low densities of artefacts from movement through the landscape rather than long term occupation.
- No aboriginal objects are likely to occur within the site and therefore no reason to move or avoid the activity.
- The desktop assessment and visual inspection indicate there were no Aboriginal Objects likely to occur within the site.
- No further investigations are required.

The subject land does not contain any documented Aboriginal sites, or objects, or any specific areas of potential Aboriginal archaeological sensitivity. No Aboriginal heritage constraints were identified for the proposed activity and no further investigations are warranted.

Recommendations include:

- All workers & contractors be inducted and informed of their obligations under the NPW Act;
- In the event that Aboriginal objects are found and cannot be avoided, all activities with the potential to impact the object must stop and a qualified archaeologist engaged to assess findings. Notification to the Department of Planning Industry and Environment is required.
- In the event that human remains are found, stop work, secure the site and notify the NSW Police and the Office of Environment and Heritage.

9.4 ROAD, TRAFFIC AND TRANSPORT

This section provides details regarding road, traffic, transport, access and parking as a result of the proposed development.

9.4.1 Traffic and Parking Impact Assessment

A Traffic and Parking Impact Assessment for the proposed development was undertaken by Motion Traffic Engineers. A summary of the outcomes of this assessment are provided below:

Parking

- The proposed resource Recovery Facility has enough on-site car and truck parking to accommodate all parking demand.

Traffic

- The proposed resource Recovery Facility is a low trip generator for the weekday AM and PM peak hours.
- The additional trips from the proposed resource Recovery Facility can be accommodated at the nearby intersection without significantly affecting intersection performance, delays or queues.
- There are no traffic engineering reasons why a planning permit for the proposed Recovery Facility at 344 Park Road in Wallacia should be refused.

The car park and driveway certification (Appendix 12) demonstrate that the proposed car park area and driveway are compliant with Australian Standards and Council's DCP. Swept path drawings are provided.

9.4.1.1 Car Parking

Car parking requirements are set out in the Penrith Development Control Plan, Part C.

The DCP requires that car parking is provided generally in accordance with the following standards set out in Clause 10.5. There is no specific guideline for use of the site as a resource recovery facility.

Section 5.11.1 of the RMS Guidelines provides parking requirements for 'factories' as follows:

- All new factories on undeveloped sites must provide on-site parking for all vehicles used by employees of the firm

The car space parking provision has been designed to be more than adequate for the expected staff numbers.

The site plan shows there will be 32 car parking spaces including a disabled space provided on site. Expected employee numbers for the operation of the facility would be 26. Day shift would require up to 20 people to be on site, with afternoon and night shift needing up to 2 staff. Therefore, 32 car spaces would be more than adequate to accommodate staff vehicles for the proposed development.

The traffic and parking assessment (Appendix 12) prepared by ML Traffic Engineers concurs with the above conclusion.

9.4.1.2 Site Access

The existing site access is from a single lane unsealed driveway. This will be converted to two separate sealed access driveways for one way entry and one way exit for site traffic. A landscaping strip would be established between the driveways. Both driveways access the site via Park Road. An internal intersection would provide access to the proposed car parking area or weighbridge entry into the facility. An exit lane containing a weighbridge will be provided for outgoing loads. A one way reject load lane would be established for immediate exit for any non-conforming loads.

Access intersection treatment has been designed by Stanbury Traffic Planning in consultation with TfNSW. This includes a rural auxiliary left turn treatment (AUL) and basic right turn treatment (BAR) at the junction of Park Road and the site access driveway. A concept design in accordance with relevant AUSROADS requirements has been prepared and indicates the extent of the pavement widening required on both sides of Park Road. This is also reflected on architectural plans. Intersection treatment details are provided in Appendix 12.

9.4.1.3 Truck Scheduling and Weighbridge Operation

Due to the nature of the industry, it is difficult to manage the timing of deliveries. Therefore, the facility intends to implement a truck booking system which is a computerised program called "Waste Edge". This system allows for bookings to be made for delivery and pick up of skip bins and waste loads and enables the timing of truck movements into and out of the site to be managed.

An allocator stationed at the weighbridge would be dedicated to the truck scheduling program to manage:

- Scheduling of trucks arriving and leaving the site;
- Timing of truck deliveries to ensure there is room on-site for them to unload; and
- The weighbridge to contain vehicle queues inside the site.

Two weighbridges are proposed to provide weighing upon entry and upon exit of the site.

9.4.2 Park Road

Park Road is listed under Penrith DCP as a key transport corridor that needs to be protected. Park Road is a rural road with one lane each way with a sign posted speed limit of 80km/hr. The proposed facility has been designed to ensure the operations would not impact on the existing road, in particular, sealing the internal driveways and providing intersection treatment to upgrade the access driveway to the site. The facility is set well back from the road and existing trees as well as additional landscaping would ensure it is concealed from view from Park Road.

9.4.3 Outer Sydney Orbital

The outer Sydney Orbital is a recommended corridor of land to be preserved for a possible future motorway and freight rail line. The land to be preserved is adjacent to the subject site as shown in the following figures.

A timeline for future development has been prepared based on information publicly available as follows:

0-5 years: Preserve corridor for the Outer Sydney Orbital which is adjacent to proposed site.

10-20 years: Detailed investigation to determine whether the Outer Sydney Orbital is required in the next decade.

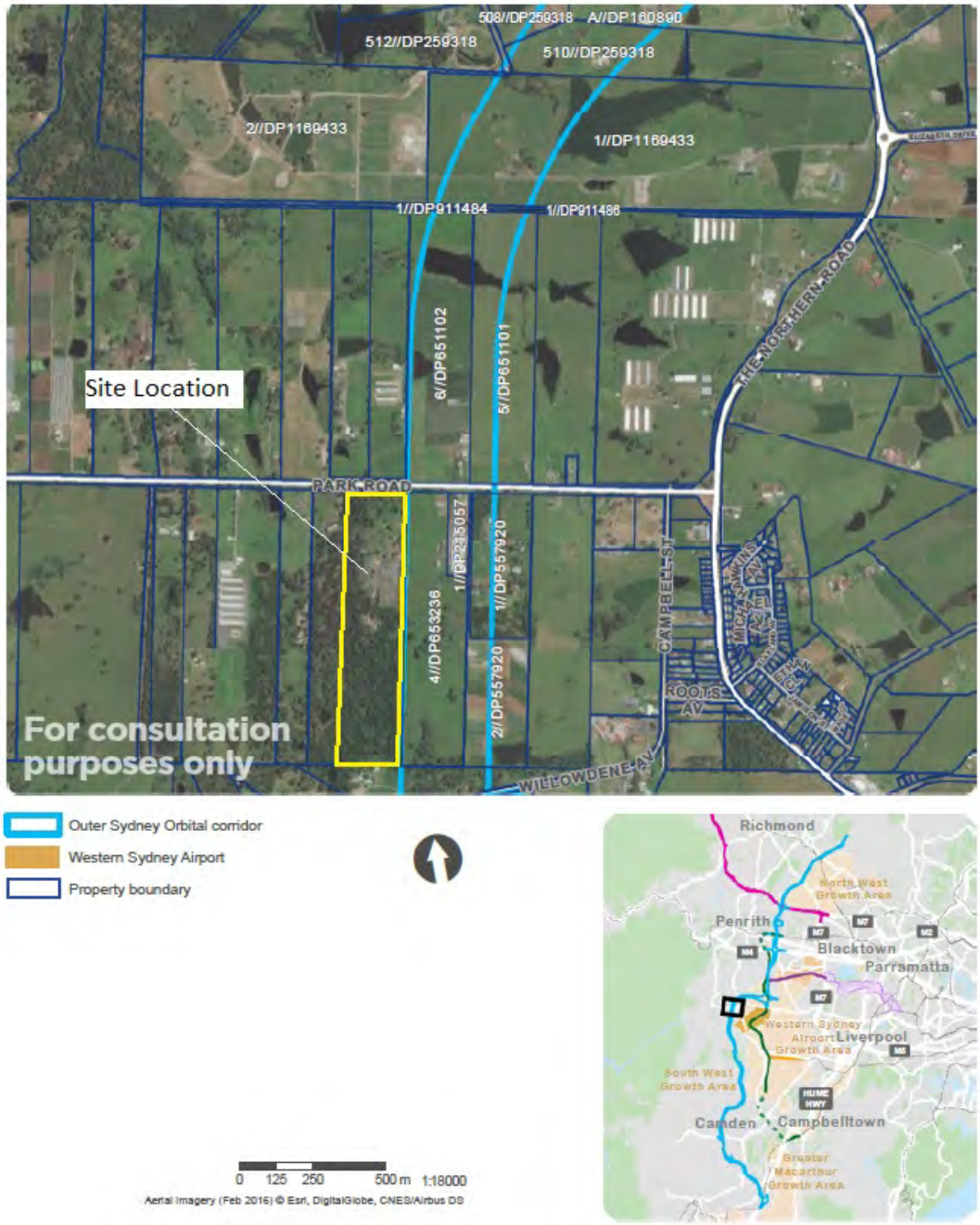
20+ years: Possible construction of the M9 if detailed investigation determines this is required.

Figure 9-3: Map of recommended corridor for Outer Sydney Orbital

Source: NSW Government

N Not to scale		Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 9-4: Map showing location of site in relation to Outer Sydney Orbital



Source:

N Not to scale	LEGEND: Site boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

The future establishment of the M9 motorway is further discussed below. There are several documents that address the proposed M9 motorway.

Infrastructure Priority List, Infrastructure Australia (December 2019)

- The M9 motorway is listed under the "high priority initiatives" which are: potential infrastructure solutions for which a business case has not yet been completed. A high priority initiative seeks to address a major problem or opportunity of national significance.
- The initiative related to the M9 is to preserve corridor for outer Sydney orbital road and rail / M9 and Castlereagh connection for the future connectivity between Western Sydney and Central Coast / Illawarra.
- The timeframe is 0-5 years and the initiative seeks corridor preservation.
- See attached documents including the map of the recommended corridor for the outer Sydney orbital.

Future Transport Strategy 2056 (March 2018)

The Outer Sydney Orbital is within the metropolis of three cities area shown in the maps. It is part of initiatives outlined in the above linked document. Initiatives are divided into the following categories:

1. *Committed / funded initiatives (0–10yrs) – initiatives that either have committed funding, are committed/contractually committed, are for immediate detailed planning, or are part of key maintenance, renewal or safety programs. Some initiatives subject to a final business case and funding.*

2. *Initiatives for investigation (0–10, 10–20yrs) – intended to be investigated for potential commitment or implementation within the next 20 years. Those listed in 0–10 year horizon will be prioritised for more detailed investigation to determine if they are required in the next decade.*

3. *Visionary initiatives (20+ years) – longer term initiatives that may be investigated within the next 10 years, but are unlikely to require implementation within 20 years.*

The following is noted:

The Outer Sydney Orbital from Great Western Highway to Western Sydney Airport – Badgerys Creek Aerotropolis is included in the Greater Sydney Initiatives for Investigation (10 – 20 years).

Greater Sydney Initiatives for Investigation (20+ years) include the following:

- Outer Sydney Orbital from Hume Motorway to Illawarra
- Outer Sydney Orbital from Western Sydney Airport – Badgerys Creek Aerotropolis to Hume Motorway
- Outer Sydney Orbital from Great Western Highway to Central Coast

Detailed investigation to determine whether the initiative is required in the next decade is not a priority for the Outer Sydney Orbital. It appears that detailed investigation of this initiative will take place in 10-20 years.

10. CUMULATIVE IMPACTS AND SAFEGUARDS

This section provides an assessment of the potential cumulative impacts that may arise as a result of the operations from the proposed development, concurrently or sequentially with other projects in the region.

Cumulative impacts are incremental environmental impacts that are caused by past, present or future activities that, when combined, may have further cumulative effect. In fact, the environmental impacts of any single project upon a receiver or resource may not be significant when considered in isolation; however, the potential impacts may increase when individual effects are considered in combination, either with the same project or together with other projects.

The potential cumulative impacts that could arise from the operations of the proposed development are assessed in the following subsections.

10.1 AIR QUALITY

Minimising dust impacts are essential at any waste recovery facility. Odour was not considered at this facility due to the lack of odours from C&D and C&I waste. The cumulative impact of the dust was assessed in the Air Quality Impact Assessment (Appendix 9) as the incremental impacts from the site are added to the background dust levels. It was determined that the dust impacts from the development satisfied all air quality criteria for all surrounding receptors. This was due to control methods to minimise dust impacts being implemented, including;

- Dust generating activities including unloading, screening, crushing and sorting of materials are conducted within a building.
- Water misting system focused at local point of dust emissions, as well as applied throughout the entire building;
- Water misting system all storage bunkers; and
- Water misting system on front end loaders.

10.2 NOISE AND VIBRATION

Operational noise is a critical environmental issue in any area with surrounding residential receivers. The existing background noise levels were used in determining the project criteria for the noise impact assessment. The cumulative impact of the development is assessed when establishing the criteria for operational, construction and road traffic impacts in the Noise Impact Assessment (Appendix 6). All relevant noise criteria were satisfied at nearest residential receivers in all time periods.

10.3 SURFACE WATERS

Collective contributions from the various surrounding facilities in the local area could result in degraded quality of surrounding surface waters, potentially through the contamination of stormwater run-off due to accidental release of sediments, chemicals or waste. The potential for release of sediments is controlled using various drainage controls. The potential release of chemicals or waste from subject site would be unlikely, and any accidental release could be easily contained on site as a result of the sealed nature of the proposed development area. Therefore, contribution of the proposed activities has been appropriately mitigated and cumulative long term impacts are considered to be insignificant.

10.4 WASTE MANAGEMENT

A major incident or recurring incidents involving the storage and management of waste products could have potential cumulative impacts if considered in the context of the surrounding area, which has the potential to deal with large volumes of waste generation. Incidents include accidental spillages that have the potential to enter the surrounding environment causing land and water pollution.

A number of safeguards and management measures would continue to be established at the site in order to prevent accidental release of any waste. With these procedures and safeguards in place, the contribution of the site to cumulative impacts from the incorrect handling and management of waste would be insignificant.

10.5 HAZARDS AND RISK

Hazards and risk associated with the proposed development are related to the potential for fires, spillage of chemicals and release of particulates into the atmosphere or surrounding environment via the site's drainage/stormwater system.

There are safeguards established at the site to reduce the risk of fires as well as the risk of release of chemicals and particulates, such as the storage of diesel according to relevant standards including bunding, provision of spill kits and appropriate staff training in emergency response.

Cumulative impacts are not expected due to the safeguards designed into the facility. Additionally, sufficient fire protection equipment would be provided to address any potential fire incidents.

10.6 TRAFFIC AND TRANSPORT

The traffic impact assessment for the proposed development, undertaken by ML Traffic Engineers, considered cumulative impacts on the existing road network by using existing traffic count data of the surrounding road networks. Key intersections were assessed for the additional traffic generated by the proposal during AM and PM peak hour traffic.

11. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecologically sustainable development is defined as "development that meets the need of the present generation without compromising the ability of future generations to meet their own needs". Ecological sustainability requires a combination of good planning, and effective and environmentally sound approach to design, operations and management. The principles of ESD throughout the project's life cycle are outlined in the following paragraphs.

Decision making should be based on sound environmental management principles which consider not only the present, but also the future, particularly in relation to:

- Precautionary principle – if threats of serious or irreversible environmental damage exist, lack of full scientific evidence should not be used as a reason for postponing measures to prevent environmental degradation;
- Inter-generational equity – the present generation should ensure that health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- The conservation of biodiversity and ecological integrity – the conservation of biological diversity and ecological integrity should be a fundamental consideration; and
- The valuation of the environment and resources and the establishment for the efficient use of resources.

The above principles have been incorporated into the overall design of the project and into the management of operations on site. The EIS outlines safeguards that would be implemented on site so that the proposed operations would cause minimal harm to the environment and that resources would be sustained to ensure availability to future generations, through reducing the environmental impacts on the surrounding community.

The main environmental safeguards to be implemented in order to minimise environmental harm, in line with ESD principles, are as follows:

- Stormwater pollution control, including bunding of chemicals, spill kits, sealed surfaces, pollution control devices on stormwater pits, bioretention filter media areas, sediment pond and water monitoring program;
- Fire protection services;
- Storage and handling of hazardous chemicals including hardstand/bunded area integrity management and maintenance of dangerous goods storage area;
- Waste management and stringent procedures to manage the incoming and outgoing waste; and
- Environmental Management Plan (EMP).

In addition to these environmental safeguards, it should be noted that it is the intention of the site is to recycle materials, rather than sending waste to landfill. This will have a positive effect on the environment, and will significantly reduce demand for landfill in the area.

Furthermore, the proposed development would not have any foreseeable negative impacts on socio-economic aspects. Instead, a positive contribution from the increased operations on site would be the creation of jobs, with an estimated 26 additional employment opportunities being provided. Increased operations are also to focus heavily on supplying the local markets. As a

result, the proposal could have positive economic "spin-off" effects in the local region, by enhancing social productivity while not undermining ecological systems. This aspect would be in accordance with the inter-generational equity principle of ESD.

In order to monitor the sustainable performance of a development, various sustainability indicators can be used.

Examples of these indicators are outlined in the table below and have been addressed in relation to the subject site and its considerations for ESD and sustainable practices. The site's EMP will be used (and be continually updated) in order to maintain the principles of ESD and monitor the sustainability indicators mentioned in the table.

Table 11-1: Sustainability Indicators

Indicator category	Comments and Description
Community	• Increase in employment opportunities; • Strengthening of local economy; • Level of knowledge based investment increased; • No net loss of heritage or other features, buildings, places of high community importance; and • No loss of community integrity.
Ecosystems	• No net reduction in richness or abundance of flora and fauna species in aquatic or terrestrial environments; • Improvement to the existing landscaping of the site including restoration and enhancement of native flora species; • No net increase of pests or disease threats to the health of the ecosystem; and • Reduction of hazards which are threats to the health of the ecosystem (fire, pollution, etc.).
Soils	• No net topsoil erosion; • No increase in area of land affected by salinisation; and • No reduction in soil pH below certain levels.
Water	• Reduction of freshwater use per unit of production; • No net increase in levels of acidification or toxic substances, heavy metals, nutrient and sediment levels; and • No net reduction in quality of water bodies as aquatic habitats.
Air	• No net reduction in air quality.
Energy	• Programs to reduce the use of fossil fuels for transportation and energy consumption.

12. MITIGATION MEASURES AND MANAGEMENT

This section provides a summary of the mitigation measures required to ensure that the surrounding natural and built environment is safeguarded from potential impacts of the proposed development. An overview of the site management plans to be implemented is also provided.

12.1 SUMMARY OF CONTROLS AND MITIGATION MEASURES

Table 12-1 presents a summary of the potential impacts of the site activities discussed in Section 8 and identifies the environmental safeguards and control measures that are recommended throughout the EIS to provide a sufficient level of protection, to both the built and natural environment surrounding the development.

Table 12-1: Summary of Potential Impacts, Environmental Safeguards and Control Measures

Potential Impacts	Safeguards and Control Measures
Air	
Generation of particulate emissions exceeding compliance levels, and resulting in impacts to air quality and complaints from the community. Residual impacts after management and mitigation measures: minor impacts from air emissions.	• All processing operations and storage to be undertaken within the enclosed building. • All truck loads to be covered. • The development area would contain sealed surfaces. • A water misting system within the building would suppress dust from processing operations. • Water misting system on front end loaders. • Use of modern electrically powered machinery.

Table 12-1: Summary of Potential Impacts, Environmental Safeguards and Control Measures

Potential Impacts	Safeguards and Control Measures
Noise	
Generation of noise by use of equipment on site and vehicle movements exceeding compliance levels and resulting in impacts to acoustic amenity and complaints from the community.	**Operational Noise** • All processing operations to be undertaken within enclosed building; • Hours of operation would be Monday – Friday: 7am – 6pm and Saturday: 8am – 1pm. No operation on Sundays or public holidays; • All front-end loaders operated on site are to be no greater than 111 kW in power, and produce no higher sound power level than 102 dB(A); • The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A); • The walls must have an R_w of at least 36 dB, double corrugated steel has been modelled; • The roof must have an R_w of at least 32 dB, corrugated steel with miwo (insulation) has been modelled; • Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended; • Pedestrian doors should also be kept close when not in use; The following management practices are also recommended as good practice: • Prohibition of extended periods of on-site revving/idling; • Keeping the roller shutter door closed where possible; • Minimisation of the use of truck exhaust brakes on site; • Enforcement of low on-site speed limits; and • On-site vehicles and machinery to be maintained in accordance with a preventative maintenance program to ensure optimum performance and early detection of wearing or noisy components.
Water	
Contamination of stormwater run-off and consequent impacts on nearby surface waters. Residual impacts after management and mitigation measures: insignificant impacts from potential discharges to water.	• The development area would be fully sealed; • Bunded diesel storage tank; • Stormwater drains discharging to bioretention filter media then sediment detention basins • No waste to be stored externally.

Table 12-1: Summary of Potential Impacts, Environmental Safeguards and Control Measures

Potential Impacts	Safeguards and Control Measures
Waste Management	
Potential environmental and off-site impacts associated with excessive generation of waste requiring landfill and potential release of waste to surrounding environment. Residual impacts after management and mitigation measures:	• All waste storage within the building; • Prevention of windblown litter by storage inside or within walled and covered bunkers and ensuring all truck loads are covered; • Licenced waste contractors for collection; • Incoming waste inspection procedure to ensure no non-conforming waste is accepted onto site; • Weighbridges for accurate record keeping.
Hazards and Risk	
Incident involving the potential for a spill or fire. Residual impacts after management and mitigation measures: potential for fire to cause serious material damage and impact on human life is low.	• Chemical storage in accordance with relevant Australian Standards; • All combustible waste material stored within the building; • Control of ignition sources, including “no smoking” policy; • Adequate provision for escape; • Adequate fire services; • Spill controls including, DG storage bunding, spill kits and spill kit training; • Building and site security; • Forklift driver training; and • Emergency plan and emergency response training.
Bushfire	
	Manage APZ around the resource recovery facility building as inner protection zones as follows; • North for a distance of 16 metres • East for a distance of 12 metres • South for a distance of 16 metres • West for a distance of 16 metres
Human Health	
Impacts stemming from other aspects including air quality, noise and hazards and risk: airborne dust, high internal noise levels and harmful consequences of a potential fire or chemical spill incident. Residual impacts after management and mitigation measures: minor to insignificant impacts to human health of workers and local community.	• Implementation of EMP; • Use of Personal Protective Equipment; • Undertake occupational health assessments if required; • Regular workplace inspection and high standard of housekeeping; • Regular equipment maintenance; • Safeguards and control measures implemented for Air Quality; • Safeguards and control measures implemented for Hazards and Risks; and • Safeguards and control measures recommended for Noise.

Table 12-1: Summary of Potential Impacts, Environmental Safeguards and Control Measures

Potential Impacts	Safeguards and Control Measures
Biodiversity	
Impacts to native vegetation during construction.	• Locate any temporary structures for construction within areas containing no native vegetation. • Include in the Construction Environmental Management Plan measures for the management of soil, surface water, weeds and pollutants as well as following: ► An arborist to establish tree protection zones and advice on non-destructive or tree sensitive construction methods. ► Assign an suitably qualified project ecologist for targeted searches, pre-clearing survey and to supervise the clearance of trees and shrubs • Maintain the small portion of APZ the west of the proposed facility to IPA standards. • Relocate any woody debris (fallen trees and logs). • Erect temporary fencing around retained native vegetation during construction works. • Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained.
Traffic and transport	
Low to moderate traffic impact	Sealed internal roads Signs directing internal site traffic Pavement widening to allow for AUL and BAR at the junction of Park Road and the site access driveway (Refer Appendix 12)

12.2 Site Management Plans

Site management plans have been developed to ensure the safety of individuals on the site, especially in relation to workplace health and safety, as well as minimising the impact to the environment. These plans include;

- Operational Plan of Management (OPM);
- Emergency Plan (EP);
- Pollution Incident Response Management Plan (PIRMP); and
- Environmental Management Plan (EMP).

Details of the purpose and contents of these plans are provided in the following sections.

12.2.1 Operational Plan of Management

A draft operational plan of management (Appendix 13) is provided with the application. This would be finalised as the development becomes operational.

12.2.2 Emergency Plan

An emergency plan is required and should be prepared with the following guidelines and standards:

- NSW Rural Fire Service Guidelines for the Preparation of Emergency/Evacuation Plans;
- AS 3745–2010 *Planning for Emergencies in Facilities*;
- AS/NZS 1596:2014 *The storage and handling of LP Gas;*
- AS 4332–2004 *The storage and handling of gases in cylinders and*
- AS 1940-2017 *The storage and handling of flammable and combustible liquids*

The aims of the plan are: to provide a clear understanding of how to handle and react to any emergency situation that may occur at the site in the form of effective control structures, procedures and directives; to prevent or minimise the impact of an emergency and pollution incident on human life, the community and surrounding environment; and to facilitate a return to *normal* or *safe* operations as soon as possible.

The procedures contained in the plan should be designed to protect life and where possible prevent or minimise damage to the equipment, site and installations at the site and facilitate a return to normal operations by providing effective utilisation of the safety features, systems and/or equipment installed at the site. The procedures would be updated as continually improving guidelines to support site management and handling of unanticipated situations.

Designated roles are established for individuals in the plan, and take on responsibilities in order to ensure the safety of all individuals who may have been on the site. The Chief Warden of the site is the most prominent role, and liaises with the emergency services to coordinate the emergency response in accordance with the EP.

An Incident Reporting and Investigation procedure should be included in the plan to address the following aspects and actions:

- If the incident poses a risk to human health or the environment, report the incident immediately, otherwise report incident within 24 hours of the occurrence of the incident;
- Undertake an incident investigation especially if multiple incidents occur or if the incident results in serious injury/death or property damage; and
- Monitor and review incidents to determine follow-up actions, prevent the recurrence of the incident and ensure that follow-up actions are implemented.

12.2.3 Pollution Incident Response Management Plan

Holders of an EPL under the POEO Act 1997 are required to prepare and implement Pollution Incident Response Management Plans (PIRMP) for each licensed activity.

A Pollution Incident Response Management Plan could be incorporated into the site's Emergency Plan for ease of use, resulting in an "Emergency and Pollution Incident Response Management Plan".
A PIRMP would be prepared in accordance with the following guideline:

- NSW EPA Environmental Guidelines: Preparation of Pollution Incident Response Management Plans;

The aims of the plan are: to provide a clear understanding of how to handle and react to any pollution situation that may occur at the site in the form of effective control structures, procedures and directives; to prevent or minimise the impact of a pollution incident on human life, the community and surrounding environment.

The plan would include:

- Legal obligations of the licensee and staff;
- Contact details of responsible persons;
- Staff training;
- Procedure for actions to be taken immediately after a pollution incident;
- Notification procedure to ensure all relevant people and authorities are notified and kept informed throughout the incident;
- Action and communication procedures to ensure incidents are effectively and safely dealt with;
- Inventory of pollutants on the premises;
- Safety equipment used to minimise risks or contain or control a pollution incident;
- Detailed maps showing location of the premises, location of any potential pollutants and stormwater drains on the premises and the surrounding areas that may be affected;
- Testing and revision of the PIRMP.

12.2.4 Environmental Management Plan

The development at 344 Park Road, Wallacia, will require an EMP. This will address the following elements that need to be controlled on the site;

- Legal and regulatory requirements;
- Site description including environmental characteristics and general infrastructure;
- Operational conditions and controls;
- Environmental management activities in relation to particular aspects and impacts;
- Reporting, staffing and training requirements;
- Environmental monitoring and review; and
- Environmental procedures including but not limited to:
  - Dust management;
  - Noise management;
  - Stormwater management;
  - Waste Management;
  - Equipment monitoring and maintenance schedule; and
  - Regular Workplace Inspection.

The EMP would adopt the framework suggested by the ISO 14001 Standard. This would maximise consistency and simplicity in the administration and implementation of the EMP procedures. Specific procedures would be developed to manage the identified environmental aspects and impacts of site activities.

12.2.5 Operational Traffic Management Plan

An operational traffic management plan would be prepared by a suitably qualified Traffic Engineer and would address the management and control of heavy vehicle access and the routes that would be predominantly via The Northern Road and Park Road.

This plan would be prepared as part of the Construction Certificate process.

13. STATEMENT OF COMMITMENTS

Greenfields Resource Recovery Facility commits to the following course of action during the installation and operation of the proposed development at 344 Park Road, Wallacia:

- Greenfields Resource Recovery Facility will abide by all legal requirements, licence conditions and approvals pertaining to the site.

- Greenfields Resource Recovery Facility will ensure all external areas are sealed and kept tidy and free of items and debris to facilitate movement of vehicles on site and minimise potential pollution.

- Greenfields Resource Recovery Facility will implement and maintain the following safeguards and mitigation measures at the site, as detailed in this EIS:

  - Construct the walls of the building with double corrugated steel or similar (an R_w of at least 36 dB) and roof with (Rw = 32 dB) on a concrete slab floor.

  - All processing activities and storage areas to be confined within the building.

  - Install automatic closing roller shutter doors on the building.

  - Ensure roller shutter doors wherever possible and when the facility is not operational.

  - The diesel tank must be self bunded and located in accordance with the relevant Australian Standards.

  - Spill kits must be provided within 10 metres of the diesel tank and must be maintained and replenished as required.

  - Install and maintain a building water misting system that includes water sprayers on dust generating equipment, all storage bunkers and front end loader operational area.

  - Ensure all internal roads are sealed and signs are provided to direct on-site traffic.

  - Stormwater drainage measures, and all stormwater infrastructure and pollution control devices are installed in accordance with relevant plans and are regularly inspected and/or cleaned and maintained in good working condition.

  - Provide static water supply of 20,000 L equipped with fittings to enable fire suppression.

  - Staff must be trained in spill response and emergency procedures, including firefighting techniques.

  - All waste must be stored in designated bunkers and provided with unique identification numbers.

- Fire services and equipment must be provided in accordance with National Construction Code (NCC) and relevant Australian Standards.
- All equipment should be regularly inspected and maintained.
- All staff must wear PPE relevant to their role.

- Greenfields Resource Recovery Facility will implement the Construction Environmental Management Plan.
- Greenfields Resource Recovery Facility will implement an Environmental Management Plan and ensure it incorporates the commitments, safeguards, mitigation measures and recommendations documented in this EIS.
- Greenfields Resource Recovery Facility will implement an Emergency Plan and Pollution Incident Response Management Plan.
- Greenfields Resource Recovery Facility will implement an operational plan of management.
- Greenfields Resource Recovery Facility will implement an incoming waste inspection procedure to be included in the EMP.

14. LIST OF APPROVALS AND LICENCES

A list of licences, approvals and permits required for the proposed development are shown in the following table in **bold**.

Table 14-1: Required licences, approvals and permits

Type	Relevant Legislation	Required?	Agency
LICENCES			
Environment Protection Licence	**Clause 34 and 42 of Schedule 1 of the Protection of the Environment Operations Act 1997**	**Yes**	**NSW EPA**
Surface Water Licence	Water Act 1912	No	WaterNSW
Groundwater Licence	Water Act 1912	No	WaterNSW
Controlled Activity Approval	Water Management Act 2000	No	WaterNSW
PERMITS			
Permits under the Fisheries Management Act	Fisheries Management Act 1994	No	DPI Fishing and Aquaculture
Aboriginal Heritage Impact Permit	National Parks & Wildlife Act 1974	No	OEH
Permits under the Heritage Act 1977	Heritage Act 1977	No	OEH
APPROVALS			
Development Consent	**Clause 32 of Schedule 3 of the Environmental Planning and Assessment Act 1979**	**Yes**	**Penrith City Council**
Alter or erect improvements within a mine subsidence district	Mine Subsidence Compensation Act 1961	No	Mine Subsidence Board
Consent for works and structures in a public road	Roads Act 1993	No	RMS
Sub-division or development of bush fire prone land	Rural Fires Act 1997	No	Commissioner of the NSW Rural Fire Service

15. JUSTIFICATION AND CONCLUDING REMARKS

15.1 PROJECT JUSTIFICATION

The local and regional demand for the recycling of C&D and C&I waste is expected to increase in future years, which will lead to industry growth on the domestic market. Natural resources are not infinite and the increase in infrastructure and civil works projects associated with the growth areas in western Sydney means an increase in the generation of quantities of this waste.

Currently a large number of skip bin companies within the regional area collect waste and transport this waste directly to landfill. This is the underlying reason for establishing the business. Greenfields Resource Recovery Facility will pursue a relationship with various existing companies within the regional area that currently take their waste directly to landfill.

This proposal allows the proponent to utilise a growing market need that supports sustainable use of waste materials and the project has been driven, and is justified, by the need to match these growing market demands.

Furthermore, the proposal supports and is consistent with a number of statutory policies including the "Waste Avoidance and Resource Recovery Act, 2001" (WARR Act), the "NSW Waste Avoidance and Resource Recovery Strategy 2014-21", the "National Waste Policy 2018" and the "Greater Sydney Region Plan: A Metropolis of Three Cities".

The NSW Waste Avoidance and Resource Recovery Strategy 2014-21 is a key policy tool under the WARR Act. The proposed development supports the goals of the strategy:

- Increase recycling – by 2021-22 increase recycling rates for construction and demolition waste from 75% to 80%, and for commercial and industrial waste from 57% to 70%.

  Comment: The proposal would establish a facility to enable recycling of C&D and C&I wastes thereby supporting an increase in the recycling rates for these wastes.

- Divert more waste from landfill – by 2021-22 increase the waste diverted from landfill from 63% to 75%.

  Comment: Establishing the resource recovery facility would enable more wastes to be diverted from landfill.

- Reduce illegal dumping.

  Comment: The proposal supports the reduction in illegal dumping by providing a facility that accepts unwanted wastes.

The National Waste Policy 2018 is an Australian Government initiative that aims to "better support our economy, protect the health of our communities and reduce environmental impacts if we harness the value of materials we dispose of and return them to productive use". The policy provides a framework for collective action for businesses, governments, communities and individuals until 2030. The proposal is consistent with the policy as it would be active in applying the principles of the circular economy, in particular:

- Improve resource recovery – including materials collection systems and processes for recycling and the quality of recycled material we produce;

- Improve information to support innovation, guide investment and enable informed consumer decisions

The subject site is located outside the boundaries of the Western Sydney Aerotropolis, being approximately from the boundary of the "Aerotropolis core" and adjacent to the "Outer Sydney Orbital" under the Western Sydney Infrastructure Plan. "The Greater Sydney Region Plan- A Metropolis of Three Cities" sets a 40 year vision and establishes a 20 year plan to manage growth and change for Greater Sydney. The proposal would support infrastructure projects in this growing area by providing a facility to recycle wastes as the existing waste facilities currently do not have the capacity to accommodate the projects in the area.

The justifications for selecting the subject site and for implementing the proposed development are listed as follows:

- The subject site has ample room available to cater for the proposed operations and also enables preservation of environmental values by retaining the majority of the site's vegetation.
- The site is not in a sensitive land use area.
- The development is a permitted use with consent under the infrastructure SEPP.
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged.
- The development would generate local employment.
- Existing transport routes are readily available and the site is located adjacent to the Outer Sydney Orbital, a preserved corridor for the future M9 motorway and freight rail.
- The site has sufficient room for on-site parking and truck manoeuvring.
- The proposed development will recycle both C&D and C&I waste, therefore diverting such wastes from landfill and providing a facility able to support the future infrastructure projects in the adjacent growth areas of Western Sydney.
- The proposed development will have extensive environmental safeguards to provide assurance in regards to the expected degree of environmental impacts.

15.2 CONCLUDING REMARKS

The environmental assessment process has enabled the potential impacts of the proposed development of a resource recovery facility to be evaluated, and control strategies to be devised in order to ensure compliance with regulatory standards.

The development has been designed to minimise environmental impacts with operations to be undertaken within an enclosed building and additional safeguards to be put in place and therefore request is made that approval be granted.

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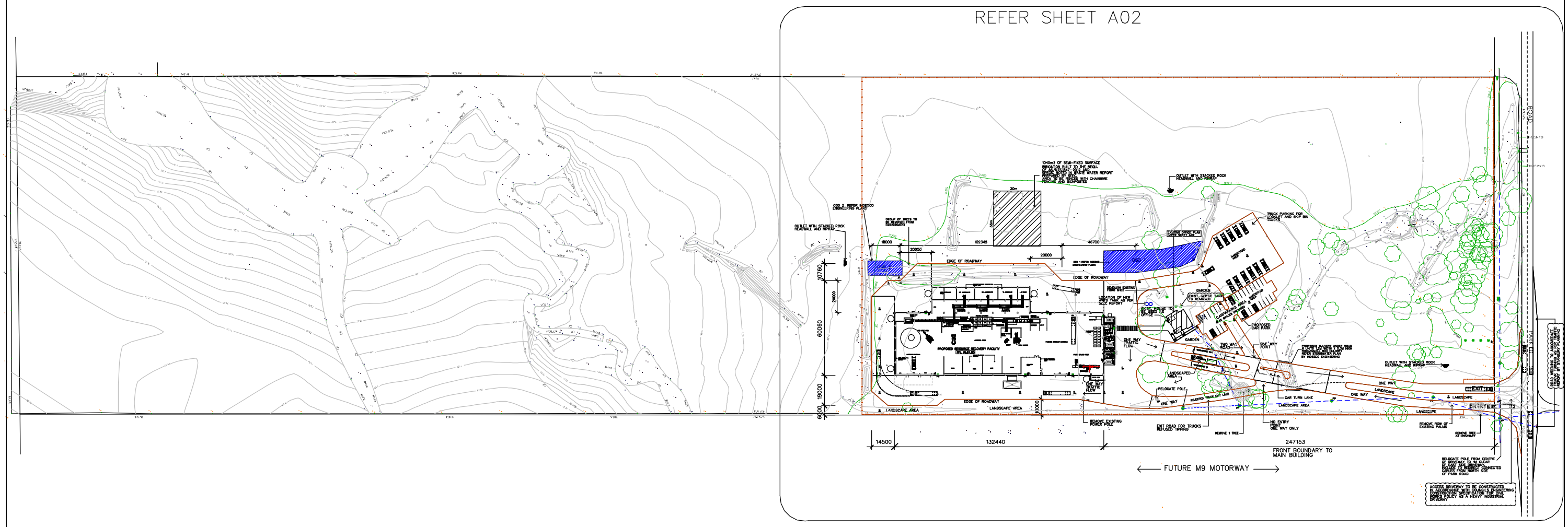
APPENDICES

EIS Appendix 1: Overall Site Plan

REFER SHEET A02



PROPOSED OVERALL SITE PLAN

METRES

REVISIONS:			
ISSUE	BY	DATE	DESCRIPTION
A	GR	19-3-2020	ISSUE FOR REVIEW
B	GR	25-3-2020	ISSUE FOR REVIEW
C	GR	22-4-2020	ISSUE FOR DA
D	GR	29-9-2020	ISSUE FOR DA
E	GR	8-6-2021	ISSUE FOR DA

NORTH

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CLIENT:
GATEWAY DEVELOPMENTS
MR ELLIE BARIKHAM

PROJECT:
PROPOSED GREENFIELDS RESOURCE RECOVERY FACILITY
344 PARK ROAD WALLACIA
LOT 5 DP 655046

DRAWING: OVERALL SITE PLAN

SCALE: 1:2500	DATE: 8-6-2021		DRAWN: G.R.
PRJ. NO.: EB/050320	JOB 0320	SHEET A01	REV E

A1 SHEET

EIS Appendix 2: BDAR Assessment

Biodiversity Development Assessment Report

344 Park Road, Wallacia, NSW, 2745

Report prepared for Benbow Environmental

February 2022

NARLA

environmental

Report:	Biodiversity Development Assessment Report
Prepared for:	Benbow Environmental
Prepared by:	Narla Environmental Pty Ltd
Project no:	benb2
Date:	February 2022
Version:	Final v4.0

Narla Environmental Pty Ltd

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Report Certification

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Document Control

Revision	Document Name	Date	Internal Document Review
Draft v1.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	May 2020	Jack Tatler Alexander Graham
Final v1.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	May 2020	Jack Tatler
Draft v2.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	October 2020	Alexander Graham
Final v2.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	December 2020	Alexander Graham
Final v3.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	July 2021	Jack Tatler
Final v4.0	Biodiversity Development Assessment Report (BDAR) for 344 Park Road, Wallacia	February 2022	Jack Tatler

Dr Jack Tatler *BSc (Hons) PhD*
General Manager / Senior Ecologist
Accredited Biodiversity Assessor (BAAS21006)
Narla Environmental Pty Ltd

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Glossary

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPIE) to apply the Biodiversity Assessment Method.
BAM	The NSW Biodiversity Assessment Method
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified.
Biodiversity Offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
DA	Development Application
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectare
HTE	High Threat Exotic
km	Kilometre
LGA	Local Government Area
Locality	A 1500m buffer area surrounding the Subject Land
m	metres
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
NSW	The State of New South Wales
OEH	Office of Environment and Heritage (now DPIE)
PCT	NSW Plant Community Type
Proposal	The development, activity or action proposed.
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

Acronym/ Term	Definition
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The footprint of the proposed development.
Subject Property	344 Park Road, Wallacia (Lot 5/DP 655046)
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016.
TPZ	Tree Protection Zone: A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development
VIS Plot	Vegetation Integrity Survey Plot

Executive Summary

Narla Environmental Pty Ltd was commissioned by Benbow Environmental to prepare this Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) for the proposed development of a resource recovery facility at 344 Park Road, Wallacia (Lot 5/DP 655046). This BDAR has been produced in response to the Secretary's Environmental Assessment Requirements (SEARs) issued by NSW DPIE for the preparation of an Environmental Impact Statement (EIS). This proposed development is located within lands mapped on the Biodiversity Values Map (DPIE 2020d).

This BDAR has been prepared by Narla Environmental Pty Ltd to identify the potential impacts of the proposed development on biodiversity values. This assessment has been completed in accordance with the BAM Appendix 10.

The proposed development involves the construction and operation of a resource recovery facility (hereafter referred to as the 'Subject Land'), covering an area of approximately 3.48 ha. The proposed development has been purposefully designed to minimise impacts on biodiversity values, as it has been positioned within a mostly cleared area within the north of the Subject Property. The removal of vegetation within this area has largely been avoided, as the proposed development has been strategically placed to avoid the removal of as many trees as possible. The proponent has selected an area with the least biodiversity values, and has chosen to avoid higher quality bushland in the western and southern portions of the Subject Property.

The proposed development is expected to impact one (1) Plant Community Type (PCT): PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion. This PCT conforms to the Endangered Ecological Community (EEC) Shale Gravel Transition Forest in the Sydney Basin Bioregion.

Two (2) ecosystem credits for PCT 724 are to be offset in order to mitigate the impacts upon biodiversity as a result of the proposed development.

In order to avoid and minimise potential impacts of the proposal on local biodiversity values, a series of mitigation and management measures have been identified, which are to be implemented as part of any Construction Environmental Management Plan (CEMP) produced for the site. This includes assigning a Project Ecologist to undertake an extensive pre-clearing survey, and to supervise the clearing of all vegetation in relation to the proposed development. The proponent will enter the majority of the undeveloped portion of the Subject Property into a Biodiversity Stewardship Agreement, which will conserve the two threatened ecological communities surrounding the Subject Land.

1. Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was commissioned by Benbow Environmental ('the proponent') to prepare this BDAR to accompany a DA for the proposed development of a resource recovery facility at 344 Park Road, Wallacia (Lot 5/DP 655046; hereafter referred to as the 'Subject Property'). The proposed development is considered a designated and integrated development under Part 4 of the Environmental Planning and Assessment Act 1979 and requires an approval under the Protection of the Environment Operations Act 1997. As such, the SEARs have been issued by NSW DPIE for the preparation of an EIS. The preparation of this BDAR is in response to the 'Key Issue – Biodiversity' as listed in the SEARs, which requires an assessment of the proposal in accordance with the BAM.

The proposed development is also located on lands mapped on the 'Biodiversity Values Map' (DPIE 2020d; **Figure 1**). The Biodiversity Values (BV) Map identifies land with high biodiversity value, as defined by clause 7.3(3) of the Biodiversity Conservation Regulation 2017. This assessment has therefore been completed in accordance with Appendix 10 of the BAM (OEH 2017a).

Narla have produced this report in order to assess any potential impacts associated with the DA and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Penrith City Council.

1.2 The Proposed Development

The Subject Land is located within the northern section of the Subject Property and is defined by the development footprint of a proposed resource recovery facility, Onsite Detention Basins, office building, irrigation area, landscaping and an Asset Protection Zone (APZ; **Figure 2**). The Subject Land covers an area of approximately 3.48 ha, which mostly contained cleared areas that are void of any vegetation. Small areas of vegetation that exist within the Subject Land included scattered occurrences of native and exotic ground layers, scattered canopy trees, as well as a shrubby patch of native vegetation in the south-western corner. The proposed development will require the removal of all vegetation in the development footprint and ongoing management of the vegetation within the APZ.

1.3 Site Location and Description

The Subject Property is situated within an agricultural landscape in the suburb of Wallacia in the Penrith Local Government Area (LGA; **Figure 3**). The Subject Property is approximately 20.2 ha, and comprises large areas of remnant native vegetation within the west and southern portions. The mostly cleared section within the north of the Subject Land will be utilised for the proposed development.

Figure 1. Encroachment of the Subject Land into land mapped on the Biodiversity Values Map.

Figure 2. The components and location of the Subject Property and Subject Land.

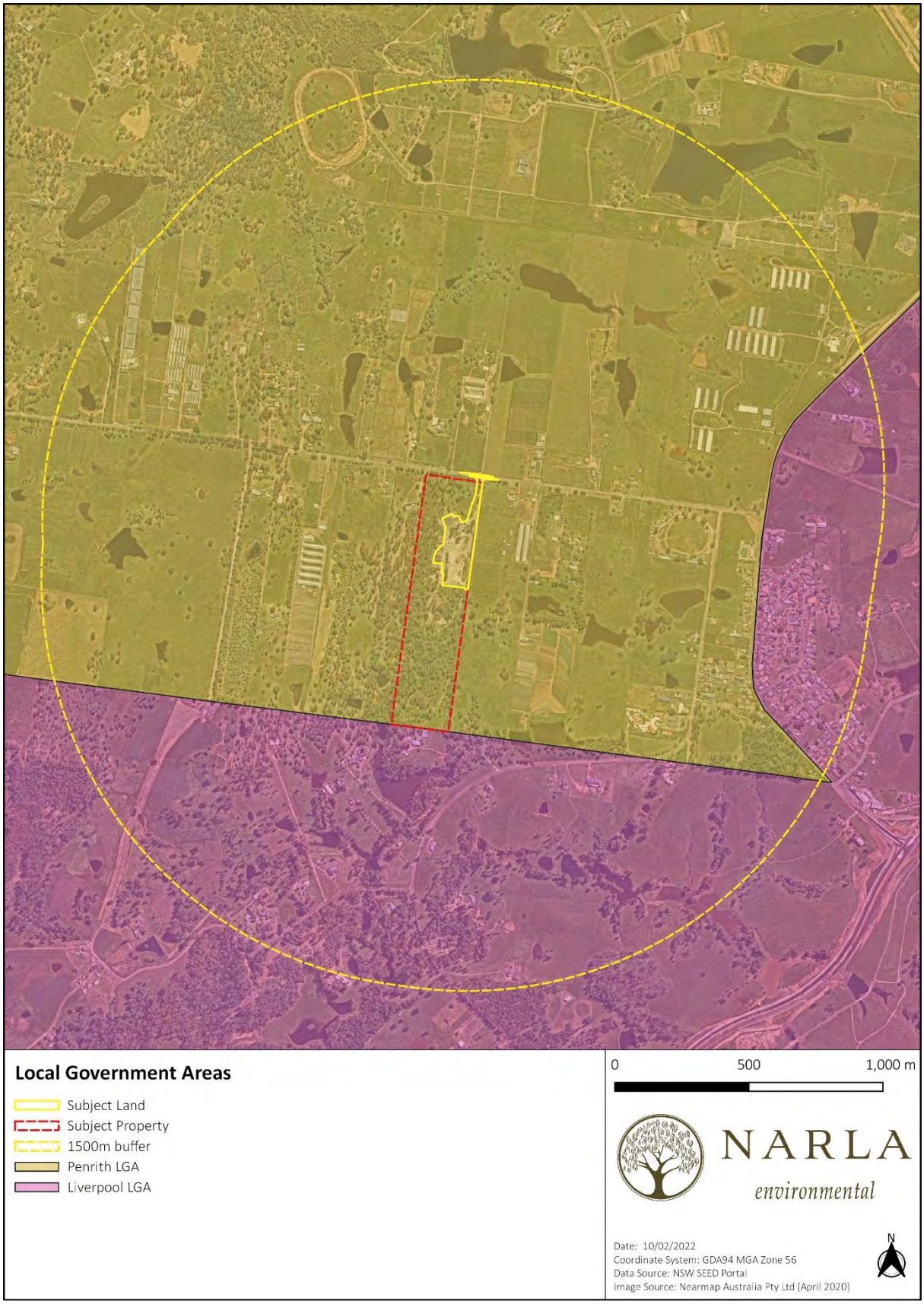

Figure 3. The location of the Subject Land within the locality.

1.4 Sources of Information Used

A thorough literature review was undertaken to gain an insight into the ecology and applicable legislation within the locality and the Penrith LGA, including:

- Relevant State and Commonwealth Databases & Datasets:
    - NSW BioNet. The website of the Atlas of NSW Wildlife (OEH 2020a)
    - NSW BioNet. Threatened Biodiversity Data Collection (OEH 2020b)
    - NSW BioNet. Vegetation Classification System (OEH 2020c)
    - NSW Government Spatial Services: Six Maps Clip & Ship
- Vegetation and Soil Mapping:
    - 'The Remnant Vegetation of the western Cumberland subregion' 2013 Update. VIS_ID 4207 (OEH 2013).
    - Soil Landscapes of the Penrith 1:100 000 Sheet (Bannerman & Hazelton 1990).
- NSW State Guidelines:
    - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019a)
    - Biodiversity Assessment Method Calculator Version 1.2.7.2 (DPIE 2019b)
    - Biodiversity Offsets and Agreement Management System (BOAMS)
    - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c)
    - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004)
- Council Documents:
    - Penrith Development Control Plan (DCP) 2014
    - Penrith Local Environment Plan (LEP) 2010

Preparation of this BDAR also involved the review of the following accompanying project documents:

- Bio Engineered Solutions Pty Ltd (2020) Landscape Concept Plan: Proposed Recycling Facility, Lot 5 DP 655046, 344 Park Road, Wallacia. Plan No's 1853LAN2B and 1853LAN3B.
- Bushfire Consulting Services Pty Ltd (2020) Bush Fire Assessment Report in relation to the proposed waste recycling facility at: Lot 5 DP 655046, 344 Park Road Wallacia.

These sources were used to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds. Searches using NSW Wildlife Atlas (BioNet) were conducted to identify current threatened flora and fauna records within and surrounding the Subject Land. These data were used to assist in establishing the presence or likelihood of any biodiversity values as occurring on, or adjacent to, the Subject Land, and helped inform our Ecologist on what to look for during the site assessment.

1.5 Aim and Approach

This report has been prepared in accordance with the BAM (OEH 2017a) and aims to:

- Describe the biodiversity values present within the Subject Land, including the extent of native vegetation, vegetation integrity and the presence of Threatened Ecological Communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and SAIIs within the Subject Land;

- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e. ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker (Penrith City Council) as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.

2. Landscape Features

2.1 IBRA bioregion and subregion

The Subject Land occurs within the 'Cumberland' Interim Biogeographic Regionalisation for Australia 7 (IBRA7) Subregion, which is part of the 'Sydney Basin' IBRA7 Bioregion (**Figure 4**; **Figure 5**).

2.2 Mitchell Landscapes

NSW Landscapes Mapping: Background and Methodology (Mitchell 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term.

The Subject Land occurs entirely within the 'Cumberland Plain' Mitchell Landscape Ecosystem (**Figure 6**; **Figure 7**). This landscape is characterised by low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline. Intruded by a small number of volcanic vents and partly covered by Tertiary river gravels and sands (Hawkesbury-Nepean Terrace Gravels landscape). Quaternary alluvium along the mains streams. General elevation 30 to 120m, local relief 50m and sometimes affected by salt in tributary valley floors. Pedal uniform red to brown clays on volcanic hills. Red and brown texture-contrast soils on crests grading to yellow harsh texture-contrast soils in valleys. Woodlands and open forest of Grey Box (*Eucalyptus moluccana*), Forest Red Gum (*Eucalyptus tereticornis*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Thin-leaved Stringybark (*Eucalyptus eugenioides*), Cabbage Gum (*Eucalyptus amplifolia*) and Broad-leaved Apple (*Angophora subvelutina*). Grassy to shrubby understorey often dominated by Australian Boxthorn (*Bursaria spinosa*), poorly drained valley floors, often salt affected with swamp oak (*Casuarina glauca*) and paperbark (*Melaleuca* sp.).

2.3 Topography, geology and soils

The Subject Land is mapped as occurring on the Blacktown soil landscape, which consists of gently undulating rises on Wianamatta Group shales. Soils are shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils; and red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines. This soil landscape occurs extensively on the Cumberland Lowlands. Examples include Blacktown, Mount Druitt, Glossodia and Leppington.

The Subject Land did not contain any areas of geological significance, such as karsts, caves, cliffs or crevices. The Subject Land and wider locality (1500m buffer) are not mapped as occurring on acid sulfate soils nor mapped as having risk/probability of exhibiting occurrence of acid sulfate soils.

2.4 Hydrology

Site assessment revealed an unmapped dam and drainage line within the north of the Subject Property. The riparian buffer of the dam intersects the Subject Land (**Figure 8**). A number of mapped watercourses occur within the 1500m buffer surrounding the Subject Land, including a mapped 2nd order stream within the south of the Subject Property (**Figure 9**). The watercourses within the 1500m buffer are tributaries that form part of the Hawkesbury-Nepean Catchment.

The Subject Land and immediate surrounds (within the 1500m buffer) do not contain any areas of native vegetation identified as 'Coastal Wetlands' or 'Littoral Rainforest' as per the State Environmental Planning Policy (Coastal Management) 2018.

2.5 Native Vegetation Cover and Connectivity

Native vegetation cover and connectivity have been assessed in accordance with Section 4.2 and 4.3 of the BAM (OEH 2017a). The native vegetation cover will be used to assess the habitat suitability of the Subject Land for threatened species. Areas of connectivity will determine the extent of habitat that may facilitate the movement of threatened species across their range.

A 1500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity. Native vegetation covered approximately 791 ha within the buffer circle (total area = 1027 ha) and was assigned to the >70% class (**Figure 10**; **Figure 11**). Cleared areas totalled 237 ha, which equated to approximately 23% of the total area within the 1500m buffer. Large areas of connectivity that may facilitate the movement of threatened species were evident within the 1500m surrounding the Subject Land. This included large vegetated areas south of the Subject Land and a smaller area within the north of the 1500m buffer. These areas of connectivity ultimately link with large vegetated areas along the Nepean River and the Blue Mountains National Park (**Figure 10**; **Figure 11**).

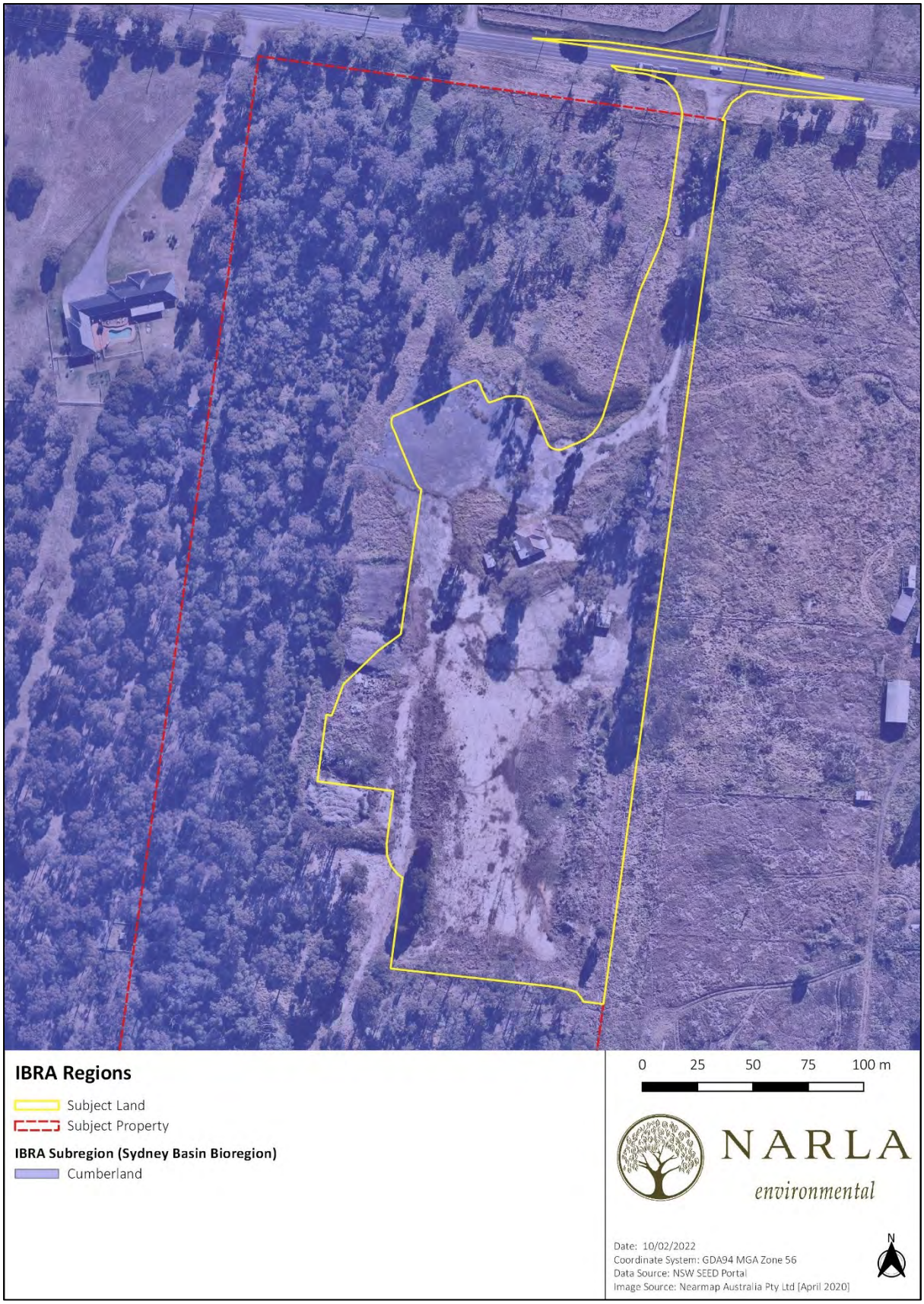

Figure 4. IBRA Bioregion and Subregion of the Subject Land.

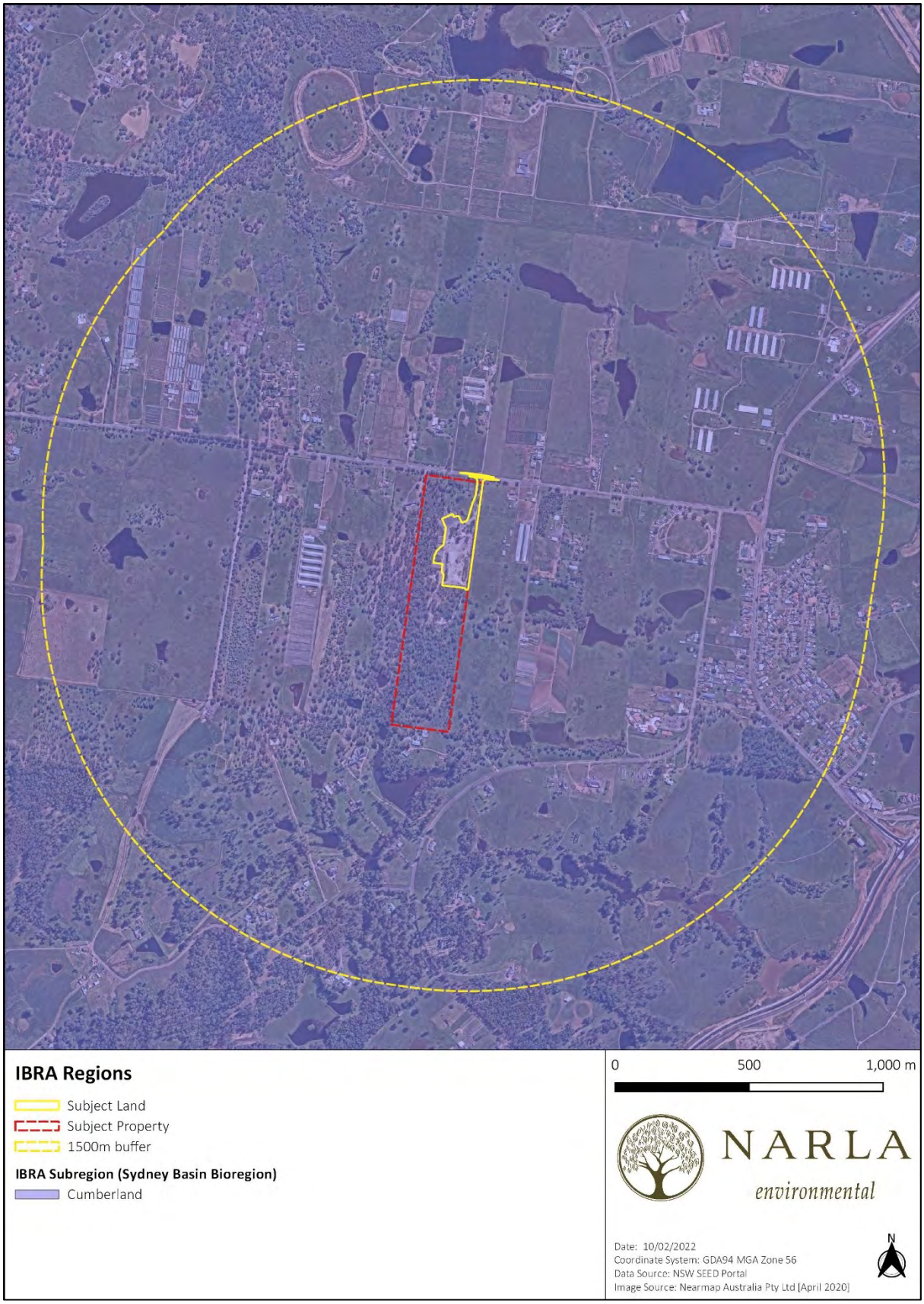

Figure 5. IBRA Bioregion and Subregion of the Subject Property, and within a 1500m buffer.

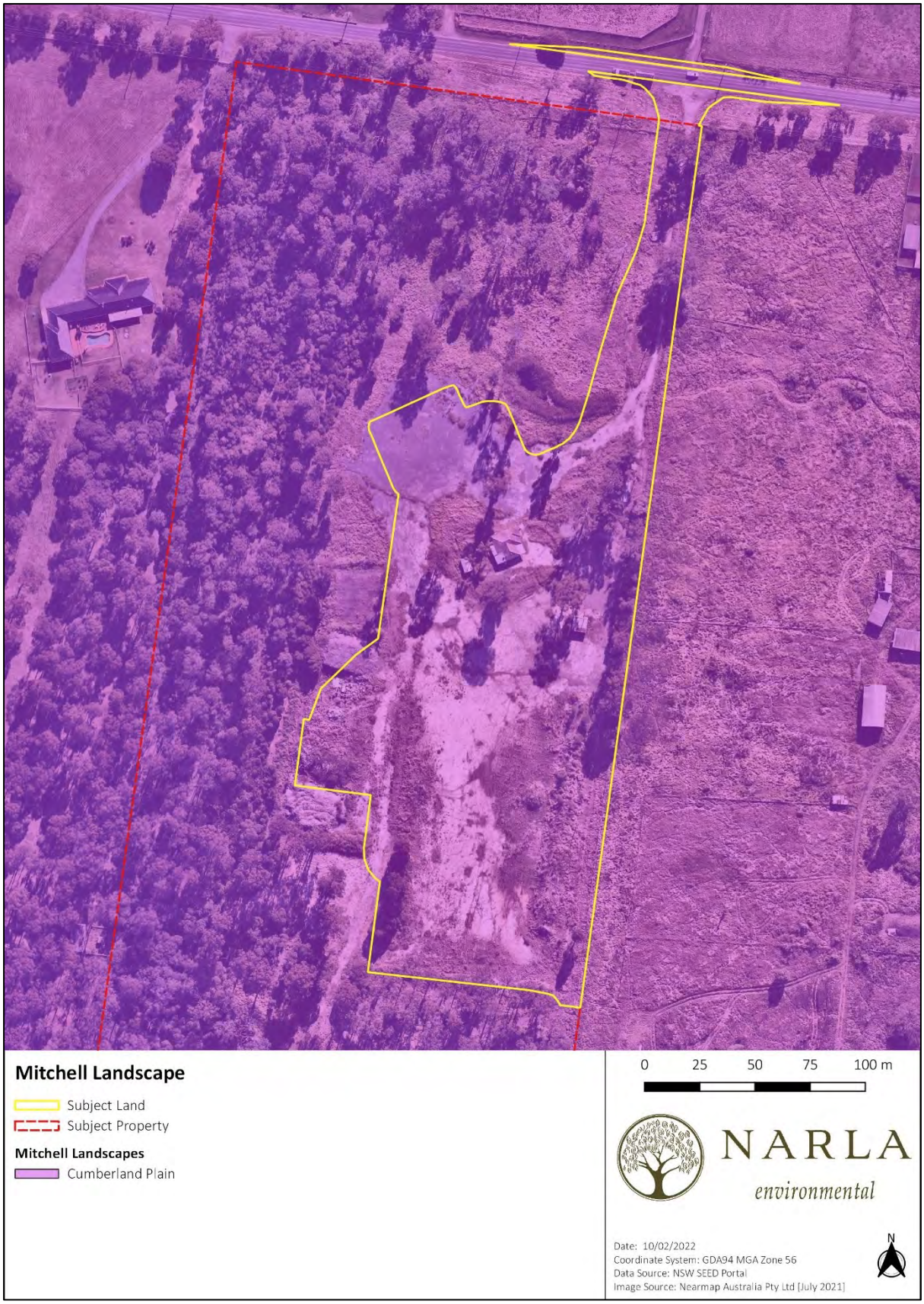

Figure 6. NSW Mitchell Landscape Ecosystem of the Subject Land.

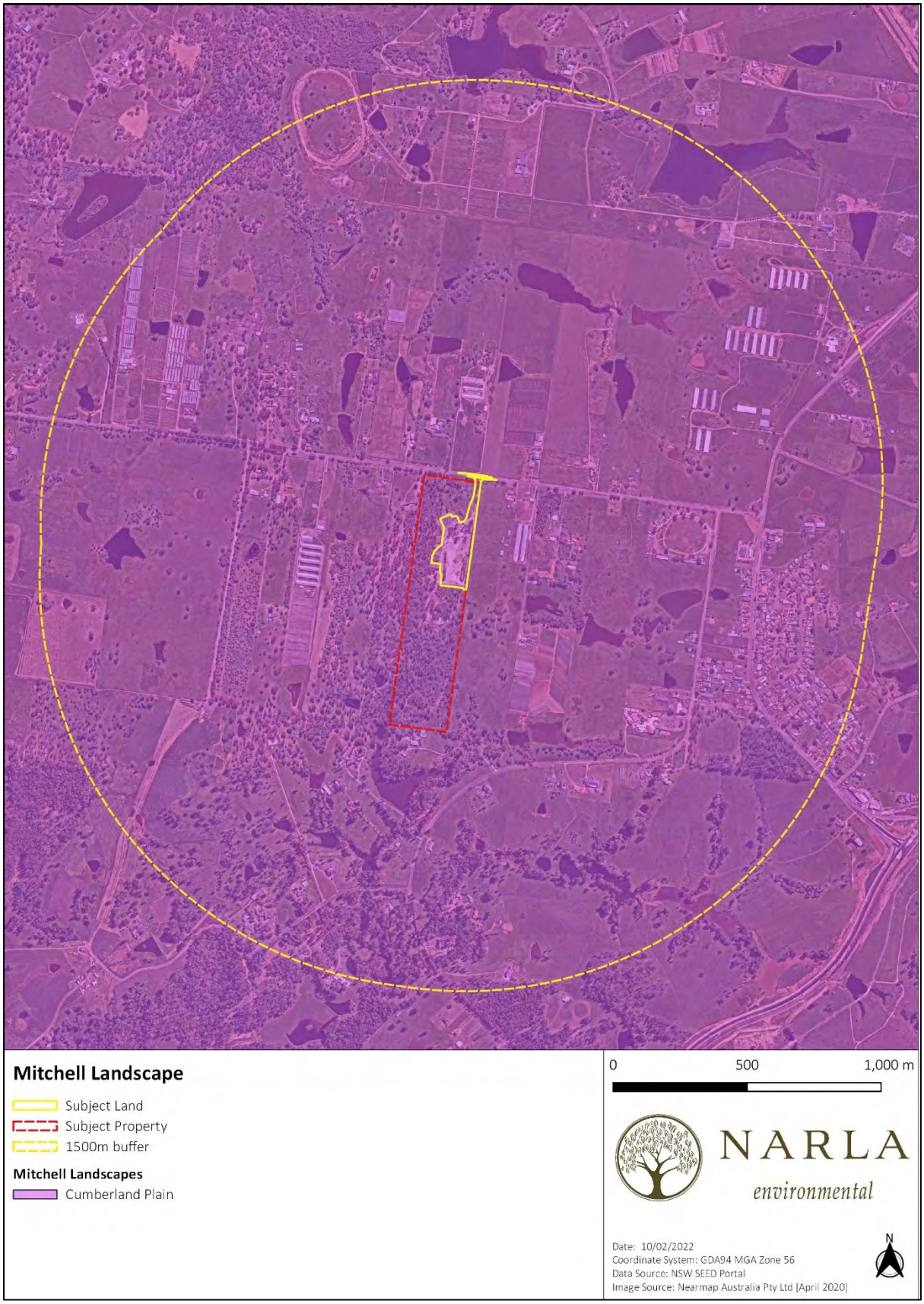

Figure 7. NSW Mitchell Landscape Ecosystem of the Subject Land and within a 1500m buffer.

Figure 8. Watercourses and riparian buffer zones occurring within and adjacent to the Subject Land.

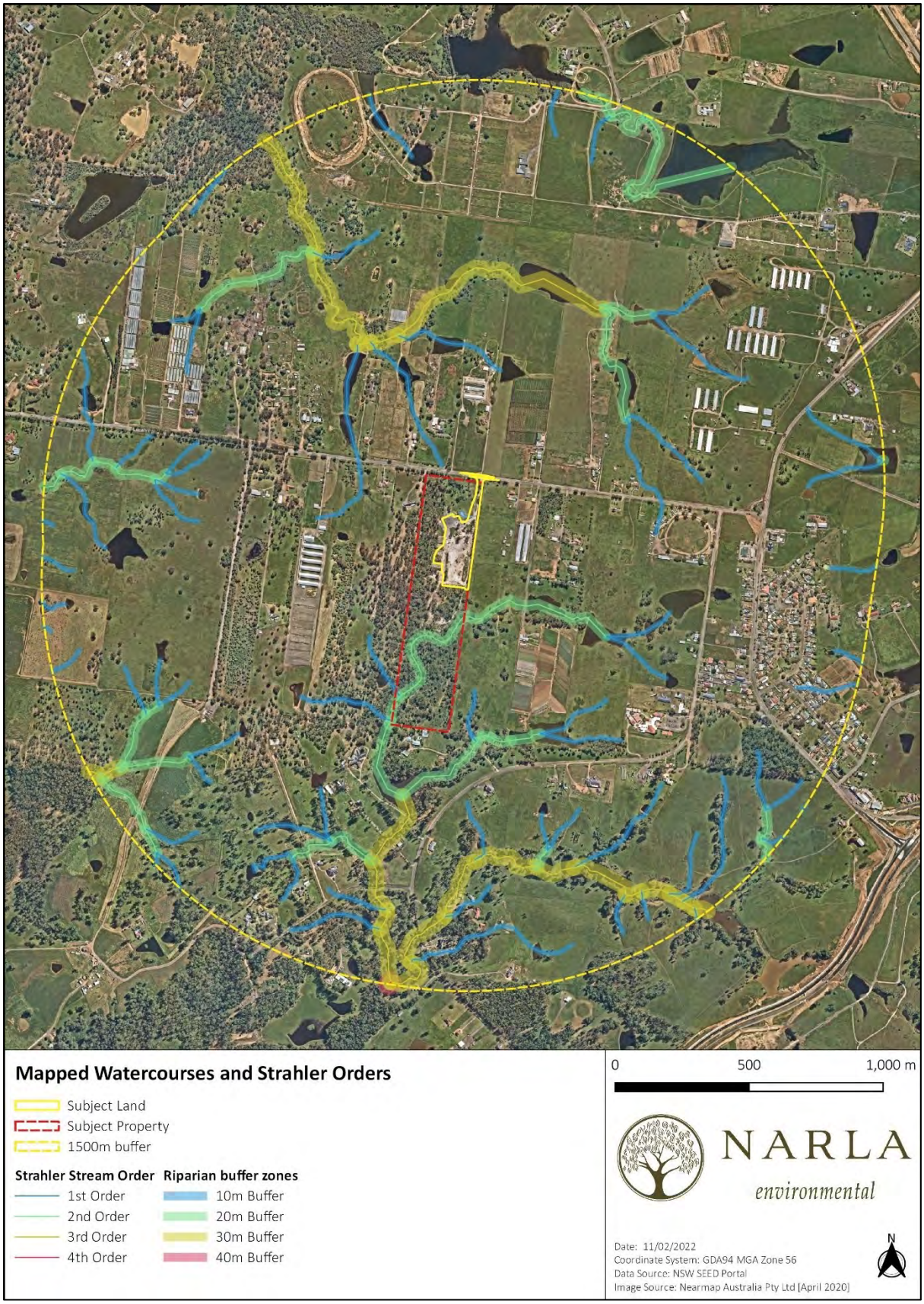

Figure 9. Rivers and streams (with associated riparian buffers) occurring within the 1500m buffer.

Figure 10. The extent of native vegetation, habitat connectivity and patch size within and surrounding the Subject Land.

Figure 11. The extent of native vegetation, patch size and habitat connectivity occurring within and surrounding the 1500m buffer.

3. Native Vegetation

3.1 PCT's identified within the Subject Land

3.1.1 PCT Selection Process

Field surveys conducted by Narla confirmed that one (1) native vegetation community occurred within the Subject Land. PCT selection for this vegetation community was undertaken using information and databases provided in the BioNet Vegetation Classification System (OEH 2020c). The following selection criteria were used to develop the PCT shortlist:

- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Cumberland
- Distribution: Penrith Region
- Dominant Upper Stratum Species: *Eucalyptus moluccana*, *Eucalyptus fibrosa* and *Melaleuca decora*.

This process delivered a selection of three (3) PCT's that could potentially occur within the Subject Land. Such PCTs contained the highest number of the selected upper stratum species. Based on historical mapping, an additional PCT (PCT 849) was added to the selection process. The steps taken to justify the presence or absence of each of these PCT's within the Subject Land is provided in Table 1. Note that due to the degraded nature of the vegetation within the Subject Land, similar structured bushland to the west of the Subject Land was also used as a guide to determine PCT. This bushland was dominated by *Eucalyptus fibrosa, Melaleuca decora* and *Melaleuca nodosa.* It was assumed that such vegetation would have historically occurred within the Subject Land.

Table 1. PCT Selection Criteria. Dark border indicates the selected PCT.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	*Eucalyptus fibrosa* *Melaleuca decora*	Mid Stratum Species: *Bursaria spinosa subsp. spinosa, Daviesia ulicifolia* and *Lissanthe strigosa.* Ground Stratum Species: *Aristida vagans, Brunonia australis, Cheilanthes sieberi* subsp*. sieberi, Desmodium gunnii, Dianella revoluta, Dichelachne micrantha, Dichondra repens, Goodenia hederacea, Hypericum gramineum, Lepidosperma laterale, Lomandra multiflora, Microlaena stipoides* var. *stipoides, Opercularia diphylla, Oxalis perennans, Panicum simile, Poranthera microphylla, Pratia purpurascens, Themeda australis* and *Wahlenbergia gracilis.*	Castlereagh Shale-Gravel Transition Forest is recognised as a community associated with shale-influenced sandy soils that support a component of ironstone gravels. These soils can occur in remarkably different locations. Some are associated with low-lying Tertiary alluvium overlying shale soils in the Bankstown area, whereas others occur on the northern Woronora Plateau where residual shale caps lie above bands of ironstone laterite and sandstone bedrock. The combination of the parent material produces a soil of relatively low fertility compared to the deeper Wianamatta shale soils of the Cumberland Plain. Together with a relatively low mean annual rainfall (800-900 millimetres) these conditions produce an open eucalypt forest with an understorey that may vary between dense shrubs and a low sparse shrub cover with an	Although the Subject Land is situated on the Blacktown soil landscape and comprises a higher number of species characteristic of PCT 849, Narla have assigned this PCT to the vegetation within the Subject Land. This PCT was chosen as the vegetation within the Subject Land, and directly to the west, was distinctively different from the more open Cumberland Plain Woodland that was situated to the south of the Subject Land. The dominance of *Eucalyptus fibrosa* to the west of the Subject Land, including a dense understorey of *Melaleuca decora* and *Melaleuca nodosa,* is not typical of the grassy open woodland of Cumberland Plain. In particular, the prominence of *Melaleuca nodosa* to the west of the Subject Land is much more characteristic of PCT 724 than PCT 849. The shrubby nature of the vegetation within the Subject Land, characterised by a dense Melaleuca shrub layer, led us to believe that this was more so representative of the Shale-Gravel Transition Forest to the west of the Subject Land, rather than the Cumberland Plain Woodland to the south.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
			abundant ground cover of grasses.	A total of 18 positive diagnostic species (as per Tozer et al. 2010) were present within the Subject Land. Canopy species within the Subject Land that are representative of this PCT included *Eucalyptus moluccana* and *Eucalyptus fibrosa*. Shrub and groundcover species within the Subject Land that are representative of this PCT included *Acacia decurrens, Brunoniella australis, Desmodium varians, Dichondra repens, Dillwynia sieberi, Euchiton sphaericus, Fimbristylis dichotoma, Glycine clandestine, Lomandra filiformis, Melaleuca decora, Melaleuca nodosa, Microlaena stipoides, Opercularia diphylla, Paspalidium distans, Polymeria calycina, Pratia purpurascens* and *Themeda triandra.* Additional species that were recorded adjacent to the Subject Land that are characteristic of this PCT include *Aristida vagans, Cheilanthes sieberi, Eucalyptus fibrosa, Oxalis perennens, Panicum simile, Solanum prinophyllum* and *Vernonia cinera.* Evidently the Subject Property is situated on a transition between PCT 724 and PCT 849, with PCT 724 represented to the west of the Subject Land, and PCT 849 represented directly south of the Subject Land. There is potential that a stretch of the Richmond soil landscape that lies approximately 600m

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
				south of the Subject Property may have influenced the vegetation within the Subject Land, as it contains quaternary alluviums consisting of sand, silt and gravels derived from sandstone and shale. This would explain the distinct structure of vegetation within and directly to the west of the Subject Land, which significantly differs from other vegetation within the surrounding landscape.
PCT 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	*Eucalyptus fibrosa* *Melaleuca decora.*	Mid Stratum Species: *Lissanthe strigosa, Melaleuca nodosa, Daviesia ulicifolia, Ozothamnus diosmifolius, Acacia falcata* and *Bursaria spinosa* subsp. *spinosa.* Ground Stratum Species: *Entolasia stricta, Microlaena stipoides* var. *stipoides, Cheilanthes sieberi* subsp. *sieberi, Aristida vagans, Pratia purpurascens, Lomandra multiflora, Opercularia diphylla, Dianella revoluta* var. *revoluta, Lepidosperma laterale, Goodenia hederacea, Paspalidium distans, Pomax umbellata, Themeda australis, Panicum simile, Laxmannia*	Castlereagh Ironbark Forest is one of two closely related ironbark shrub-grass forests found in western Sydney that occur on gravelly-clay soils. Castlereagh Ironbark Forest is associated with clay soils derived from Tertiary alluvial deposits. The structure ranges from a moderately tall open eucalypt forest or woodland to a low dense thicket of paperbarks with low emergent eucalypts.	This PCT does not fit the vegetation within the Subject Land. Although a number of the species within this PCT were present, a higher number of characteristic species were represented in the selected PCT. A total of eleven (11) species (as per Tozer et al. 2010) recorded within the Subject Land are positive diagnostic species of this PCT, as opposed to eighteen (18) positive diagnostic species representative of PCT 724. PCT 725 is therefore not the most appropriate PCT to represent the vegetation within the Subject Land.

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
		gracilis, Austrodanthonia tenuior and *Eragrostis brownii.*		
PCT 849 – Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	*Eucalyptus tereticornis Eucalyptus moluccana.*	Mid Stratum Species: *Bursaria spinosa* subsp. *spinosa.* Ground Stratum Species: *Dichondra repens, Cheilanthes sieberi* subsp. *sieberi, Aristida vagans, Microlaena stipoides var.stipoides, Themeda australis, Brunoniella australis, Desmodium gunnii, Opercularia diphylla, Wahlenbergia gracilis, Dichelachne micrantha, Paspalidium distans, Eragrostis leptostachya, Lomandra multiflora, Dianella longifolia, Oxalis perennans, Euchiton sphaericus, Goodenia hederacea, Aristida ramosa, Arthropodium milleflorum, Austrodanthonia tenuior, Cymbopogon refractus* and *Echinopogon caespitosus.*	The gentle topography associated with the shale plains of western Sydney carries an open grassy woodland dominated by grey box (*Eucalyptus moluccana*), forest red gum (*Eucalyptus tereticornis*) and ironbark (*Eucalyptus crebra/ Eucalyptus fibrosa*). The primary habitat for this PCT occurs at elevations less than 150 meters above sea level with some sites occurring at higher elevations where the landscape remains gently inclined. Rainfall is restricted to a narrow band between 750 and 950 millimetres per annum. This PCT occupies the north-west and west zones of the study area but is widespread elsewhere across the Cumberland Plain	As discussed previously, the Subject Land is situated on the Blacktown soil landscape and comprises a higher number of species characteristic of PCT 849 compared to PCT 724. However, the distinct understorey dominated by *Melaleuca decora* and *Melaleuca nodosa* within the Subject Land and directly west of the Subject Land, as well as the dominance of *Eucalyptus fibrosa* to the west of the Subject Land, was noticeably different to the characteristic structure and composition of PCT 849. It was therefore concluded that PCT 849 is not the most appropriate PCT to represent the vegetation within the Subject Land.
PCT 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	*Angophora floribunda Casuarina glauca Eucalyptus baueriana Eucalyptus moluccana*	Mid Stratum Species: *Casuarina glauca, Melaleuca decora, Melaleuca nodosa, Melaleuca styphelioides,*	Cumberland Swamp Oak Riparian Forest is found on the riverflats of the Cumberland Plain in western Sydney and in the Hunter Valley.	This PCT does not fit the vegetation within the Subject Land. The Subject Land did not contain many diagnostic species that are representative of this PCT. A total of nine (9)

Candidate PCT	Characteristic Canopy	Characteristic Shrub / Groundcover	Landscape Position / Geology	Justification
	Eucalyptus tereticornis	*Acacia decurrens* and *Bursaria spinosa.* Ground Stratum Species: *Brunoniella australis, Dianella longifolia, Dichondra repens, Lomandra longifolia, Maytenus silvestris, Ozothamnus diosmifolius, Polyscias sambucifolia, Entolasia marginata, Einadia hastata, Microlaena stipoides* var. *stipoides, Echinopogon ovatus, Pratia purpurascens, Commelina cyanea, Senecio hispidulus, Veronica plebeian* and *Wahlenbergia gracilis.*		species (as per OEH 2016) recorded within the Subject Land are positive diagnostic species of this PCT, as opposed to eighteen (18) species that are characteristic of the selected PCT. The Subject Land also did not contain any stands of *Casuarina glauca,* which is a characteristic feature of this PCT.

3.1.2 Final PCT and Vegetation Zone Selection

Field surveys conducted by Narla confirmed that one (1) PCT was identified within the Subject Land:

- PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion

Four vegetation zones were identified within the Subject Land that consisted of differing condition classes or vegetation types:

- Zone 1: PCT 724 – Shrubby understorey
- Zone 2: PCT 724 – Cleared
- Zone 3: Non-native Vegetation
- Zone 4: Cleared land

These vegetation zones are detailed in **Table 2**, **Table 3**, and **Table 4**, and displayed in **Figure 12**.

Table 2. Vegetation identified within the Subject Land: Zone 1 & 2

PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion		
Vegetation class	Cumberland Dry Sclerophyll Forests	
Total area (ha)	0.41ha (0.3ha to be impacted)	
Description in VIS		
Castlereagh Shale-Gravel Transition Forest is recognised as a community associated with shale-influenced sandy soils that support a component of ironstone gravels. These soils can occur in remarkably different locations. Some are associated with low-lying Tertiary alluvium overlying shale soils in the Bankstown area, whereas others occur on the northern Woronora Plateau where residual shale caps lie above bands of ironstone laterite and sandstone bedrock. The combination of the parent material produces a soil of relatively low fertility compared to the deeper Wianamatta shale soils of the Cumberland Plain. Together with a relatively low mean annual rainfall (800-900 millimetres) these conditions produce an open eucalypt forest with an understorey that may vary between dense shrubs and a low sparse shrub cover with an abundant ground cover of grasses. Typically, the canopy includes broad-leaved ironbark (*Eucalyptus fibrosa*) along with a wide variety of other eucalypts depending on location. The taller paperbark *Melaleuca decora* may be prominent above a lower open shrub layer of blackthorn (*Bursaria spinosa*) and gorse bitter pea (*Daviesia ulicifolia).* The ground cover is a mix of grasses, sedges and herbs. Map users may experience difficulties in distinguishing this map unit from the closely related Castlereagh Ironbark Forest (S_DSF01) on the basis of floristic composition alone. Within the Sydney area the largest stands occur within the Holsworthy defence area, with isolated remnants extending to Prospect and Bankstown.		
Condition Class	**Moderate Condition**	**Low Condition**
Vegetation Zone	**Zone 1 Shrubby Understorey**	**Zone 2 Cleared**
Extent within Subject Land (approximate)	0.19ha (0.08 to be impacted)	0.22ha
Field survey effort	A site assessment was conducted on 25th March 2020. One (1) BAM plot was established.	A site assessment was conducted on 25th March 2020. One (1) BAM plot was established.

PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion		
Description of vegetation	This vegetation zone is comprised of a sparse native canopy layer, a dense mid-story/shrub layer, and a mixed native/exotic ground layer (Plate 1). The canopy within this zone comprised of *Eucalyptus moluccana* and *Eucalyptus fibrosa,* with a dense shrub layer dominated by *Melaleuca decora.* The ground layer comprised of a diverse native and exotic species assemblage, with high cover of *Chloris gayana, Eragrostis curvula, Ehrharta erecta, Cynodon dactylon, Einadia hastata* and *Solanum sisymbriifolium.*	This vegetation zone has been historically cleared, comprising of a fill mound that has regenerated since 2018 (Nearmap 2020). This zone contains an almost absent canopy layer, comprising regenerating *Acacia parramattensis,* and an absent shrub layer. The groundlayer within the zone was dominated by exotic species, including high cover of *Brassica fruticulosa, Chloris gayana, Digitaria ciliaris, Acacia saligna* and *Panicum maximum.* A low cover of native groundcover species was present within the zone, including *Hardenbergia violacea, Einadia trigonos* and *Tetragonia tetragonioides* (Plate 2).
Structure of vegetation	A low canopy cover was evident within the BAM plot, with native trees totalling 5.5% cover. Shrub coverage was dense in patches, and equated to 41.2% within the BAM plot. A low-moderate native ground cover was present, including 9.7% grass, 9.1% forbs and 1.7% scramblers/vines. High Threat Exotics (HTE's) also had a moderate cover within the plot, at 43.6%. A relatively moderate cover of leaf litter (43.2%) was also apparent. The BAM plot contained tree stems within three DBH classes and regenerating stems. No large trees or hollow bearing trees were present. Approximately 8m of fallen logs were recorded within the BAM plot.	A low canopy cover was evident within the BAM plot, with canopy trees totalling 0.5% cover, which comprised of a singular regenerating *Acacia parramattensis*. No shrubs were present within the zone. A low native ground cover was present, including 0.2% grass, 2.7% forbs and 2.5% scramblers/vines. High Threat Exotics (HTE's) also had a low cover within the plot, at 10.7%. An exceptionally low cover of leaf litter (0.2%) was also apparent. The BAM plot contained no tree stem classes, with the exception of one regenerating stem. No hollow bearing trees or fallen logs were recorded within the BAM plot.
Scientific Reference from VIS (OEH 2020c)	Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., 2010 Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0	
TEC Status (BC Act 2016 and EPBC Act 1999)	Conforms to the BC Act listed CEEC Shale Gravel Transition Forest in the Sydney Basin Bioregion. Does not conform to the EPBC Act listed CEEC Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest.	

PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	
TEC area (ha)	0.41ha of BC Act listed CEEC Shale Gravel Transition Forest in the Sydney Basin Bioregion.
Estimate of percent cleared value of PCT in the major catchment area	75.00 %

Table 3. Non-native vegetation identified within the Subject Land.

Non-native Vegetation (Zone 3)	
Total area (ha)	0.86 ha
Field survey effort	A site assessment was conducted on 25th March 2020. No BAM plots were required.
Description of vegetation	This vegetation zone did not contain any native canopy or mid-storey species. The groundlayer was dominated by exotic species, including *Eragrostis curvula, Chloris gayana* and *Solanum sisymbriifolium* (Plate 3).
Justification of vegetation assignment	The BAM (OEH 2017a) describes ground cover as not native if the native vegetation that comprises the groundcover is: i) less than 50% of the cover of indigenous species of vegetation; and ii) not less than 10% of the area is covered with vegetation (whether dead or alive); and iii) the assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum. As the vegetation within this zone contained no native canopy and mid-storey species, and a groundlayer of <50% native species, it was concluded that this zone did not constitute a PCT as was therefore classified as 'Non-native Vegetation'.

Table 4. Areas without vegetation identified within the Subject Land.

Cleared Land (Zone 4)	
Total area (ha)	2.18 ha
Field survey effort	A site assessment was conducted on 25th March 2020. No BAM plots were required.
Description of vegetation	This zone contained driveways and cleared areas devoid of native and exotic species. Introduced gravel was present in many areas of the zone (Plate 4).
Justification of vegetation assignment	As this zone was cleared and contained no vegetation, it was concluded that this zone did not constitute a PCT and was therefore classified as 'Cleared Land'.

Plate 1. Representative photo of Zone 1 (PCT 724 – Shrubby Understorey) within the Subject Land.

Plate 2. Representative photo of Zone 2 (PCT 724 – Cleared) within the Subject Land.

Plate 3. Representative photo of Zone 3 (Non-native Vegetation) within the Subject Land.

Plate 4. Representative photo of Zone 4 (Cleared Land) within the Subject Land.

3.1.1 Threatened Ecological Communities

The native vegetation within the Subject Land conforms to the EEC Shale Gravel Transition Forest in the Sydney Basin Bioregion (SGTF; Figure 12). This was determined by a comprehensive desktop assessment that identified the typical SGTF landscape attributes within the Subject Land, in conjunction with a site visit that found a suite of characteristic SGTF species.

Shale Gravel Transition Forest tends to grade into Cumberland Plain Woodland as alluvial and ironstone influences decline. Although desktop analysis revealed the Subject Land occurs on Wianamatta Group shales, its vegetation is a distinct variation from the surrounding landscape. There is potential that the presence of quaternary alluviums approximately 600m south of the Subject Property may have influenced the structure and composition of such vegetation within the Subject Land.

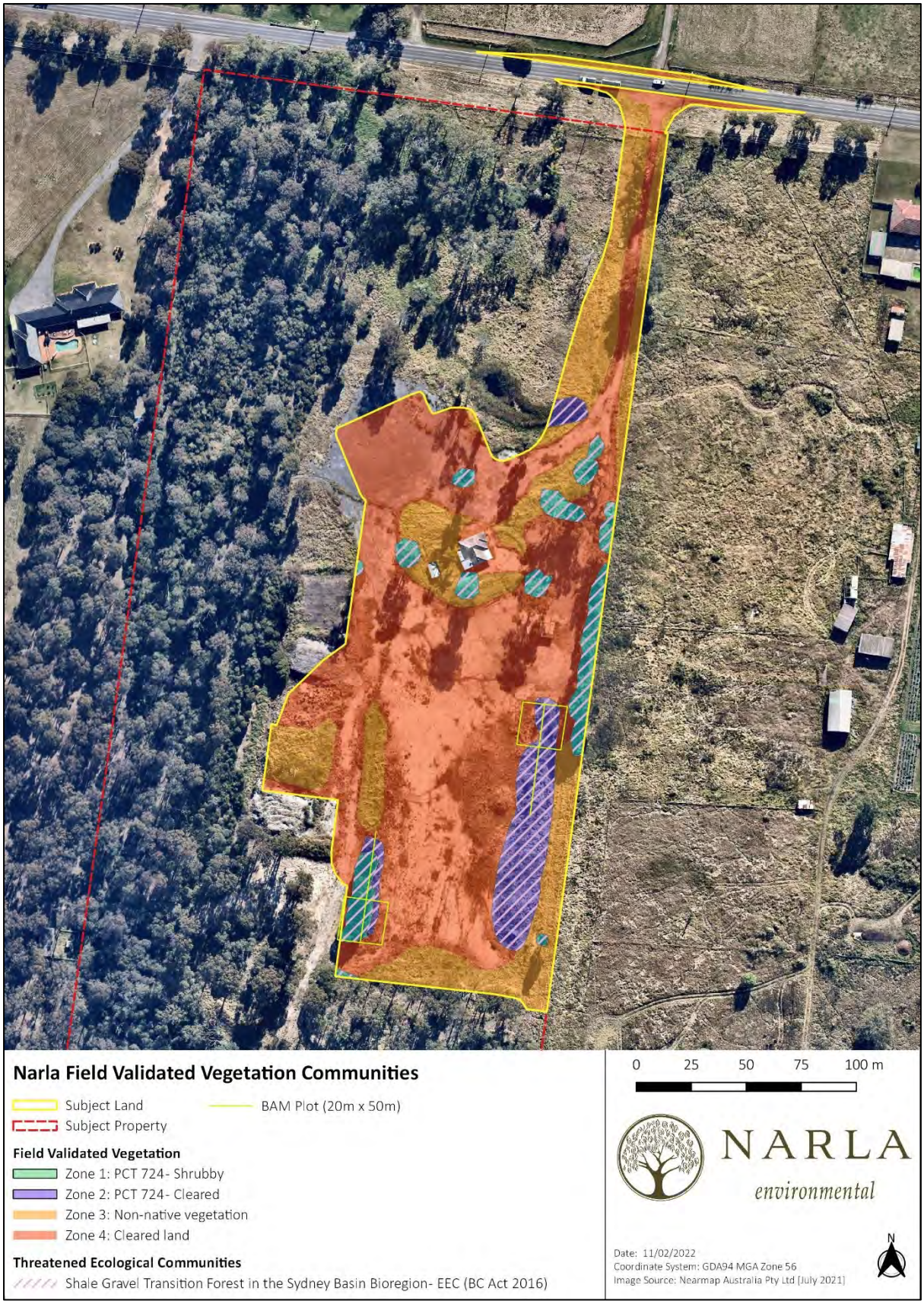

Figure 12. Narla field validated vegetation mapping within the Subject Land.

3.1 Assessing Patch Size

Patch size is defined by the BAM as 'an area of native vegetation that:

- occurs on the development site or biodiversity stewardship site, and
- includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems)

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site' (OEH 2017a).

Patch size was calculated according to the above guidelines, and equated to >100 ha (**Figure 10**; **Figure 11**).

3.2 Vegetation Integrity Survey (VIS) Plots

Two (2) BAM VIS Plots were undertaken within the Subject Land. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix A**. Vegetation Integrity (VI) Scores represented by existing vegetation within each vegetation zone are detailed in **Table 5**.

3.2.1 Determining future vegetation integrity scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained, the assessor may determine that the future value of the relevant VI attributes are greater than zero (DPIE 2019c).

The Subject Land will be exposed to varying degrees of clearing, including full clearing within the proposed building envelope and partial clearing within the APZ. Subsequently, each vegetation zone within the Subject Land has been divided into management zones to account for the varying clearing levels (**Figure 13**). The attributes influencing future vegetation scores within each of these management zones are detailed in **Table 6**.

Figure 13. Management Zones within the Subject Land.

Table 5. Vegetation integrity scores for each identified zone.

PCT	Vegetation Zone	Management Zone	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Future VI Score	Change in VI Score	Total change in VI score	Hollow bearing trees
PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Zone 1 (Shrubby understorey)	1.1 Total Impact	0.08	One 1000m^2 (20m x 50m) VIS Plot	72	38.1	42.7	48.9	0	-48.9	-48.9	Absent
	Zone 2 (Cleared)	2.1 Total Impact	0.22	One 1000m^2 (20m x 50m) VIS Plot	10.7	4.2	15	8.7	0	-8.7	-8.7	Absent

Table 6. Management Zones within the Subject Land, and the relevant vegetation attributes (composition, structure and function) affecting future VI scores.

Vegetation Zone	Management Zone	Changes in current vegetation attributes	Vegetation attributes not changed	Justification
Zone 1 (Shrubby understorey)	Zone 1.1 Total Impact	▪ All vegetation will be removed	▪ NA	▪ All vegetation within this zone will be removed to facilitate the proposed development.
Zone 2 (Cleared)	Zone 2.1 Total Impact	▪ All vegetation will be removed	▪ NA	▪ All vegetation within this zone will be removed to facilitate the proposed development.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 7.** Two (2) species predicted by the BAM calculator as potential ecosystem credits were excluded from the assessment due to habitat constraints.

Table 7. Candidate ecosystem credits predicted to occur within the Subject Land.

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered	No	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	No	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable	No	-
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	Vulnerable	Yes	Habitat constraints: the Subject Land does not contain *Allocasuarina* and *Casuarina* species
Chthonicola sagittata Speckled Warbler	Vulnerable	No	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable	No	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	No	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	No	-
Falsistrellus tasmaniensis Eastern False Pipistrelle	Vulnerable	No	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	No	-
Grantiella picta Painted Honeyeater	Vulnerable	No	-
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable	No	-
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable	No	-
Lathamus discolour Swift Parrot (Foraging)	Endangered	No	-
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable	No	-
Melanodryas cucullata cucullata	Vulnerable	No	-

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
Hooded Robin (south-eastern form)			
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Vulnerable	No	-
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	Vulnerable	No	-
Miniopterus australis Little Bent-winged Bat (Foraging)	Vulnerable	No	-
Miniopterus orianae oceanensis Large Bent-winged bat (Foraging)	Vulnerable	No	-
Neophema pulchella Turquoise Parrot	Vulnerable	No	-
Ninox connivens Barking Owl (Foraging)	Vulnerable	No	-
Ninox strenua Powerful Owl (Foraging)	Vulnerable	No	-
Pandion cristatus Eastern Osprey (Foraging)	Vulnerable	No	-
Petaurus australis Yellow-bellied Glider	Vulnerable	Yes	Habitat constraints: the Subject Land does not contain hollow-bearing trees.
Petroica boodang Scarlet Robin	Vulnerable	No	-
Petroica phoenicea Flame Robin	Vulnerable	No	-
Phascolarctos cinereus Koala (Foraging)	Vulnerable	No	-
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	Vulnerable	No	-
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Vulnerable	No	-
Scoteanax rueppellii Greater Broad-nosed Bat	Vulnerable	No	-
Stagonopleura guttata Diamond Firetail	Vulnerable	No	-
Tyto novaehollandiae Masked Owl (Foraging)	Vulnerable	No	-
Varanus rosenbergi Rosenberg's Goanna	Vulnerable	No	-

4.2 Candidate Species Credit Species Summary

This section provides a summary of the candidate species credit fauna and flora species for the Subject Land derived from BAMC (DPIE 2019b). A summary of the targeted survey effort applied to each species is provided along with the results of the survey effort, specifically whether or not the species credit needs to be offset through retiring of Biodiversity Offset Credits (**Table 8**; **Table 9**).

Table 8. Candidate Fauna Credit Species predicted to occur within the Subject Land

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Anthochaera phrygia Regent Honeyeater (Breeding)	No, the Subject Land is not included on the map of important areas for Regent Honeyeaters (DPIE 2020e).	No	NA	Very High – 3	No
Burhinus grallarius Bush Stone-curlew	This species is known to occupy areas where there is adequate fallen/standing dead timber including logs. Potential suitable habitat was present within the Subject Land and therefore this species was included in the assessment.	Yes	No	High - 2	No
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	This species requires Eucalypt trees with hollows greater than 9cm diameter for breeding. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	This species requires living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
Chalinolobus dwyeri Large-eared Pied Bat	This species is known to occur within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. Such geological features were not observed within or adjacent to the Subject Land. Furthermore, as the Subject Land and surrounds are located within a flat terrain with little	No	NA	Very High - 3	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	topographical variation, it is highly unlikely such habitat features would occur within the area surrounding the Subject Land. As such, this species was excluded from the assessment.				
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	This species requires live large old trees within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines for breeding. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Heleioporus australiacus Giant Burrowing Frog	This species is dependent on hanging swamps on the top of sandstone plateaus and deeply dissected gullies that occur as erosion features in the Sydney Basin. As such habitat was not present in the Subject Land, this species was excluded from the assessment.	No	NA	Moderate - 1.5	No
Hieraaetus morphnoides Little Eagle (Breeding)	This species requires live (occasionally dead) large old trees within vegetation for nesting. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No
Lathamus discolour Swift Parrot (Breeding)	No, the Subject Land is not included on the map of important areas for Swift Parrot (DPIE 2020e).	No	No	Very High - 3	No
Litoria aurea Green and Golden Bell Frog	This species is known to occur within semi-permanent/ephemeral wet areas, and within 1km of wet areas (swamps and waterbodies). As a number of waterbodies are present within 1km of the Subject Land, this species was included in the assessment.	Yes	No	High – 2	No
Lophoictinia isura Square-tailed Kite (Breeding)	This species requires live, large old trees within vegetation for nesting. As large trees are present within Zone 1 of the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Meridolum corneovirens Cumberland Plain Land Snail	The species is reliant on a good cover of coarse woody debris. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Miniopterus australis Little Bent-winged Bat (Breeding)	This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
Myotis macropus Southern Myotis	As the Subject Land occurs within 200m of a waterbody with pools/stretches of 3m or wider, this species was included in the assessment.	No	No	High - 2	No
Ninox connivens Barking Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
Ninox strenua Powerful Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
Pandion cristatus Eastern Osprey (Breeding)	This species requires living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting. As the Subject Land was not located within 100m of a floodplain, this species was excluded from the assessment.	No	NA	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Petauroides volans Greater Glider	This species requires abundant tree hollows for refuge and nest sites. As such habitat was not present within the Subject Land, this species was excluded from the assessment	No	NA	High - 2	No
Petaurus norfolcensis Squirrel Glider	This species requires abundant tree hollows for refuge and nest sites. As such habitat was not present within the Subject Land, this species was excluded from the assessment	No	NA	High - 2	No
Phascolarctos cinereus Koala (Breeding)	Potential feed trees were present within the Subject Land and therefore, this species was included in the assessment.	Yes	No	High - 2	No
Pommerhelix duralensis Dural Land Snail	The species requires leaf litter, shed bark and logs, and can occur within 50m of such habitat requirements. As such habitat was present within and adjacent to the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	This species is known to breed within breeding camps. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No
Tyto novaehollandiae Masked Owl (Breeding)	This species is known to breed in living or dead trees with hollows greater than 20cm diameter. As such habitat was not present within the Subject Land, this species was excluded from the assessment.	No	NA	High - 2	No

Table 9. Candidate Flora Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Acacia bynoeana Bynoe's Wattle	This species is known to occur in dry sclerophyll forests. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Acacia pubescens Downy Wattle	This species is known to occur within Shale/Gravel Transition Forest. As such vegetation was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Allocasuarina glareicola	This species is known to occur in association with *Eucalyptus fibrosa* and *Melaleuca nodosa,* which were present within the Subject Land. As such, this species was included in the assessment.	Yes	No	Very High - 3	No
Caladenia tessellata Thick Lip Spider Orchid	This species is found in grassy sclerophyll woodland on clay loam or sandy soils. As such habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High - 3	No
Callistemon linearifolius Netted Bottle Brush	This species grows in dry sclerophyll forest on the coast and adjacent ranges. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No
Dillwynia tenuifolia	This species is known to occur in Shale Gravel Transition Forest on tertiary alluvium or laterised clays. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Dillwynia tenuifolia - endangered population Dillwynia tenuifolia, Kemps Creek	This population is bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA. As the Subject Land does not occur within this location, this population was excluded from the assessment.	No	NA	High - 2	No
Grevillea juniperina subsp. *juniperina* Juniper-leaved Grevillea	This species is known to occur in Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	Moderate - 1.5	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea	This species occurs in a range of vegetation types from heath and shrubby woodland to open forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Gyrostemon thesioides	This species is known to occur on sandy, alluvial or colluvial soil within 50 m of a water course. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	No	NA	Very High - 3	No
Hibbertia fumana	This species is known to occur in association with *Eucalyptus fibrosa* and *Melaleuca decora,* which were present within the Subject Land. As such, this species was included in the assessment.	Yes	No	Very High - 3	No
Marsdenia viridiflora subsp. viridiflora - endangered population Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	This population is geographically limited to the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGA's. As the Subject Land is situated within the Penrith LGA, this population was included in the assessment.	Yes	No	High - 2	No
Micromyrtus minutiflora	This species is known to occur in Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Persoonia nutans Nodding Geebung	This species is known to occur in range of sclerophyll forest and woodland vegetation communities, including those on tertiary alluvium and shale sandstone transition communities.	Yes	No	High - 2	No

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	As the Subject Land contains Shale Gravel Transition Forest, this species was included in the assessment.				
Pimelea curviflora var. *curviflora*	This species is known to occur on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. As the Subject Land contains Shale Gravel Transition Forest, this species was included in the assessment.	Yes	No	High - 2	No
Pultenaea parviflora	This species is known to occur within Shale Gravel Transition Forest. As such habitat was present within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No
Pultenaea pedunculata Matted Bush-pea	This species is known to occur in association with *Eucalyptus moluccana, Eucalyptus fibrosa* and *Melaleuca decora, and* favours sites in clay or sandy-clay soils (Blacktown Soil Landscape) on Wianamatta Shale-derived soils, usually close to patches of Tertiary Alluvium. As such habitat occurs within the Subject Land, this species was included in the assessment.	Yes	No	High - 2	No

4.3 Targeted Species Credit Surveys

Targeted surveys were undertaken for a number of species credit species considered likely to have suitable habitat within the Subject Land. These surveys were implemented in accordance with Section 6.5 of the BAM and all relevant DPIE threatened species survey guidelines.

Targeted surveys were undertaken in March, October and November 2020. Weather conditions taken from the nearest weather station (Badgerys Creek AWS; Station No. 067108) in the lead up and during the field survey are outlined in **Table 10.**

Pre-survey weather conditions were generally conducive for identifying threatened species should they occur within the Subject Land. Although no rainfall occurred in the week prior to the initial targeted flora survey, moderate falls earlier in March provided ideal conditions for the emergence and/or flowering of threatened species should they occur within the Subject Land. Such rainfall also allowed for optimal conditions for the emergence of shrubs and groundcovers within the Subject Land, which ensured maximum species diversity was observed during the site visit. Optimal conditions were also experienced prior to and during subsequent targeted surveys.

Table 10. Weather conditions taken from the nearest weather stations (Station number 067105) in the lead up and during the field survey (BOM 2019; BOM 2020). Survey dates are in bold.

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	18/03/2020	Wednesday	11.4	26.5	0
	19/03/2020	Thursday	13.2	31.6	0
	20/03/2020	Friday	16.1	33.5	0
	21/03/2020	Saturday	13.5	25.9	0
	22/03/2020	Sunday	14.5	29.3	0
	23/03/2020	Monday	15.7	22.8	0
	24/03/2020	Tuesday	14.2	22.8	0
Site Assessment (Vegetation Mapping; BAM Plots; Targeted Flora Survey)	**25/03/2020**	**Wednesday**	**14.8**	**25.9**	**0**
Lead up to the survey	19/10/2020	Monday	13.7	22.5	2
	20/10/2020	Tuesday	14.5	23.2	0.2
	21/10/2020	Wednesday	10.7	27.4	0
	22/10/2020	Thursday	14.2	26.8	0
	23/10/2020	Friday	14.8	30.3	0
	24/10/2020	Saturday	17.5	24.6	6.6
	25/10/2020	Sunday	12.8	15.6	15.8
Site Assessment (Targeted Flora and Fauna Survey)	**26/10/2020**	**Monday**	**12**	**19.9**	**31.4**
Lead up to the survey	9/11/2020	Monday	13.4	25.5	0
	10/11/2020	Tuesday	11.6	28.2	0
	11/11/2020	Wednesday	13.6	31.8	0
	12/11/2020	Thursday	16.9	33	0
	13/11/2020	Friday	18.7	32	4

	14/11/2020	Saturday	13.3	30.4	12.4
	15/11/2020	Sunday	15.2	33.9	0.2
Site Assessment (Targeted Flora and Fauna Survey, SM4BAT)	16/11/2020	Monday	17.1	40.6	0
Site Assessment (Targeted Fauna Survey, SM4BAT)	17/11/2020	Tuesday	16.8	27.1	0
	18/11/2020	Wednesday	17.3	No data	0.2
Site Assessment (SM4BAT)	19/11/2020	Thursday	No data	No data	0.2
	20/11/2020	Friday	No data	37.3	No data
	21/11/2020	Saturday	14.6	27	0
	22/11/2020	Sunday	14.8	28.5	0
	23/11/2020	Monday	18.9	27.3	0
	24/11/2020	Tuesday	14.1	No data	0
	25/11/2020	Wednesday	16.9	No data	0
	26/11/2020	Thursday	13.7	No data	0
	27/11/2020	Friday	16.3	No data	0
	28/11/2020	Saturday	17.9	No data	0
	29/11/2020	Sunday	26.1	39.3	0
	30/11/2020	Monday	No data	No data	0
	01/12/2020	Tuesday	No data	No data	0
	02/12/2020	Wednesday	No data	No data	0

4.3.1 Fauna Species Credit Survey

A total of twenty-four (24) threatened fauna species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. Targeted fauna surveys were conducted for nine (9) of those species within the DPIE endorsed survey period (**Table 11**), as they were identified as having the potential to occur within the Subject Land due to suitable habitat. Details of each targeted fauna survey technique are outlined in **Section 4.3.1.1**.

The remaining eighteen (18) species were not surveyed for due to the following:

- Species are considered unlikely to occur and no further assessment is required for that species if it is determined that no habitat constraints are present on the entire Subject Land for the threatened species (as per Section 6.4.1.13 of the BAM) (OEH 2017a).

Table 11. Species credit fauna species requiring targeted surveys and DPIE endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Burhinus grallarius Bush Stone-curlew											✓	
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)										✓		
Hieraaetus morphnoides Little Eagle (Breeding)										✓		
Litoria aurea Green and Golden Bell Frog											✓	
Lophoictinia isura Square-tailed Kite (Breeding)										✓		
Meridolum corneovirens Cumberland Plain Land Snail										✓		
Myotis macropus Southern Myotis										✓	✓	
Phascolarctos cinereus Koala (Breeding)											✓	
Pommerhelix duralensis Dural Land Snail										✓		
Key	✓ = Surveyed					= Optimum Survey Period						

4.3.1.1 Targeted Fauna Survey Effort

The following species credit species were identified by the BAMC as having the potential to utilise the habitat within the Subject Land:

- *Burhinus grallarius* (Bush Stone-curlew)
- *Haliaeetus leucogaster* (White-bellied Sea-Eagle - breeding)
- *Hieraaetus morphnoides* (Little Eagle – breeding)
- *Litoria aurea* (Green and Golden Bell Frog)
- *Lophoictinia isura* (Square-tailed Kite - breeding)
- *Meridolum corneovirens* (Cumberland Plain Land Snail)
- *Myotis macropus* (Southern Myotis)
- *Phascolarctos cinereus* (Koala – breeding)
- *Pommerhelix duralensis* (Dural Land Snail)

Targeted surveys for these species were required to determine their presence or absence. Targeted surveys were undertaken in accordance with the following guidelines:

- Species credit threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method (OEH 2018a);

- Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians (DECC 2009); and
- Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft) (DEC 2004).

The targeted survey effort undertaken for these species is detailed in Table 12 and displayed in Figure 14.

One (1) threatened fauna species, *Meridolum corneovirens* (Cumberland Plain Land Snail), was found in the Cumberland Plain Woodland to the south of the Subject Land, although not found within the Subject Land. Impact mitigation measures for the Cumberland Plain Land Snail are detailed in Section 5.1.

Table 12. Microbat targeted survey effort undertaken within the Subject Land.

Target Species	Survey Technique	Survey Effort and Timing	Target Species Identified?
Burhinus grallarius Bush Stone-curlew	Call playback	Call playback and spotlighting was conducted one (1) hour after dark across three (3) nights.	No
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
Hieraaetus morphnoides Little Eagle (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
Litoria aurea Green and Golden Bell Frog	Call playback and habitat search	Call playback and habitat searches were conducted for one (1) hour after dark across three (3) nights. Survey focussed on the dam that is situated just outside the Subject Land.	No
Lophoictinia isura Square-tailed Kite (Breeding)	Stick nest search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing mature trees.	No
Meridolum corneovirens Cumberland Plain Land Snail	Habitat search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing leaf litter, shed bark and logs.	No, although present within the bushland to the south of the Subject Land.
Myotis macropus Southern Myotis	SM4BAT	One (1) device deployed for sixteen (16) nights between approximately 8pm and 5am. The device was located adjacent to the dam that is situated just outside the Subject Land.	No
Phascolarctos cinereus Koala (Breeding)	Call playback	Call playback and spotlighting was conducted one (1) hour after dark across three (3) nights.	No
Pommerhelix duralensis Dural Land Snail	Habitat search	Thorough searches of potential habitat over the course of one (1) day. Habitat searches focused on areas containing leaf litter, shed bark and logs.	No

4.3.2 Flora Species Credit Survey

A total of fifteen (15) threatened flora species were identified within the BAMC (DPIE 2019b) as having the potential to occur within the Subject Land. Targeted surveys were undertaken within the DPIE endorsed survey period (**Table 13**). Targeted surveys were undertaken using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPIE 2020c; **Figure 14**).

The remaining two (2) flora species were not surveyed for due to the following:

- Species are considered unlikely to occur and no further assessment is required for that species if it is determined that no habitat constraints are present on the entire Subject Site for the threatened species (as per Section 6.4.1.13 of the BAM) (OEH 2017a).

No threatened flora species were observed within the Subject Land during the targeted surveys.

Table 13. Species credit flora species requiring targeted surveys. Targeted surveys were conducted within DPIE endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acacia bynoeana Bynoe's Wattle			✓									
Acacia pubescens Downy Wattle			✓									
Allocasuarina glareicola			✓									
Caladenia tessellata Thick Lip Spider Orchid										✓		
Callistemon linearifolius Netted Bottle Brush										✓		
Dillwynia tenuifolia										✓		
Grevillea juniperina subsp. *juniperina* Juniper-leaved Grevillea			✓									
Grevillea parviflora subsp. *parviflora* Small-flower Grevillea										✓		
Hibbertia fumana										✓		
Marsdenia viridiflora subsp. *viridiflora - endangered population*											✓	
Micromyrtus minutiflora			✓									
Persoonia nutans Nodding Geebung			✓									
Pimelea curviflora var. *curviflora*			✓									
Pultenaea parviflora										✓		

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pultenaea pedunculata Matted Bush-pea										✓		
Key	✓ = Surveyed						= Optimum Survey Period					

4.4 Species Polygons

No species credit species were present within the Subject Land. Therefore, no species polygons were assigned.

Figure 14. Targeted survey effort undertaken by Narla within the Subject Land.

5. Avoid and Minimise Impacts

5.1 Impact Mitigation and Minimisation Measures

This section details the measures to be implemented before, during and post construction to avoid and minimise the impacts of the project (**Table 14**).

Table 14. Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the project.

Action	Outcome	Timing	Responsibility
Avoid and Minimise Impact - Project Location and Design	The development has been strategically positioned to minimise impacts on native vegetation and habitat as much as possible. The proponent has chosen a mostly cleared area within the north of the Subject Property for the proposed development. This area has been historically and continues to be exposed to varying disturbances, including weed invasion and vehicular access. The removal of vegetation within this area has largely been avoided, as the proposed development has been strategically placed to avoid the removal of as many trees as possible. Note that larger areas of higher quality bushland in the west and south of the Subject Property will not be affected as part of the proposed development. Any temporary structures required for construction works should be located within the Subject Land or areas containing no native vegetation. This will avoid unnecessary impacts on native vegetation and habitat elsewhere within the Subject Property.	Pre-construction phase	Proponent
Preparation of a Construction Environmental Management Plan (CEMP)	A CEMP will be required for the construction phase of the project, and will be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties and nearby waterways in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity, the mitigation and management measures outlined within this table would be implemented as part of the CEMP for the site.	Pre-construction phase	Proponent Project Ecologist Construction Contractor

Action	Outcome	Timing	Responsibility
Tree Protections	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. A Minor Encroachment is less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods.	Pre-construction phase	Proponent Arborist
Assigning a Project Ecologist for vegetation clearing	Prior to construction, the applicant should commission the services of a qualified and experienced Ecologist Consultant (minimum 3 years' experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist will be commissioned to: ▪ Undertake any required targeted searches for threatened flora prior to vegetation clearing; ▪ Undertake targeted searches for Cumberland Plain Land Snail to ensure it is not located within the Subject Land; ▪ Undertake an extensive pre-clearing survey, delineating habitat-bearing trees and shrubs to be retained/removed; and ▪ Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/or relocate any displaced fauna.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Preparation of a VMP	A VMP may be required to outline the extent, nature, method and timeframes for vegetation modification required to establish and/or maintain the APZ within the Subject Land. The VMP will detail on-going habitat management including management of the APZ, weed	Pre-construction phase	Proponent Project Ecologist

Action	Outcome	Timing	Responsibility
	management, native flora plantings and maintenance. The VMP may also ensure the enhancement of Cumberland Plain Land Snail habitat adjacent to the Subject Land.		
Riparian vegetation	The Subject Land intersects a small section of unmapped artificial waterbody and its associated riparian buffer. Impacts to the riparian zone will primarily involve the removal of exotic vegetation, including infestations of the priority weed *Ludwigia peruviana* in the riparian zone. Priority weeds must be managed in accordance with the Biosecurity Act 2015. The following 'Regional Recommended Measure' applies to this priority weed within the Greater Sydney region: ▪ Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant should not be bought, sold, grown, carried or released into the environment. Local Control Authority is notified if the plant is found on the land. Prior to vegetation clearing works in the riparian zone, a Project Ecologist will be commissioned to undertake any required targeted searches for threatened flora.	Prior to and during vegetation clearance works	Proponent Project Ecologist
Biodiversity Stewardship Agreement	The proponent has chosen to enter into a Biodiversity Stewardship Agreement in order to conserve and increase the condition of the two TECs surrounding the Subject Land.	Prior to and during vegetation clearance works	Proponent Ecologist
APZ	The APZ is almost entirely going to become hardstand. The small portion of APZ to the west of the proposed resource recovery facility must be maintained to IPA standards.	Construction phase and post-construction phase	Proponent
Relocation of woody debris	Any woody debris (fallen trees and logs) within the Subject Land are to be relocated to an area of native vegetation adjacent to the Subject Land.	Construction phase	Project Ecologist Proponent Bush regeneration contractor

Action	Outcome	Timing	Responsibility
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Construction phase	Proponent Construction Contractor
Erection of temporary fencing	Temporary fencing should be erected around retained native vegetation that may incur indirect impacts on biodiversity values due to the construction works. As Cumberland Plain Land Snails were found in the area to the south of the Subject Land, access to all areas of native vegetation not within the Subject Land should be prevented during construction and operation, as to not incur indirect impacts to this species.	Construction phase	Proponent Construction Contractor
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	Construction Contractors
Stormwater	Potential impacts relating to stormwater and runoff will be managed during construction and operation phases. The CEMP will guide stormwater management during the construction phase of development.	Post-construction phase	Proponent Construction Contractors/ Architect

6. Impact Summary

6.1 Impacts on Native Vegetation

The following native vegetation within the Subject Land is proposed to be impacted as a result of the proposed development:

- 0.30 ha representative of PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion.

The purchase and retirement of Biodiversity Offset Credits will be required for the following native vegetation within the Subject Land:

- 0.08 ha within Vegetation Zone 1 (Shrubby Understorey), representative of PCT 724 (**Figure 15**).

6.2 Impacts on Threatened Species

No threatened species are predicted to be impacted as a result of the proposed development.

6.3 Serious and Irreversible Impacts (SAII)

No SAII ecological communities or species are predicted to be impacted as a result of the proposed development.

Figure 15. Impacts on native vegetation and offset requirements.

6.4 Other Impacts

6.4.1 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. The indirect impacts of this proposed development are outlined in Table 15.

Table 15. Indirect impacts associated with the proposed development.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	Vegetation and habitat directly adjacent to the Subject Land has the potential to experience ongoing indirect impacts as a result of the proposed development. Although unlikely given the disturbed history of the Subject Land, the disturbance caused during construction may increase weed infestations within adjacent vegetation, which in turn may decrease its habitat value. Furthermore, the proposed development has the potential to alter the natural hydrology occurring within the area, due to an increase in hard surfaces. This in turn may negatively impacting vegetation downslope of the Subject Land by altering natural runoff.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land that may be impacted by a decrease in habitat condition or hydrological changes.	While changes to vegetation condition and hydrology may have a localised impact to threatened species, threatened ecological communities and their habitats, this is not expected to impact on their bioregional persistence.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction and on-going operation may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. This may in turn reduce the viability of such habitats, with the impact expected to be restricted to a couple of metres into adjacent vegetation.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land These TECs and species may be impacted by edge effects leading to a reduced viability in habitat.	While edge effects may have a localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering the large habitat connectivity within the surrounding areas.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during and post-construction. As the Subject Land is located in a semi-rural area, this may have an impact on any species roosting adjacent to the site during the day that are not adapted to such noises, as would be expected with typical urban species. It is not expected that construction and operation of the resource facility would not occur throughout the night, and as such would not impact on nocturnal species that may utilise adjacent habitat, or diurnal species that roost in adjacent habitat.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest, and may be impacted by increases in noise and dust spill. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that	While the construction and operation of the facility may have a localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering large areas of habitat connectivity within the surrounding area.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	The construction and operation of the facility may increase dust in adjacent habitat. Dust can impact on a plants ability to photosynthesise and may increase plant mortality in the adjacent vegetation. It is however not expected that this would have such an impact to decrease the viability of adjacent habitat. It is expected that the construction and operation of the facility would occur during normal working hours, and as such light spill is not expected to affect adjacent habitat.	other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in noise and dust spill into adjacent habitats.	
(d) transport of weeds and pathogens from the site to adjacent vegetation	As previously discussed, the proposed construction and on-going operation may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. It is however not expected that weeds will be transported via human or vehicular traffic into surrounding areas during construction and operation of the resource management facility. Temporary fencing will be erected around retained native vegetation to avoid such indirect impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(e) increased risk of starvation, exposure and loss of shade or shelter	It is highly unlikely that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade and shelter as a result of the proposed development	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	given the majority of it is already completely cleared and unsuitable for habitation. No habitat is to be removed beyond the Subject Land, although disturbances from noise during construction and operation may deem such habitats unsuitable for certain species. However, due to the large areas of habitat connectivity adjoining the Subject Land, it is unlikely that this impact will be significant as such habitats will continue to provide food resources and shelter for fauna species.		
(f) loss of breeding habitats	No habitat is proposed to be removed beyond the Subject Land. However, an increase in noise is to be expected during and post-construction. As such, there is potential for disturbance to breeding habitats directly adjacent to the Subject Land. However, due to the large areas of habitat connectivity adjoining the Subject Land, it is not expected for this to significantly impact on species inhabiting such areas.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. As no habitat is to be removed beyond the Subject Land, no loss of breeding habitat is to be expected as a result of the proposed development. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in noise into adjacent habitats, which	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
		may in turn impact on their breeding habitat.	
(g) trampling of threatened flora species	No threatened flora species were recorded within the Subject Land. Although no threatened flora species have been historically recorded directly adjacent to the Subject Land, there is still the potential for such species to exist in these areas, as these areas were not surveyed. In order to prevent the trampling of threatened flora species that could potentially occur within adjacent habitat, such habitats will be delineated with temporary fencing to avoid such impacts occurring during construction. It is not expected that such areas would be accessible post-construction.	N/A	N/A
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that the inhibition of nitrogen fixation will affect vegetation adjacent to the Subject Land. Increased soil salinity may result due to clearing of vegetation leading to the rising of the water table. However, clearing will be limited to the Subject Land and as such is not expected to affect vegetation directly adjacent to the Subject Land.	N/A	N/A
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land. No fertiliser is expected to be used during construction and operation of the resource management facility.	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(j) rubbish dumping	An increase in traffic on Park Road as a result of the construction and operation of the facility may lead to an increase in rubbish dumping (including littering) within vegetated areas adjacent to the Subject Land. The dumping/littering of food resources may provide a food source for fauna, including threatened species. However, this may also encourage invasive species into such foxes. This can be mitigated by preventing access to adjacent vegetated areas.	Two TECs occur adjacent to the Subject Land - Cumberland Plain Woodland and Shale Gravel Transition Forest, and both of these may be impacted by rubbish dumping. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. The dumping of rubbish may decrease suitable habitat for this species. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by the dumping of rubbish, particularly food resources. This may result in both positive (food source) and negative impacts (increase in predators) to such species.	This impact is expected to be localised and will not have an overall impact on the bioregional persistence of the TECs or threatened species.
(k) wood collection	An increase in traffic on Park Road as a result of the construction and operation of the resource management	Two TECs occur adjacent to the Subject Land - Cumberland Plain	This impact is expected to be localised and will not have an overall

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	facility may lead to an increase in wood collection from adjacent vegetated areas. In turn, this will negatively impact on species that rely on logs for shelter. This can be mitigated by preventing access to adjacent vegetated areas.	Woodland and Shale Gravel Transition Forest, and both of these may be impacted by wood collection. In addition, the Cumberland Plain Land Snail was located adjacent to the Subject Land. The removal of logs may have a significant impact on this species as they are reliant on a good cover of coarse woody debris. There is also the potential that other threatened species occur in areas adjacent to Subject Land. The collection of wood from such habitat may impact on threatened species that rely on such habitat for survival.	impact on the bioregional persistence of the TECs or threatened species.
(l) bush rock removal and disturbance	This issue is not likely to affect the vegetation surrounding the Subject Land. No bush rock was observed within or adjacent to the Subject Land.	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(m) increase in predatory species populations	There is potential that predatory species, such as foxes and cats, already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage predatory species into the area.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in predatory species populations.	An increase in predatory species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the large areas of habitat connectivity adjacent to the Subject Land will allow for the movement of predatory species across the wider landscape.
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. There is the possibility that other indirect impacts, such as an increase in rubbish dumping, may encourage an increase in pest animal populations.	The Cumberland Plain Land Snail was located adjacent to the Subject Land. There is also the potential that other threatened species occur in areas adjacent to Subject Land. Such species may be impacted by an increase in pest animal populations.	An increase in pest animal species adjacent to the Subject Land may have widespread ramifications for any locally occurring threatened species. In particular, the large areas of habitat connectivity adjacent to the Subject Land will allow for the movement of pest animal species across the wider landscape.
(o) increased risk of fire	The Subject Land is identified by Penrith City Council as occurring within bushfire prone land. The proposed development has been positioned to comply with the RFS guidelines for bushfire protection without any further land	N/A	N/A

Indirect Impact	Nature, extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
	management. It is not expected that this will alter the bushfire risk of vegetation surrounding the Subject Land.		
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	No specialist breeding and foraging habitat was identified within or adjacent to the Subject Land. It is therefore not expected that the proposed development will disturb any specialist breeding and foraging habitat.	N/A	N/A

6.4.2 Groundwater Dependent Ecosystems

The Australian Government Atlas of Groundwater Dependent Ecosystems (GDE; BOM 2019a) was reviewed and it was identified that the Subject Land contains a high potential terrestrial GDE. Terrestrial GDE's are terrestrial ecosystems that rely on the subsurface presence of groundwater, which includes all vegetation ecosystems (BOM 2019a). Such reliance can vary from complete to partial reliance (DPIE 2020d). An increase in groundwater levels that occurs through land clearing are threats to GDE's (DPIE 2020d). Approximately 0.3 ha of native vegetation is proposed for removal within the Subject Land. All other vegetation surrounding the Subject Land that are dependent on GDE's will be retained. It is not expected that the clearing within the Subject Land will impact on such GDE's.

6.4.3 Prescribed and Uncertain Impacts

This list of impacts includes all of those impacts on biodiversity values not caused by direct vegetation clearing or development that have been prescribed by the Biodiversity Conservation Regulation 2017. Prescribed biodiversity impacts require an assessment of the impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance. This is discussed in Table 16 below.

Table 16. Prescribed and uncertain impacts associated with the proposed development.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	There are no karsts, caves, crevices, cliffs and other features of geological significance on or near the Subject Land.
Habitat of threatened species or ecological communities associated with rocks	No	No threatened species or ecological communities associated with rocks were located on the Subject Land.
Habitat of threatened species or ecological communities associated with human made structures	No	There are no threatened species or ecological communities located within the Subject Land that are associated with human made structures.
Habitat of threatened species or ecological communities associated with non-native vegetation	No	There will be no impact to the habitat of threatened species or ecological communities associated with non-native vegetation. Non-native vegetation exists in the form of herbaceous weeds and exotic grasses.
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	It is unlikely the proposed development will interrupt connectivity for any threatened species, as extensive areas of habitat connectivity will continue to exist in vegetated areas surrounding the Subject Land.

Will there be impacts on any of the following	Yes/No	If Yes, Address all of the assessment questions from section 9.2.1 of the BAM
Movement of threatened species that maintains their life cycle	No	It is unlikely that the area of impact will interrupt the movement of threatened fauna or flora species that maintains their life cycle, considering the degraded nature of the habitat and the extensive areas of habitat connectivity surrounding the Subject Land.
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	The Subject Land is mapped as containing a high potential terrestrial GDE. It is however not expected that the removal of vegetation within the Subject Land will impact upon any groundwater processes within the surrounding landscape.
Wind turbine strikes on protected animals	No	There are no wind turbines proposed on the Subject Land.
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	The Subject Land has the potential to support threatened species. However, due to the nature of the proposed development, it is highly unlikely that vehicle strikes will be an issue given the slow speed requirements of vehicles within the property.

6.5 Biodiversity Offset Credit Requirements

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate species credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAM calculator. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAMC.

A payment to the Biodiversity Conservation Trust (BCT) would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

Estimated costs to purchase these credits, or alternatively, to allocate offset funds directly into the NSW BCT are available in the NSW Biodiversity Offsets Payment Calculator (DPIE 2020a).

6.5.1 Offset Requirement for Ecosystem Credits

A total of two (2) ecosystem credits are required to offset the biodiversity impacts of the proposed development (Table 17).

Table 17. Ecosystem credits required to offset the proposed development.

PCT	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Critically Endangered Ecological Community	Zone 1 (Shrubby understorey)	0.08	2
		Zone 2 (Cleared)	0.22	0
Total Ecosystem Credits				**2**

6.5.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development.

7. Other Relevant Legislation and Planning Policies

7.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The native vegetation within the Subject Land in Zone 1 and Zone 2 does not conform to the EPBC Act 1999 listed CEEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. The vegetation within Zone 1 does not conform to this listed CEEC as it does not meet all of the key diagnostic characteristics as outlined in Table 18. That is, as the upper tree layer species present within the Subject Land have <10% canopy cover, the entire criteria within Table 18 has not been met. It is however noted that the vegetation to the south and west of the Subject Land is likely to conform to the EPBC listing.

The vegetation within Zone 2 does not meet the EPBC listed community as vegetation derived from grasslands and shrublands are not included as part of the nationally listed CEEC.

Table 18. Key Diagnostics Characteristics required to meet the EPBC Listing Status for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Threatened Species Scientific Committee 2009).

Key Diagnostic Characteristic	Criteria met? (Vegetation Zone 1)
Distribution is limited to the Sydney Basin Bioregion with most occurrences in the Cumberland Sub-region. This covers a geographic area commonly known as the Cumberland Plain, a rainshadow coastal valley in western Sydney.	Yes, the Subject Land is situated within the Cumberland IBRA Subregion.
Most occurrences are on clay soils derived from Wianamatta Group geology, with limited to rare occurrences on soils derived from Tertiary Alluvium, Holocene Alluvium, the Mittagong Formation, Aeolian Deposits and Hawkesbury Sandstone	Yes, the Subject Land occurs on Wianamatta Group shales.
Upper tree layer species must be present with these features: ▪ The minimum projected foliage cover of canopy trees is 10% or more; and ▪ The tree canopy is typically dominated by *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and/or *E. fibrosa* (Red Ironbark). Other canopy species may occur in association with the typical dominants and may be locally dominant at some sites.	No, the minimum projected foliage cover of canopy trees (*Eucalyptus moluccana* and *Eucalyptus fibrosa*) is <10%.
A sparse lower tree layer may be present, typically with young eucalypts of upper tree canopy species and species of Acacia, Exocarpos and Melaleuca.	Yes, lower tree layer comprises *Melaleuca decora, Melaleuca styphelioides* and *Melaleuca nodosa.*
The understorey typically is dominated by the ground layer and shows these features: ▪ The ground layer typically comprises a variety of perennial native graminoids and forbs;	Yes, understorey comprises a diversity of native forbs and grasses. Native shrub layer is also present.

Key Diagnostic Characteristic	Criteria met? (Vegetation Zone 1)
▪ Native graminoid species that are often present include: the grasses *Aristida ramosa* (Purple Wiregrass), *A. vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed Wire Grass), *Dichelachne micrantha* (Plumegrass), *Echinopogon caespitosus* var. *caespitosus* (Tufted Hedgehog Grass), *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides* subsp. *stipoides* (Weeping Grass), *Paspalidium distans* and *Themeda triandra* (Kangaroo Grass), and other graminoids *Carex inversa* (Knob Sedge), *Cyperus gracilis* (Slender Sedge), *Lomandra filiformis* subsp. *filiformis* (Wattle Mat-rush) and *L. multiflora* subsp. *multiflora* (Manyflowered Mat-rush); ▪ Native forb and other herb species present include: *Asperula conferta* (Common Woodruff), *Brunoniella australis* (Blue Trumpet), *Cheilanthes sieberi* (Poison Rock-Fern), *Desmodium varians* (Slender Tick-trefoil), *Dianella longifolia* (Blue Flax-Lily), *Dichondra repens* (Kidney Weed), *Glycine* spp., *Hardenbergia violacea* (Native Sarsparilla), *Opercularia diphylla* (Stinkweed), *Oxalis perennans, Pratia purpurascens* (Whiteroot) and *Wahlenbergia gracilis* (Australian Bluebell); and ▪ A shrub layer may be present, to variable extent, and is often dominated by *Bursaria spinosa* (Blackthorn) while other species include: *Daviesia ulicifolia* (Gorse Bitter Pea), *Dillwynia sieberi*, *Dodonaea viscosa* subsp. *cuneata* (Wedge-leaf Hop-bush), *Indigofera australis* (Native Indigo) and *Lissanthe strigosa* (Peach Heath).	

7.2 State Environmental Planning Policy (Koala Habitat Protection) 2019

This SEPP seeks to address the declining status of koalas in NSW through better conservation and management of koala habitat as part of the planning and assessment process. The overarching aim of the SEPP is to "… encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline" (DPIE 2020b).

This SEPP applies to local government areas that are listed in Schedule 1 'Local government areas' of the SEPP. As City of Penrith LGA is not included in Schedule 1, this SEPP does not apply to the Subject Land.

7.3 State Environmental Planning Policy No 19—Bushland in Urban Areas

SEPP 19 – Bushland in Urban Areas applies to the areas and parts of areas specified in Schedule 1 of the SEPP that adjoin bushland zoned or reserved for public open space purposes. Although Penrith is listed in Schedule 1 of the SEPP, the Subject Land does not adjoin any bushland zoned or reserved for public open space purposes. As such, this SEPP does not apply to the Subject Land.

7.4 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 applies to land within the coastal zone. The coastal zone means the area of land comprised of the following coastal management areas:

- the coastal wetlands and littoral rainforests area;
- the coastal vulnerability area;
- the coastal environment area; or
- the coastal use area.

As the Subject Land does not occur within any of these listed areas, this SEPP does not apply.

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9. Appendices

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

Appendix B. BAMC Generated Biodiversity Credit Report.

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	25/03/2020	**Plot ID:**	Plot 1	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 50m	**Easting:**	285235.67 E
Datum:	GDA94	**Middle bearing from 0m:**	355°	**Northing:**	6249259.82 S
PCT:	PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion [Vegetation Zone 1: Shrubby understorey]				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Acacia decurrens*	0.5	1
Forb (FG)	*Alternanthera denticulata*	0.2	20
Exotic	*Aster subulatus*	0.1	1
HTE	*Bidens pilosa*	0.1	15
Forb (FG)	*Brunoniella australis*	0.2	30
Forb (FG)	*Centella asiatica*	0.1	5
HTE	*Chloris gayana*	15	N/A
Grass & grasslike (GG)	*Chloris truncata*	0.1	2
Exotic	*Cirsium vulgare*	0.1	10
Forb (FG)	*Commelina cyanea*	1	50
Exotic	*Conyza bonariensis*	1	15
Grass & grasslike (GG)	*Cynodon dactylon*	8	N/A
Exotic	*Cyperus brevifolius*	0.1	5
HTE	*Cyperus eragrostis*	3	40
Other (OG)	*Desmodium varians*	0.1	5
Forb (FG)	*Dichondra repens*	0.1	10
Shrub (SG)	*Dillwynia sieberi*	0.1	2
Shrub (SG)	*Dodonaea viscosa*	0.1	1
Exotic	*Echinochloa crus-galli*	0.5	10
HTE	*Ehrharta erecta*	10	N/A
Forb (FG)	*Einadia hastata*	5	N/A
Forb (FG)	*Einadia nutans* subsp. *linifolia*	1	15
Forb (FG)	*Einadia trigonos*	1	15

BAM Site – Field Survey Form			
HTE	*Eragrostis curvula*	15	N/A
Grass & grasslike (GG)	*Eriochloa pseudoacrotricha*	0.1	5
Tree (TG)	*Eucalyptus moluccana*	5	N/A
Forb (FG)	*Euchiton sphaericus*	0.1	1
Grass & grasslike (GG)	*Fimbristylis dichotoma*	0.1	5
Other (OG)	*Glycine clandestina*	1	30
Other (OG)	*Glycine tabacina*	0.5	20
Grass & grasslike (GG)	*Juncus* spp.	0.1	1
Grass & grasslike (GG)	*Lomandra filiformis*	0.1	10
Exotic	*Lysimachia arvensis*	0.1	5
Shrub (SG)	*Melaleuca decora*	35	N/A
Shrub (SG)	*Melaleuca nodosa*	1	1
Shrub (SG)	*Melaleuca styphelioides*	5	N/A
Grass & grasslike (GG)	*Microlaena stipoides*	0.1	10
Exotic	*Modiola caroliniana*	0.1	10
Forb (FG)	*Opercularia diphylla*	0.1	1
Grass & grasslike (GG)	*Oplismenus aemulus*	0.5	30
Exotic	*Oxalis corniculata*	1	50
Grass & grasslike (GG)	*Paspalidium distans*	0.1	1
HTE	*Paspalum dilatatum*	0.5	20
Exotic	*Paspalum urvillei*	0.5	1
Forb (FG)	*Phyllanthus virgatus*	0.1	1
Exotic	*Phytolacca octandra*	0.1	1
Other (OG)	*Polymeria calycina*	0.1	10
Forb (FG)	*Pratia purpurascens*	0.1	10
Exotic	*Richardia stellaris*	0.1	1
Exotic	*Setaria* spp.	1	50
Exotic	*Sida rhombifolia*	0.5	25
Forb (FG)	*Sigesbeckia orientalis*	0.1	5
Exotic	*Solanum nigrum*	0.5	10
Exotic	*Solanum sisymbriifolium*	5	N/A
Exotic	*Sonchus oleraceus*	0.1	10

BAM Site – Field Survey Form			
Grass & grasslike (GG)	*Themeda triandra*	0.5	10
Exotic	*Verbena bonariensis*	0.1	10

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	
30-49cm	Absent	
20-29cm	Present	
10-19cm	Present	
5-9cm	Present	
<5cm	Present	

Length of Logs (m)	8

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	80
2 (15m)	25
3 (25m)	30
4 (35m)	80
5 (45m)	1
Average	43.2

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	2	5.5
Shrub	5	41.2
Grass	10	9.7
Forb	13	9.1
Fern	0	0
Other	4	1.7
High Threat Exotics	6	43.6

BAM Site – Field Survey Form					
Date:	25/03/2020	**Plot ID:**	Plot 2	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20 x 50m	**Easting:**	285151.89 E
Datum:	GDA94	**Middle bearing from 0m:**	185°	**Northing:**	6249149.62 S
PCT:	PCT 724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion [Vegetation Zone 2: Cleared]				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Acacia parramattensis*	0.5	1
Exotic	*Acacia saligna*	5	N/A
HTE	*Bidens pilosa*	0.1	20
Exotic	*Bidens subalternans*	0.1	50
Exotic	*Brassica fruticulosa*	15	N/A
HTE	*Chloris gayana*	7	N/A
Exotic	*Cirsium vulgare*	0.5	20
Exotic	*Conyza bonariensis*	0.1	10
Grass & grasslike (GG)	*Cynodon dactylon*	0.2	20
Exotic	*Digitaria ciliaris*	5	N/A
Exotic	*Echinochloa crus-galli*	0.1	10
Forb (FG)	*Einadia nutans* subsp. *linifolia*	0.1	1
Forb (FG)	*Einadia trigonos*	2	5
HTE	*Eragrostis curvula*	3	20
Other (OG)	*Hardenbergia violacea*	2	10
Exotic	*Hypochaeris radicata*	0.1	1
Other (OG)	*Kennedia rubicunda*	0.5	5
Exotic	*Malva* spp.	0.1	5
Exotic	*Medicago* spp.	1	50
Exotic	*Modiola caroliniana*	0.5	20
Exotic	*Panicum maximum*	4	10
HTE	*Paspalum dilatatum*	0.5	10
Exotic	*Paspalum urvillei*	0.2	3
Exotic	*Plantago lanceolata*	0.1	15
Forb (FG)	*Portulaca oleracea*	0.1	5

BAM Site – Field Survey Form			
HTE	*Senecio madagascarensis*	0.1	10
Exotic	*Sida rhombifolia*	0.5	15
Exotic	*Solanum nigrum*	1	20
Exotic	*Sonchus oleraceus*	0.2	15
Forb (FG)	*Tetragonia tetragonioides*	0.5	5
Exotic	*Verbena bonariensis*	0.1	5

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	
30-49cm	Absent	
20-29cm	Absent	
10-19cm	Absent	
5-9cm	Absent	
<5cm	Present	

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	0
2 (15m)	1
3 (25m)	0
4 (35m)	0
5 (45m)	0
Average	0.2

Growth Form	Composition Data (count of native cover)	Structure Data (sum of cover)
Tree	0	0
Shrub	0	0
Grass	1	0.2
Forb	4	2.7
Fern	0	0
Other	2	2.5
High Threat Exotics	5	10.7

Appendix B. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00022139/BAAS21006/20/00022140	Proposal Name 344 Park Road Wallacia	BAM data last updated * 24/11/2021
Assessor Name Jack Tatler	Assessor Number BAAS21006	BAM Data version * 50
Proponent Names Carlo Ranieri	Report Created 11/02/2022	BAM Case Status Finalised
Assessment Revision 5	Assessment Type Part 4 Developments (General)	Date Finalised 11/02/2022
BOS entry trigger BOS Threshold: Biodiversity Values Map	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami / Glossy Black-Cockatoo
Petaurus australis / Yellow-bellied Glider

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
724-Castlereagh shale - gravel transition forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion	0.3	0	2	2

BAM Biodiversity Credit Report (Like for like)

724-Castlereagh shale - gravel transition forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 724, 808	-	724_Zone1_Shrubby	No	2	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 724, 808	-	724_Zone2_Cleared	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

Assessment Id	Proposal Name	Page 4 of 4
00022139/BAAS21006/20/00022140	344 Park Road Wallacia	

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EIS Appendix 3: Waste Management Report

WASTE MANAGEMENT REPORT FOR PROPOSED RESOURCE RECOVERY FACILITY 344 PARK ROAD, WALLACIA

Prepared for: Greenfields Resource Recovery Facility
Department of Planning, Industry and Environment
NSW Environment Protection Authority
Penrith City Council

Prepared by: Linda Zanotto, Senior Environmental Engineer
R T Benbow, Principal Consultant

Report No: 191318_Waste_Rev3
February 2022
(Released: 16 February 2022)

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R T Benbow	Principal Consultant		16 February 2022

DOCUMENT REVISION RECORD

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1	11-5-2020	Rev1	E Hansma	R T Benbow
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3	16-2-2022	Rev3	E Hansma	R T Benbow

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1	11-5-2020	Greenfields Resource Recovery Facility	Benbow Environmental
2	6-8--2021	Greenfields Resource Recovery Facility	Benbow Environmental
3	16-2-2022	Greenfields Resource Recovery Facility	Benbow Environmental

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1. INTRODUCTION

This Waste Management Report documents the waste types received, processed and stored at the proposed Resource Recovery Facility located at 344 Park Road Wallacia in NSW. Procedures for managing the waste at the facility are also described and how the facility will adhere to relevant waste legislation. The report accompanies the Environmental Impact Statement (EIS) prepared by Benbow Environmental Ref: 191318_EIS that supports the development application for establishment of the business at the site.

Waste management at the site would be undertaken in line with the waste hierarchy demonstrated in the following diagram:

1.1 SCOPE

Secretary's Environmental Assessment Requirements (SEAR) 1227 were issued on 5 June 2018. Requirements specific to waste management were provided by the Department of Planning and The NSW Environment Protection Authority. These requirements are listed in the following table and form the scope of this report.

Table 1-1: SEARs

Requirement	Comment / Section
Department of Planning	
Waste management – including:	
• Details of the type, quantity and classification of waste to be received at the site;	Sections 2.2 and 4.2
• Details of the resource outputs and any additional processes for residual waste;	Section 4.2
• Details of waste handling including, transport, identification, receipt, stockpiling and quality control;	Sections 4.6, 4.7, 4.8 and 5
• Details of the machinery and waste processing to be used; and	Section 2.1

Requirement	Comment / Section
• The measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21.*	Section 3.3
NSW EPA	
2. Waste Management – the environmental impact statement (EIS) must include a detailed assessment of the waste management processes to be undertaken at the Premises. This includes but is not limited to:	
• details of the sources of waste to be received at the Premises;	Section 2.1.4
• details of the types and quantities of each type of waste to be received at the Premises;	Sections 2.2 and 4.2
• details of the maximum volume of waste to be stored on the Premises at any one time;	Section 2.1.2
• details of the maximum annual throughput of waste for be processed at the Premises;	Section 2.1.1
• a description of waste processing procedures for each waste type;	Section 2.1
• the PEA indicates that the proposal will trigger the scheduled activities of resource recovery and waste processing. The EPA is unable to issue a licence for both these activities simultaneously.	An EPL is needed for resource recovery (not waste processing) and waste storage as detailed in Section 3.1.
• Resource recovery applies to activities which dispose of less than 50% of waste after processing, while waste processing applies to activities that dispose of more than 50% of waste after processing;	The activity is defined as resource recovery.
• a description of how the proponent will meet the EPA's record keeping and reporting requirements, including weighing material in and out of the Premises (refer to the EPA's Waste Levy Guidelines for more information – available at http://www.epa.nsw.gov.au/your-environment/waste/waste-levy;	Section 4.10
• a detailed site plan(s) identifying areas for: o haulage; o waste receival, processing, storage and loading (for each waste type) o quarantine; o infrastructure for environmental controls including dust, noise, water and wheelwash; o weighbridge; o site boundaries; o stormwater drainage areas; and o unused stabilised areas;	Site plans are provided with the development application.
• details of the type and quantities of materials to be produced and their intended fate;	Section 4.2

Requirement	Comment / Section
• details of any materials produced under a Resource Recovery Order, and the controls in place for meeting the conditions of that order; and	The Recovered Aggregate Order 2014 Section 3.2 and 4.9.2.1
• a description of procedures for dealing with non-conforming waste (i.e. waste not permitted to be received at the Premises).	Section 5
It is noted that the Proponent wishes to accept both VENM and building & demolition waste to the Premises. The Proponent is reminded that VENM certificates must be retained for all loads of VENM received at the site. It is noted that the Proponent stated that less than 10% of the waste received at site will be building and demolition waste. The Proponent should be aware that the EPA will formalise this as a condition of an Environment Protection Licence, should it be issued for this proposal.	VENM will not be accepted at the site. Incoming waste to be received at the site includes C&D and C&I waste and is detailed in Section 2.2
3. Waste types – the EPA requires detailed information on the waste types proposed to be received at the Premises. For each waste type the Proponent must detail the physical and chemical content of the waste, the types of pollution which may result from the storage and processing of that waste and mitigation measures for managing any such impacts. The list of waste types to be received at the Premises must be made clear.	Section 2.2
Please note that the EPA will not consider including the following waste types on the licence: • Excavated Natural Material or other wastes listed under a resource recovery exemption –resource recovery exemptions apply to the application of waste to land. It is not appropriate to list these on an environment protection licence. • General Solid Waste (Non-putrescible) – this classification is too broad. The applicant must specify which types of General Solid Waste it proposes to receive at the Premises.	ENM would not be received at the premises.

Since the issue of the SEARs, details of the proposed development have changed. The main modifications include the following:

- Establishment of a building to enclose the resource recovery facility;
- All wastes and recovered materials would be stored within the building.
- Waste accepted at the site will now include approximately 70% C&D and 30% C&I waste and will not include ENM and VENM.

Details of the proposed development are provided in the following section.

2. PROPOSED DEVELOPMENT

The initial design of the proposed facility was for establishment of mobile crushing and screening equipment and stockpiled materials. As part of the consultation process, feedback from the NSW EPA indicated that external activities would not be approved. Therefore, redesign of the development lead to the current proposal which includes a Resource Recovery and Transfer Facility (RRTF) enclosed within a building. Furthermore, following the planning panel meeting held on 15 December 2021, extending the building was proposed to enclose all storage areas and the truck loading area. All wastes and recovered product would be stored within the building.

The proposal involves the construction of a purpose-built building to house the resource recovery facility and development of internal access driveway, car park, hardstand areas on the north eastern portion of the site. The existing dwelling will be converted into a site office and a weighbridge would be provided on the access driveway from Park Road.

The facility would operate Monday to Friday 7am – 6pm and Saturday 8am – 1pm, with no operations on Sundays and public holidays. Up to 95,000 tonnes per year of C&D and C&I waste mainly from the local and Sydney metropolitan area would be accepted at the site. This waste would be processed to generate a range of materials mainly for use in the construction industry and civil works. Due to the quantity of waste to be processed and stored, the facility will require an Environment Protection Licence.

The proposed facility is ideally located, being 10km from the Western Sydney Airport and in close proximity to the associated infrastructure projects required to establish growth centres in Western and Southern Sydney.

The waste accepted would consist of C&D and C&I waste, classified as "General Solid Waste (Non-putrescible) under the *NSW Waste Classification Guidelines*. The recyclable material would be made up of:

Construction & Demolition (C&D)	Commercial & Industrial (C&I)
▪ Wood ▪ Gyprock – plaster board ▪ Concrete ▪ Brick ▪ Aggregates ▪ Asphalt ▪ Steel	▪ Cardboard ▪ Paper ▪ Plastic ▪ Steel ▪ Aluminium ▪ Wood

2.1 PROCESS DESCRIPTION

The plant will be designed to process 95,000 tonnes of C&D and C&I waste materials collected from various businesses across the local and metropolitan Sydney area. The materials will be sorted through the plant in separate runs, the C&I and C&D will not be mixed, this will ensure maximum recovery of recyclables. To achieve this, the different waste streams would be processed on separate days. The following provides the typical steps involved in the process that would be undertaken at the facility. Figure 2-1 provides a process flow diagram.

1. All trucks arriving at the site would be directed over the weighbridge and inspected for any abnormal contamination;

2. Trucks with conforming loads would be weighed on the weighbridge then directed inside the building. Non-conforming loads would be turned away via the turning bay adjacent to the weighbridge.

3. Loads of C&I material would be unloaded in a designated storage bunker for processing on a separate day. Loads of C&D material would be unloaded in the pre-sorting area inside the building for initial separation;

4. A front end loader would transfer the pre-sorted material to the infeed hopper / shredder at the start of the process or to the appropriate storage bunker.

5. The material would be fed into the system and conveyed to an electrical magnet for the removal of steel. Any ferrous material would be separated at this point and fall into a storage bin.

6. The waste stream would then be conveyed through a waste screen where aggregates would be removed and further screened into varying sizes and then directed to storage bunkers via the conveyor system.

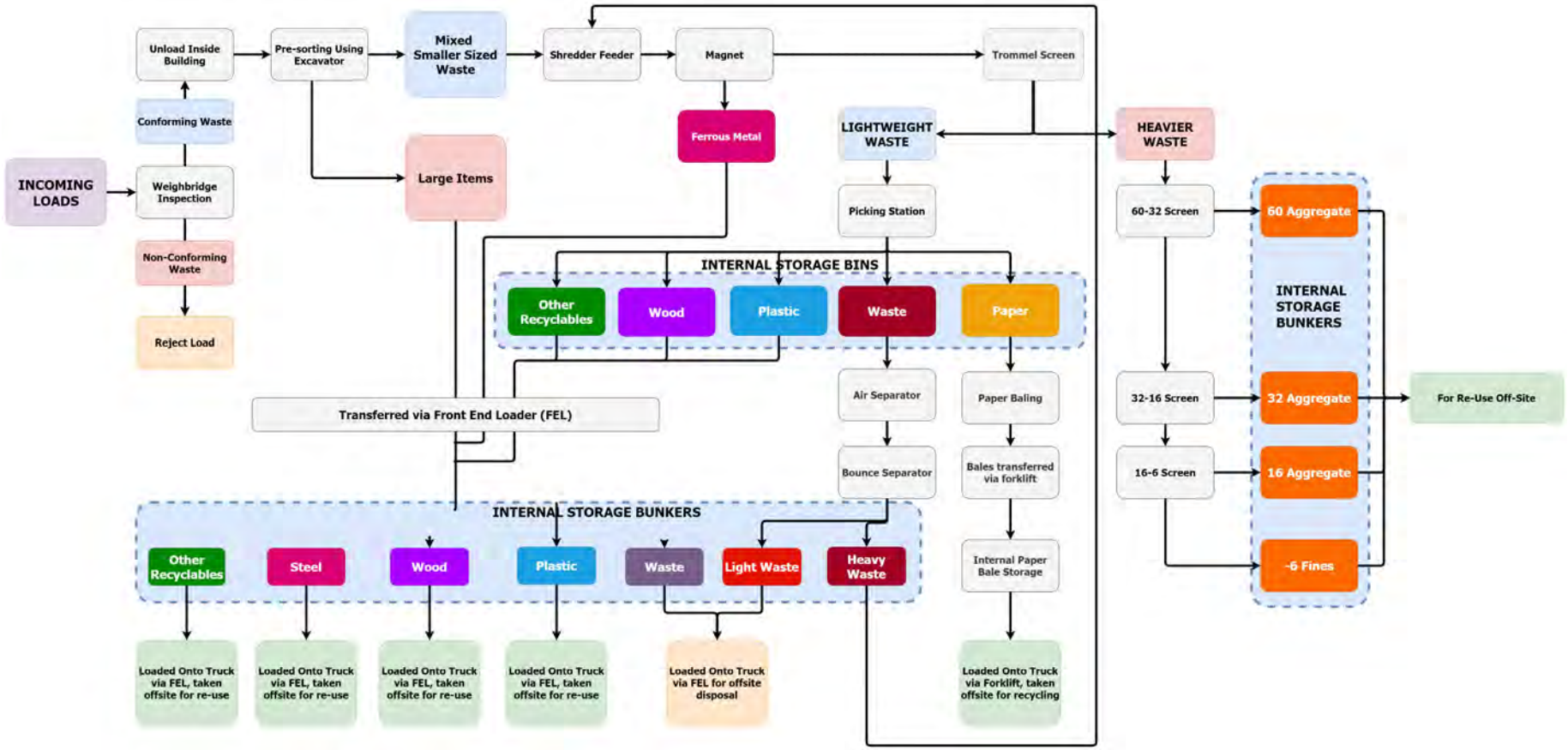
7. The waste stream would be directed to the manual picking station where it is separated into paper/cardboard, wood, plastic and other waste. Paper and cardboard is transferred to the paper baling area for baling. Bales are stored in a designated area within the building.

8. The remaining waste stream is conveyed where it is further separated into heavy and light wastes.

9. Recovered waste would be loaded into trucks for transport to various facilities for reuse or further processing.

No retail sales will be made on site. There will be no public access to the premises.

Figure 2-1: Process flow diagram



2.1.1 Maximum Throughput

The maximum throughput would be up to 95,000 tonnes of waste per year.

2.1.2 Maximum Storage Capacity

The facility would have the capacity to store up to a maximum of 9,000 tonnes of waste at any one time within storage bays and an internal incoming material stockpile.

2.1.3 Equipment

Equipment and machinery required for the resource recovery facility includes:

- 2 x weighbridges;
- Resource Recovery and Transfer Facility (RRTF) consisting of control room, shredder, infeed hopper, conveyor belt, ferrous magnet, waste screens, picking station, air separator and bounce separator;
- Paper Baler;
- 30T Excavator;
- 20T Excavator;
- 35T Front end loader;
- Forklifts;
- Water misting system for the building and awning areas; and
- Internal storage bunkers.

2.1.4 Incoming Waste

Incoming waste would be sourced from reputable construction and demolition companies undertaking work in the regional area. Waste would also be accepted from commercial and industrial premises.

2.1.5 Recovered Materials

The recovered materials generated include wood, plastic, scrap metal, paper & cardboard and aggregates. Recovered aggregates would be sent off site for application to land under the recovered aggregates order and exemption. The other recovered material would be sent on for further processing at licensed recycling facilities.

Any non-recyclable waste would be sent to landfill.

2.2 WASTE STREAMS & TYPES

Waste streams and types and defined under the NSW Waste Levy Guidelines.

Two waste streams would be accepted at the facility and these include:

1. Commercial and Industrial (C&I) waste; and
2. Construction and Demolition (C&D) waste.

Waste Types accepted at the site would generally include: MIX – Mixed waste which would be a combination of the following:

AGG – Aggregate, road base or ballast
AL – Aluminium (non-ferrous)
ASPH – Asphalt
BC – Bricks or concrete
CER – Ceramics, tiles, pottery
COMM – Comingled recyclables
FE – Ferrous (iron or steel)
NFE – Non-ferrous (metals, not iron steel or aluminium)
PAPER – Paper or cardboard
PB – Plasterboard
PL – Plastic
WOOD – Wood, trees or timber

3. LEGAL AND OTHER REQUIREMENTS

3.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is the principal environmental protection legislation for NSW. It defines 'waste' for regulatory purposes and establishes management and licensing requirements for waste. It defines offences relating to waste and sets penalties.

Part 1 in Schedule 1 of the POEO Act lists premise-based activities that are scheduled activities and, as such, that require a licence under the Act. The development falls under the definition of resource recovery (recovery of general waste) and waste storage as defined by clause 34 and 42 respectively.

> ***34 Resource recovery***
>
> *"**recovery of general waste**" , meaning the receiving of waste (other than hazardous waste, restricted solid waste, liquid waste or special waste) from off site and its processing, otherwise than for the recovery of energy.*
>
> Comment:
> Under Clause 34, the proposed development is a scheduled activity under 34(3) as it meets the criteria in column 2 of the table (being storage of more than 1,000 tonnes of waste on site at any one time and processing more than 6,000 tonnes of waste per year) and less than 50% by weight of the waste received in any year would require disposal after processing.
>
> ***42 Waste storage***
>
> *"**waste storage**" , meaning the receiving from off site and storing (including storage for transfer) of waste.*
>
> Comment:
> Under Clause 42, the proposed development is a scheduled activity under 42(3)(c)(i) and 42(3)(d)(i) as it is located in a regulated area and would store more than 1,000 tonnes at the premises at any one time and would receive more than 6,000 tonnes of waste per year from off site.

Therefore an Environment Protection Licence (EPL) is required for 34 – resource recovery and 42 – waste storage.

3.2 PROTECTION OF THE ENVIRONMENT OPERATIONS (WASTE) REGULATION 2014

The *Protection of the Environment Operations (Waste) Regulation 2014*, referred to as the 'Waste Regulation', identifies provisions relating to waste management and disposal. Part 4 of the *Waste Regulation* details the requirements associated with tracking waste. Certain types of waste listed in Schedule 1 of the Waste Regulation have the potential to be harmful to the environment and are required to be tracked from the source to the waste disposal facility. The development would not generate, receive, handle or process waste types that require tracking

under the Waste Regulation. A procedure outlined in Section 5 demonstrates how the facility deals with waste of this nature should it be found within the incoming material.

Of relevance to the facility is Part 6 – Miscellaneous including general requirements relating to the transportation of waste. These requirements have been identified in Section 4.8.

Clause 112 – Requirements relating to the storage of waste generally

> *A person who stores waste on premises (whether or not the waste was produced on the premises) must ensure that it is stored in an environmentally safe manner.*

The facility will need to comply with the above requirements.

Resource recovery orders (RRO) issued under the Regulation may apply in cases where the recovered material needs to meet certain requirements to be supplied for application to land. Relevant RROs include:

- The recovered aggregate order 2014

Controls to be put in place for meeting the conditions of this order are addressed in Section 4.9.2.1.

3.3 WASTE AVOIDANCE AND RESOURCE RECOVERY ACT 2001

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) promotes waste avoidance and resource recovery to achieve a continual reduction in waste generation. Among other miscellaneous provisions, the WARR Act sets out provisions for waste strategies and programs, and industry actions for waste reduction.

Waste minimisation and resource recovery would be practised as part of the main goals of the facility. Resource recovery practices implemented at the site are in accordance with the primary goal of the *NSW Waste Avoidance and Resource Recovery Strategy 2014-2021*, which is "to enable all of the NSW community to improve environment and community well-being by reducing the environmental impact of waste and using resources more efficiently." Overall, the proposed development would have an important positive impact on the waste management practices in the local region since it enables the recovery and recycling of predominant waste streams, which could otherwise be send to landfill.

The company would also follow the NSW EPA's hierarchy of waste management for the management of wastes generated as a result of its ongoing operations.

3.4 PENRITH DEVELOPMENT CONTROL PLAN 2014 – C5 WASTE MANAGEMENT

Part C5 of the Penrith Development Control Plan 2014 relates to waste management. Requirements relevant to the proposed development are addressed in the following table.

Table 3-1: Requirements of Part C5 Waste Management under Penrith DCP

Clause	Requirement	Comment
5.1	Waste Management Plan	A waste management plan is required and is provided as Attachment 1.
5.2	Specific Controls 5.2.4 Non-residential development controls 3) waste storage and collection areas should be:	Clauses 3, 8, 9 and 10 apply under 5.2.4
	a) Flexible in their design so as to allow for future changes in the operation, tenancies and uses	Complies.
	b) Located away from primary street frontages, where applicable	Complies.
	c) Suitably screened from public areas so as to reduce the impacts of noise, odour and visual amenity	Complies.
	d) Designed and located to consider possible traffic hazards (pedestrian/vehicular) likely to be caused by the storage and collection of waste	Complies.
	8) Should a collection vehicle be required to enter the property, the driveway and manoeuvring area must be suitable for a collection vehicle in terms of both its strength and design.	Complies. Shown in the Traffic impact assessment provided with the development application.
	9) The system for waste management must be compatible with the collection service(s) to be used whether Council or private contractor	Private contractors would be used.
	10) Swept paths demonstrating adequate manoeuvring area are to be provided with the application	Complies. Swept paths are provided with the application.
5.3	General Controls	Relevant clauses include 5.3.1, 5.3.2 and 5.3.3.
	5.3.1 Site Management 1) Proposals involving demolition and/or construction (including earthworks) are to include a Waste Management Plan	A Waste Management Plan is provided as Attachment 1. Demolition is minor and involves only one small shed. Excavation is minor. Construction waste would be processed in the facility on site.
	5.3.2 Selection of Building Materials	Complies. Materials to be used on construction consist of materials included in Table C5.1. Unsustainable imported timber would be avoided.

Clause	Requirement	Comment
	5.3.3 Designing for waste minimisation The design of developments should incorporate principles on how waste can be minimised in the design.	The design of the development would incorporate the following: • Minimise excavation and fill • Use prefabricated frames, trusses and cladding • Use standard sizes • Materials used will not require finishes • Wet areas located in one office/amenities part of the building • The enclosed building will minimise windblown dust and stormwater pollution • Development area designed to minimise the number of trees to be removed • Incorporates facilities for source separation of waste and recyclables • Waste storage areas would be well shielded from streetscape.
5.4	Hazardous Waste Management	No hazardous waste would be accepted. An incoming waste inspection procedure would deal with any non-conforming waste brought to site.
5.5	On-Site Sewage Management	Designed by Indesco and shown on site plans provided with the development application.

3.5 WASTE LEVY GUIDELINES

Licensed waste facilities are liable to pay a levy under Section 88 of the Protection of the Environment Operations Act, 1997. Resource recovery facilities are required to record waste inputs and outputs and submit monthly reports to the NSW EPA that will determine whether they are required to pay a waste levy. The waste levy is triggered under the following circumstances:

- If the facility exceeds the authorised amount of waste stored on site at any one time;
- Stockpiling waste on site for more than 12 months; or
- Disposing of waste illegally.

The facility would be required to submit a waste report on the 26th of each month following the month the waste was received. Specific records will need to be kept using an approved method.

3.6 STANDARDS FOR MANAGING CONSTRUCTION WASTE IN NSW

Under Part 8A of the Waste Regulation, the facility must comply with the Standards for managing construction waste in NSW (NSW EPA, 2018) as a condition of the EPL. There are five standards that need to be complied with. The following table describes how the facility would comply with each standard.

Table 3-2: Compliance with Standards for managing construction waste in NSW

No.	Standard	Comment
1	**Inspection requirements** 1.1 Inspection point 1 – verified Weighbridge inspection 1.2 Inspection point 2 – Tip and spread inspection area 1.3 Training requirements for personnel 1.4 Rejected loads register	An incoming waste procedure detailed in Section 5 would be implemented at the site to ensure that inspection requirements are met.
2	**Sorting requirements** Loads not rejected under Standard 1 must be sorted and classified into individual listed waste types before being transferred to the waste storage area referred to in Standard 4.	Listed waste types are provided in Section 2.2 and include: AGG – Aggregate, road base or ballast AL – Aluminium (non-ferrous) ASPH – Asphalt BC – Bricks or concrete CER – Ceramics, tiles, pottery COMM – Comingled recyclables FE – Ferrous (iron or steel) NFE – Non-ferrous (metals, not iron steel or aluminium) PAPER – Paper or cardboard PB – Plasterboard PL – Plastic WOOD – Wood, trees or timber
3	**No mixing of waste** C&D waste that has been inspected and sorted in accordance with Standards 1 and 2 must not be mixed with any other waste at the facility unless: • That other waste has been inspected and sorted at the facility in accordance with Standards 1 and 2; and • It is of the same listed waste type as the other waste; or • The mixing is carried out to meet the requirements of a RRO or the recovered fines specifications.	The facility would comply with this standard as described in Section 2.1.

No.	Standard	Comment
4	**Waste storage requirements** 4.1 Waste storage area 4.2 Inspection point 3 – waste storage area	Waste storage at the facility would comply with this standard as described in Section 4.7.
5	**Transport requirements** Construction waste must not be transported from the facility unless it has been inspected, sorted and stored in accordance with these standards and the load of waste consists solely of a single listed waste type or waste that meets the requirements of a resource recovery exemption or the recovered fines specification. (Except where waste is rejected at inspection points 1 or 2)	The facility would comply with this standard as described in Section 4.8

4. WASTE CLASSIFICATION & MANAGEMENT

4.1 WASTE CLASSIFICATION

In the NSW EPA's *Waste Classification Guidelines* (2014), waste is described as:

a) any substance whether solid, liquid or gaseous that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment; or
b) any discarded, rejected, unwanted, surplus or abandoned substance; or
c) any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, reprocessing, recovery or purification.

All waste materials generated or received on the subject site must be classified into one of six different categories described the *Waste Classification Guidelines* (see table below).

Table 4-1: Classes of Waste from Waste Classification Guidelines

Class	Definitions / Examples
Special waste	• Clinical and related wastes; • Asbestos waste; • Waste tyres.
Liquid waste	• Waste that has an angle of repose <5 degrees; • Waste that becomes free flowing at or below 60ºC; • Is not generally capable of being picked up by a spade or shovel.
Hazardous waste	• Waste with a pH ≤2 or ≥12.5; • Containers that have not been cleaned and contained dangerous goods within the meaning of the Transport of Dangerous Goods Code; • Lead-acid or nickel-cadmium batteries.
Restricted solid waste	• This type of waste is determined by chemical tests.
General solid waste (putrescible)	• Waste from litter bins collected by local councils; • Animal waste and food waste; • Grit or screenings from sewage treatment systems that have been dewatered so that the grit of screenings do not contain free liquids.
General solid waste (non-putrescible)	• Paper or cardboard; • Glass, plastic, rubber, plasterboard, ceramic, bricks, concrete or metal; • Grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices and/or stormwater management systems, that has been dewatered so that they do not contain free liquids

Waste associated with the proposed development is classified in the following section.

4.2 ONGOING WASTE

The expected type, quantity, onsite management and offsite destination of wastes associated with the facility are outlined in the following tables. The estimated maximum quantity is a gross estimation based averages of waste generated in NSW. The quantity for each waste type may vary significantly depending on the source that generated the waste.

Two tables are provided and include details of incoming waste (waste accepted at the site for processing) and recovered waste (materials recovered from the processing and separation of waste on site). The recovered waste includes any non-recyclable material from the process and any waste generated from ancillary activities.

Table 4-2: Incoming Waste Types, Quantities and Management

Waste Stream	Estimated Incoming Quantity	Waste Classification	Management
C&D Waste	66,500 tpa (based on 70% of 95,000tpa)	General Waste (Non-putrescible)	Mixed C&D waste would be sorted through the RRTF separately from C&I waste. The waste stream will undergo initial inspection, infeed hopper, removal of steel, screening, picking and further screening, air separation, baling and storage.
C&I Waste	28,500 tpa (based on 30% of 95,000 tpa)	General Waste (Non-putrescible)	Mixed C&I waste would be sorted through the RRTF separately from C&D waste. The waste stream will undergo initial inspection, infeed hopper, removal of steel, screening, picking and further screening, air separation, baling and storage.

Table 4-3: Recovered Waste Types, Quantities and Management

Waste Type	Estimated Maximum Quantity	EPA Waste Classification[1]	Management
Aggregates	38,950 tonnes per annum	General soil waste (non-putrescible)	This screened into varying standard sizes and directed to the designated storage bay. Transported offsite to for reuse in construction projects under the Recovered Aggregates Order 2014.
Fines (-60 aggregate)		General soil waste (non-putrescible)	The smallest aggregate size that is screened through the process. Transported offsite to for reuse in landscape supplies.

Table 4-3: Recovered Waste Types, Quantities and Management

Waste Type	Estimated Maximum Quantity	EPA Waste Classification[1]	Management
Ferrous and Non-ferrous metal	7,600 tonnes per year	General solid waste (non-putrescible)	This waste is removed from the incoming load in the pre-sorting area or within the process at the ferrous magnet and transferred to a designated internal storage bay. Transfer offsite to a metal merchant for further processing. E.g. Sims Metal
Cardboard & Paper	9,500 tonnes per annum	General solid waste (non-putrescible)	This waste is removed from the incoming load in the pre-sorting area or within the process at the picking station and transferred to a baler where it is baled and stored in a designated area within the building. Bales are transferred offsite for further processing at, a licensed recycling facility. E.g. Visy Recycling
Wood	14,250 tonnes per annum	General solid waste (non-putrescible)	Large pieces of wood is removed from pre-sort area and stored in an internal storage bunker. Wood is also removed from the process at the picking station. Wood is transferred offsite for reuse at waste to energy plants or shredded for biofiltration or mulch. E.g. Landscape supply businesses, waste to energy plants.
Plastic	5,700 tonnes per annum	General solid waste (non-putrescible)	Plastic is separated from the waste stream at the picking station and stored in a designated bin. It is transferred offsite to a licensed recycling facility for further processing. E.g. Visy Recycling
Heavies	N/A Recycled back into system	General solid waste (non-putrescible)	This is the heavy fraction of waste that gets through the system without being separated. It is put back through the system to be reprocessed.
Light (SRF)	9,500 tonnes per annum	General solid waste (non-putrescible)	This material has the potential to be used as Solid Recovered Fuel (SRF) in future, but at this stage is sent to landfill with the non-recyclable waste.
Non-recyclable waste	9,500 tonnes per annum	General solid waste (non-putrescible)	General waste that cannot be recycled is stored removed at various points in the system. It is stored within a designated storage bunker inside the building and sent to a licensed landfill.

Table 4-3: Recovered Waste Types, Quantities and Management

Waste Type	Estimated Maximum Quantity	EPA Waste Classification[1]	Management
Office & Amenities Waste	10 tonnes per year	General solid waste (Putrescible)	This waste is ancillary to the process. A $3m^3$ skip bin would be provided for any office and amenities waste generated on site. This would be serviced by a licensed waste contractor and sent to landfill as required.
Office Recyclables	24 tonnes per year	General solid waste (non-putrescible)	This waste is ancillary to the process. It is transferred offsite to a licensed recycling facility for further processing. E.g. Visy Recycling

Notes:

1. Waste classification according to *Waste Classification Guidelines* provided.

Only C&D and C&I waste would be accepted at the site. Examples of waste that is not accepted includes:

- ENM and VENM;
- Hazardous materials;
- Chemicals of any description;
- Asbestos;
- Fibro;
- Putrescible materials;
- Liquid waste;
- Spent gas bottles;
- Fibreglass;
- Palm trees;
- Stumps;
- Batteries;
- Paint; and
- Any of the above mixed with accepted waste types.

To ensure contaminated waste is not accepted at the site, the Incoming Waste Inspection Procedure outlined in Section 5 must be followed.

4.3 DEMOLITION WASTE

Demolition of the small existing metal shed is proposed. This is approximately $45m^2$ in area. The dwelling and associated infrastructure would remain. Estimations of the waste generated as a result of the demolition phase and how this will be managed is provided in the following table.

Table 4-4: Expected Demolition Waste

Waste Type	Estimated Maximum Quantity (tonnes)	EPA Waste Classification[1]	Management
Excavation (eg soil, rock)	1	General solid waste (non-putrescible)	Reused on site
Greenwaste	0	General solid waste (non-putrescible)	N/A
Bricks	0	General solid waste (non-putrescible)	N/A
Concrete	0.5	General solid waste (non-putrescible)	Placed in designated skip bin and transported to an authorised recycling facility EG: SUEZ Kemps Creek.
Timber	0	General solid waste (non-putrescible)	N/A
Plasterboard	0	General solid waste (non-putrescible)	N/A
Metals: Scrap Colorbond	2	General solid waste (non-putrescible)	Placed in designated skip bin and transported to SUEZ Kemps Creek.
Other	0	N/A	N/A

Notes:

1. Waste classification according to *Waste Classification Guidelines* provided.

4.4 CONSTRUCTION WASTE

Construction works would involve establishment of a concrete hardstand area, car park, internal roadways, construction of a large building and associated infrastructure. Estimations of construction waste and how this will be managed is detailed in the table below.

Table 4-5: Expected Construction Waste

Waste Type	Estimated Maximum Quantity (tonnes)	EPA Waste Classification[1]	Management
Excavation (eg soil, rock)	>2,500	General solid waste (non-putrescible)	Reused on site for cut and fill purposes.
Greenwaste	10	General solid waste (non-putrescible)	Reused on site for landscaping purposes
Bricks	0	General solid waste (non-putrescible)	N/A
Concrete	60	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Timber	2	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Plasterboard	2	General solid waste (non-putrescible)	Placed in designated skip bin and transported to an authorised recycling facility EG: SUEZ Kemps Creek.
Metals: Scrap Colorbond	40	General solid waste (non-putrescible)	Placed in designated skip bin to remain on site until it can be processed in the RRFT
Other	5	N/A	Placed in designated skip bin and removed by a licensed waste contractor.

Notes:

- Waste classification according to *Waste Classification Guidelines* provided.

4.5 WASTE MANAGEMENT PLAN

A waste management plan required to be submitted to Penrith City Council for all development applications is provided in Attachment 1. This addresses all waste expected to be generated during the demolition, construction and operational phases of the proposed development as described in the previous sections.

The resource recovery facility receives, sorts and screens C&D and C&I waste for the purposes of on-selling the recovered material to for use in construction projects. Non-recyclable material is separated from this material and sent to a licensed landfill.

The waste management is to be conducted in accordance with the NSW EPA *Standards for managing construction waste in NSW* 2019.

4.6 RECEIPT & HANDLING OF WASTE

A description of the management of each waste type accepted and sorted on site is provided in Table 4-2 and Table 4-3.

The way waste is managed on site is described as follows:

- All incoming waste loads are brought to site in covered trucks.
- Waste is inspected at the weighbridge and during unloading. An incoming waste procedure is provided in Section 5 that explains the procedure that takes place if non-conforming material is found. Inspections are to be conducted in accordance with Standard 1 of the NSW EPA *Standards for managing construction waste in NSW* 2019.
- Trucks unload all waste within the unloading area inside the building.
- The building's water misting system is activated upon unloading and during any processing of waste to suppress emissions of dust. Pre-sorting is to be undertaken in accordance with Standard 2 of the NSW EPA *Standards for managing construction waste in NSW* 2019. There will be no mixing of inspected and sorted construction waste with construction waste that has not been inspected and sorted (Standard 3).
- Once pre-sorted, waste types are stored in designated storage bays according to the particular waste type. Storage management will be conducted in accordance with Standard 4 of the NSW EPA *Standards for managing construction waste in NSW* 2019.
- The remaining unsorted waste would be loaded into the infeeder for processing through the RRFT system. At various points in the system, recovered materials would be separated into bins or storage bays by the system or by hand picking.
- Recovered materials would be loaded onto trucks and transported to licensed facilities or for reuse in construction projects.
- Residual waste unable to be reused is sent to a licensed landfill facility.
- All truck loads leaving the site are covered.
- Records of all incoming and outgoing loads would be maintained in accordance with Waste Levy Guidelines.

Overall, waste management practices that would be in place at the facility are considered adequate and comply with S48 of the *Protection of the Environment Operations Regulation 1997*, which states the facility must store and manage waste in an environmentally safe manner.

Management of waste on site will also be in line with the *Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities* (EPA December 2012) as it includes the following practices:

- Visually screening designated waste areas and receptacles from public places (in building);
- Ensuring waste is stored adequately and cannot escape receptacles and storage areas; and
- Ensuring easy access to each waste storage area for collection services.

The facility would not accept liquid wastes, hazardous wastes, special waste including asbestos and waste tyres nor restricted solid waste. A procedure to deal with any unauthorised waste types found within incoming loads or inadvertently delivered to the site is provided in Section 5.

4.7 WASTE STORAGE

The facility would need approval to store up to 9,000 tonnes of waste material on site at any one time.

Designated waste storage areas will be established within the building. The waste storage areas are described below, including the estimated maximum waste quantity stored, and are shown on the site plan.

Area 1: Incoming material stockpile

The incoming material would be unloaded into a stockpile inside the building to be pre-sorted. This material would be temporarily stored for pre-sorting then loaded into the infeed hopper for processing in the RRFT. It is estimated this stockpile would store a maximum of 600 tonnes of waste.

The waste classification for the materials is General Solid waste (Non-putrescible).

Area 2: Internal storage bunkers

There would be four large walled bunkers within the building for the storage of waste, wood, steel and "other" materials. The storage bays would be constructed of steel frame and plate push walls up to 2.5 m high. This area would store up to 3,000 tonnes of waste or recovered materials. The maximum storage volume of each bunker is:

Bunker 1: C&I storage – 350m^3
Bunker 2: Steel storage – 380m^3
Bunker 3: Wood storage – 380 m^3
Bunker 4: Other waste materials storage – 370m^3

The waste classification for these materials is General Solid waste (Non-putrescible).

Area 3: RRFT bins/bunkers

At various points along the RRFT, there would be small bins or bunkers where steel, paper/cardboard, wood, plastic and "other" material would be separated from the waste stream. These bins/bunkers would store up to 500 tonnes of recovered materials.

Waste Screen Bin x 1 bin of 5 to 10 m^3 capacity
Picking Bins x 4 bins, each 5 to 10 m^3 capacity
Air Separator Bunkers x 2 bunkers each 90 m^3 capacity
Bounce Separator Bunkers x 2 bunkers at 120 m^3 and 95m^3 capacity

The waste classification for these materials is General Solid waste (Non-putrescible).

Area 4: Aggregate storage bunkers

At the waste screen, aggregate would be sized into -6, 16, 32 and 60 mm sizes which would be directed by conveyor into storage bunkers located inside the building. This area would store up to 4,000 tonnes of recovered materials.

Soil storage bunkers: 308 m^3
60 Aggregate bunker: 22 5m^3
32 Aggregate bunker: 295 m^3
16 Aggregate bunker 245 m^3
-6 Fines bunker 155 m3

Aggregates are a coarse to medium grained particulate material used in construction including sand, gravel, crushed stone, slag and recycled concrete. The classification for all aggregate material in accordance with the NSW EPA Waste Classification Guidelines is: General Solid waste (Non-putrescible).

Area 5: Paper bale storage area

Paper bales would be stored inside the building adjacent to the baler. This area would store up to 500 tonnes of baled material.

The waste classification for this material is General Solid waste (Non-putrescible).

Total Waste Storage
The estimated waste storage quantity on site is 8,600 tonnes. With a factor of safety applied to the estimated storage, the facility seeks approval to store a maximum of 9,000 tonnes of waste at the site at any one time. All waste and recovered materials would be stored within designated areas inside the building.

4.7.1 Waste storage requirements

Waste would be stored in designated storage bunkers or bins as described in the previous section. The location of these areas is shown on the site plan. Each bunker or bin would be clearly signposted to indicate the waste type stored within.

Signs at waste storage areas containing waste awaiting test results under resource recovery orders must contain the words “awaiting validation”.

4.7.2 Inspection of waste storage areas

Waste storage areas would be inspected daily for the following:

- Waste types stored within designated area conform to the signpost of the bunker/bin;
- Signposts are clearly legible and visible at all bunkers/bins
- Any areas containing waste awaiting compliance results contain a sign that reads “awaiting validation”
- No waste is stored outside designated bunkers/bins or areas (in the case of paper bales and incoming pre-sort stockpile area).

4.8 TRANSPORT OF WASTE

The transport of the waste streams accepted at the site are not required to be undertaken by licensed waste transporters as the waste is not trackable waste.

Under Part 6 of the Protection of the Environment Operations (Waste) Regulation 2014, the following is required:

- Waste must be transported in a manner that avoids the waste spilling, leaking or otherwise escaping.
- Waste must be covered during transport unless the waste consists solely of waste tyres scrap metal.
- Transport vehicles must be constructed and maintained to avoid waste spilling leaking of otherwise escaping from the vehicle.
- Any material that has been segregated for recycling must not be mixed with other waste during transportation.
- Transport of waste must abide by the proximity principle which restricts the transport of waste by road more than 150km from its origin.

Under Section 143 of the Protection of the Environment Operations Act, 1997, waste is required to be transported to a place that can lawfully accept it.

Waste types to be transported from the site would consist solely of a single listed waste type or waste that meets the requirements of a resource recovery exemption or the recovered fines specification.

The above requirements would be met by transporters of the waste to and from the facility.

4.9 QUALITY CONTROL

Procedures would be put in place to manage the input and output quality of the incoming waste and recovered material.

4.9.1 Incoming Waste

Quality control for incoming waste includes:

- Control of the wastes accepted into the facility, as described in the incoming waste procedure in Section 5.
- Contaminants are minimised through visual inspection to ensure inappropriate items are removed from the waste stream at the pre-sorting area.
- Further physical separation of the impurities from the waste stream at the picking station to remove contaminants from the waste prior to entering the final separation process.
- Regular maintenance of the RRFT as per manufacturer's specifications.
- Suppliers of waste would be from authorised reputable companies whose details would be recorded with all incoming loads.

4.9.2 Recovered Material

Recovered material will be produced to contain less than 1% impurities. This will be achieved by:

- Physical separation of impurities from the incoming waste stream in the pre-sorting area, at multiple screens and through manual QC picking stations to ensure that impurities are removed from each type of recovered material.
- Aggregates recovered from the waste would be sampled and tested in accordance with the *Specification for Supply of Recycled material for pavements, earthworks and drainage* (Department of Environment, Climate Change and Water NSW, 2010) to enable supply of this material for use in pavements, earthworks and drainage.
- Aggregates recovered from the waste would be sampled and tested in accordance with *the recovered aggregate order 2014*. Controls to be put in place to meet the conditions of the order are detailed in the sub-section below.

4.9.2.1 Recovered Aggregates

Recovered aggregates would need to comply with the conditions of the recovered aggregate order 2014 to be re-used off site for application to land for road making activities, building, landscaping and construction works. "Processor responsibilities" under the order apply to the facility and the following quality control measures would be put in place:

- A written sampling plan would be prepared including:
    - A description of sample preparation
    - Storage procedures for samples
    - Sampling method
    - Testing for list of chemicals and attributes as per column 1 of table 1 of the order
    - Validation of test results with values listed in the order.
    - Record keeping procedures
- Sampling to be carried out in accordance with AS 1141.3.1-2012 – Methods for sampling and testing aggregates – Sampling – Aggregates and Clauses 4.2 or 4.3 of the order
- Contaminant testing would be undertaken at a NATA certified laboratory
- Record keeping of all test results
- Preparation of a written statement of compliance certifying that the recovered aggregate complies with the conditions of the recovered aggregate order. This would be supplied to consumers of the recovered aggregate along with copies of test results, a copy of the order and exemption.
- Written records detailing the supply of recovered aggregates would be maintained for at least six years and would need to include:
    - Quantity of recovered aggregate supplied
    - Name and address of each person (and location) to whom the recovered aggregate was supplied
    - Name of the transporter and vehicle registration number
    - Date of transportation

In the event the recovered aggregate does not comply with the recovered aggregate order, alternative uses for the aggregate such as use in concrete or other products would be investigated.

4.10 MONITORING & RECORDS

Records of incoming and outgoing waste would be required under an Environment Protection Licence. A weighbridge would record all loads entering and leaving the facility. Records would need to be kept using an approved method that complies with the Waste Levy Guidelines.

Each storage bay / bunker / bin or area at the facility will need to have a unique identification number.

For all information recorded, the following would be needed in accordance with Part 3 of the Waste Regulation:

- Original records of information (such as paper documents) retained and accessible to EPA in their original form;
- All record-keeping systems are designed so that details of any adjustments are recorded against the adjusted record, including that the record has been amended and the extent of the change;
- All electronic records are backed up weekly and back ups stored in a secure location;
- Quantity of waste is recorded to two decimal places;
- All electronic records are to be downloadable by the EPA in an .xls, .xlsx, .csv or .dbf format at any time.

For each vehicle entry and exit the following will be recorded using at the gate house:

Incoming Loads:

- Date & time received;
- Name of customer;
- Address of facility received from/customer address;
- Environment Protection Licence Number for the facility/customer;
- Estimated Weight/Volume of load to two decimal points (eg: 14.22 tonnes);
- Waste Stream;
- Vehicle registration number (including any trailer(s));
- Name of driver; and
- Location of where the material is placed at the site;
- Details of any unauthorised waste found in load

Outgoing Loads:

- Date & time dispatched;
- Name of destination;
- Address of destination;
- Environment Protection Licence Number of destination (if applicable);
- Estimated Weight/Volume of load to two decimal places;
- Storage Bay ID No. from which the material was removed;
- Vehicle registration number;
- Name of driver; and
- Contents of load eg: Waste type.

4.10.1 Rejected Loads Register

The following will be recorded in a rejected loads register for each load rejected from the facility:

1. Date and time the load was rejected
2. Vehicle registration number including any trailers transporting the rejected load of waste both to and from the facility
3. The type of waste(s) in the rejected load of waste
4. The reason the load was rejected.

5. INCOMING WASTE PROCEDURE

5.1 PURPOSE

The purpose of this procedure is to facilitate the process of dealing with unauthorised or non-conforming waste brought onto the site. The procedure will enable the identity of waste types found within incoming loads and brought onto site to be confirmed and deal with any unexpected or non-conforming wastes such as asbestos.

5.2 DEFINITIONS

For the purposes of the procedure, the following definitions of relevance:

Contaminated Material
Materials that contain substances that are of sufficient concentration to potentially cause harm to human health or the environment. (EPA Act)

Acceptable wastes
Acceptable wastes include construction and demolition (C&D) waste and commercial and industrial (C&I) waste from reputable sources and is expected to include:

AGG – Aggregate, road base or ballast
AL – Aluminium (non-ferrous)
ASPH – Asphalt
BC – Bricks or concrete
CER – Ceramics, tiles, pottery
COMM – Comingled recyclables
FE – Ferrous (iron or steel)
NFE – Non-ferrous (metals, not iron steel or aluminium)
PAPER – Paper or cardboard
PB – Plasterboard
PL – Plastic
WOOD – Wood, trees or timber

Suspect material / Not accepted

Not accepted at the site are any contaminated or non-conforming wastes such as:

- ENM and VENM or any fill material;
- Hazardous materials;
- Chemicals of any description;
- Asbestos;
- Fibro;
- Putrescible materials;
- Liquid waste;
- Spent gas bottles;
- Fibreglass;
- Palm trees;
- Stumps;

- Batteries;
- Paint; and
- Any of the above mixed with accepted waste types.

5.3 TRAINING REQUIREMENTS

Training of personnel responsible for inspections, sorting and waste storage at the facility would include:

- Training in legal and other requirements for waste including:
  - Relevant requirements of the POEO Act (including the waste regulation);
  - Requirements of any waste conditions in the facility's EPL;
  - The five standards of the *Standards for managing construction waste in NSW.*
- Successful completion of a nationally accredited asbestos awareness course;
- Personnel involved in removing bonded asbestos must complete nationally accredited course in bonded asbestos removal before undertaking any task that involves removing bonded asbestos.

Other relevant environmental awareness training and details regarding maintenance of training records would be included in the site's Environmental Management Plan.

5.4 PROCEDURE

Loads are to be inspected at the following points in the process:

1. At the weighbridge;
2. While unloading in the pre-sorting area.

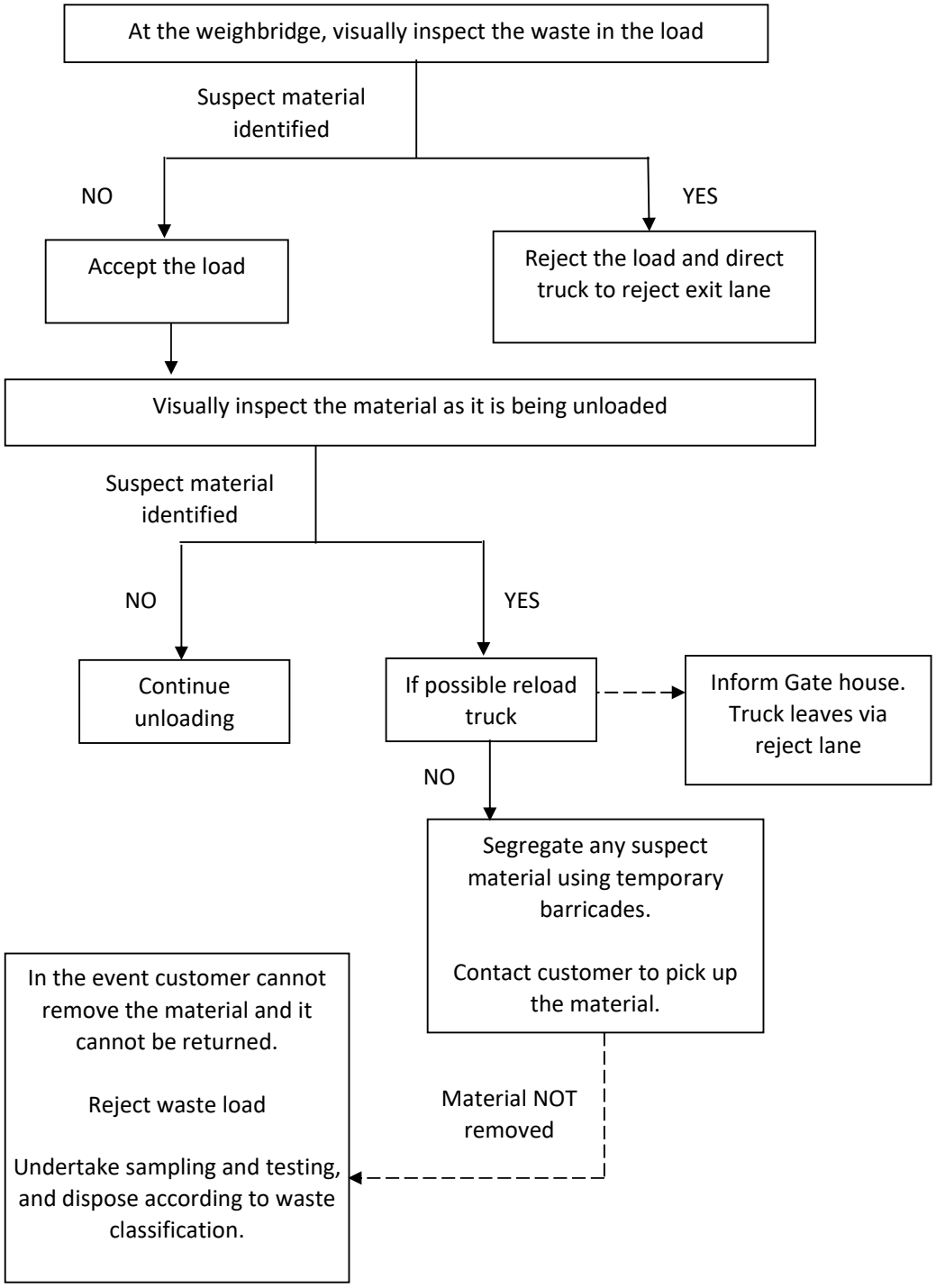
Upon the finding of suspect or contaminated material at the weighbridge, the non-conforming load shall be directed by the gate house personnel to use the reject truck exit lane to immediately leave the property. Record details in the rejected loads register.

Upon the finding of suspect or contaminated material within a load during unloading in the pre-sorting area, the following actions are required:

- If possible, re-load the truck.
- Report the non-conforming material to the gate house personnel. Gate house personnel will need to record details in the rejected loads register.
- Direct the truck to leave the facility via the reject truck exit lane.
- If re-loading the truck is not possible, secure the area, secure the material using temporary barricades within a designated area inside the building.
- Contact the customer and direct them to pick up the material.
- As a contingency, should the customer be unable to collect the material, contact a suitably qualified consultant to determine the appropriate waste classification. This may involve sampling and testing of the material in accordance with regulatory guidelines. Once the waste classification for the material is known, dispose of this lawfully using a licensed waste contractor.

The following figure presents the steps to be followed in the event of suspect or contaminated material being found:

Figure 5-1: Incoming load inspection



5.5 INSPECTION AND RECORDS

5.5.1 Records of incoming loads

The following details for incoming waste need to be maintained:

- Date & time received;
- Name of customer;
- Address of facility received from/customer address;
- Environment Protection Licence Number for the facility/customer;
- Estimated Weight/Volume of load to two decimal points (eg: 14.22 tonnes);
- Waste Stream;
- Vehicle registration number (including any trailer(s));
- Name of driver; and
- Location of where the material is placed at the site;
- Details of any unauthorised waste found in load

5.5.2 Rejected Loads Register

Any non-conforming waste must be recorded in the rejected loads register and include the following details:

1. Date and time the load was rejected
2. Vehicle registration number including any trailers transporting the rejected load of waste both to and from the facility
3. The type of waste(s) in the rejected load of waste
4. The reason the load was rejected.

5.5.3 Other Non-conforming waste

Documentation for any sampling, testing and alternate disposal of the waste must also be maintained.

This concludes the report.

Linda Zanotto
Senior Environmental Engineer

R T Benbow
Principal Consultant

6. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Greenfields Resource Recovery Facility, as per our agreement for providing environmental services. Only Greenfields Resource Recovery Facility is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Greenfields Resource Recovery Facility for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Development Applications

WASTE MANAGEMENT PLAN
DEMOLITION, CONSTRUCTION AND USE OF PREMISES

If you need more space to give details, you are welcome to attach extra pages to this form.

PLEASE COMPLETE ALL PARTS OF THIS FORM THAT ARE RELEVANT TO YOUR DEVELOPMENT APPLICATION (DA).

IF YOU NEED MORE SPACE TO GIVE DETAILS, YOU ARE WELCOME TO ATTACH EXTRA PAGES TO THIS FORM.

Council will assess the information you provide on this form along with your attached plans. We will take into account the types and volumes of waste that could be produced as a result of your proposed development, and how you are planning to:

- minimise the amount of waste produced
- maximise re-use and recycling
- store, transport and dispose of waste safely and thoughtfully.

APPLICANT DETAILS

First name: Ellie

Surname: Barikhan

Postal Address

Street No.: 344

Street name: Park Road

Suburb: Wallacia

Post code: 2745

Contact phone number: 0407 333 333

Email address: 888minerals@gmail.com

DETAILS OF YOUR PROPOSED DEVELOPMENT

Street No.: 344

Street name: Park Road

Suburb: Wallacia

Post code: 2745

What buildings and other structures are currently on the site?

One single storey house (dwelling) and two small sheds.

Briefly describe your proposed development

Establishment and operation of a resource recovery facility that accepts construction & demolition and commercial & industrial waste streams and processes these to produce recoverable products. This would involve construction of a purpose built building with covered storage bunkers, conversion of existing dwelling into an office, development of internal roads, parking and associated infrastructure.

Applicant Signature

Date

PENRITH CITY COUNCIL

SECTION 1: DEMOLITION

*Please include details on the plans you submit with this form, for example location of on-site storage areas/ containers, vehicle access point/s.

Materials		Destination		
		Re-use and recycling		Disposal
Material	Estimated volume (m^2 or m^3)	ON-SITE* Specify proposed re-use or on-site recycling	OFF-SITE Specify contractor and recycling facility	Specify contractor and landfill site
Excavation (eg soil, rock)	1 tonne	reused on site to level land where demolition		
Green waste	0			
Bricks	0			
Concrete	0.5 tonnes		Placed in designated skip bin. SUEZ	
Timber (Please specify type/s)	0			
Plasterboard	0			
Metals (Please specify type/s)	2 tonnes		Placed in designated skip bin. SUEZ	
Other	0			

SECTION 2: CONSTRUCTION

*Please include details on the plans you submit with this form, for example location of on-site storage areas/ containers, vehicle access point/s.

Materials		Destination		
		Re-use and recycling		Disposal
Material	Estimated volume (m^2 or m^3)	ON-SITE* Specify proposed re-use or on-site recycling	OFF-SITE Specify contractor and recycling facility	Specify contractor and landfill site
Excavation (eg soil, rock)	>1000 m3	Any cut and fill material would be		
Green waste	10 m3	Reused on site for landscaping purposes		
Bricks	0			
Concrete	60 tonnes		Placed in designated skip bin to remain on	
Timber (Please specify type/s)	2 tonnes		Placed in designated skip bin to remain on	
Plasterboard	2 tonnes		Placed in designated skip bin to remain on	
Metals (Please specify type/s)	40 tonnes		Placed in designated skip bin to remain on	
Other	5 tonnes			Placed in a designated skip bin to be removed

SECTION 3: WASTE FROM ON-GOING USE OF PREMISES

If relevant, please list the type/s of waste that may be generated by on-going use of the premises after the development is finished.	Expected volume (average per week)
Residual waste including any non-recyclable material found within the incoming waste streams and any light waste (SRF) requiring disposal.	350 tonnes per week
Office and amenities waste (general solid waste - putrescible)	190 kg per week
Office recyclables	460 kg per week
Wheel wash sediment / sludge to be serviced by a licensed waste contractor such as Cleanaway on as needs basis	100 L per week

SECTION 4: ON-GOING MANAGEMENT OF PREMISES

If relevant, please give details of how you intend to manage waste on-site after the development is finished, for example through lease conditions for tenants or an on-site caretaker/manager. Describe any proposed on-site storage and treatment facilities. Please attach plans showing the location of waste storage and collection areas, and access routes for tenants and collection vehicles.

A detailed waste management report has been provided with the EIS to support the development application. This report details the management of the incoming waste and recovered materials and any waste generated from the process and ancillary activities. The site plans provided show the waste storage locations. The facility is a proposed resource recovery facility and therefore no tenants or residential units exist.

EIS Appendix 4: Wastewater Management Report

Strategic Environmental & Engineering Consulting

Wastewater Management: Site & Soil Evaluation & Disposal System Design

For Proposed Commercial Development at: Lot 5 DP 655046 No. 344 Park Road, Wallacia

Prepared by:

Ciaran Bromhead

Strategic Environmental and Engineering Consulting (SEEC) Pty Ltd
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SEEC Reference: 20000086

28 April 2020

Strategic Environmental and Engineering Consulting

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Project Reference: 20000086-WW-01
Date of Assessment: 28/04/2020

Signed: 

Document Certification

This report has been developed based on agreed requirements as understood by SEEC at the time of investigation. It applies only to a specific task on the nominated lands. Other interpretations must not be made, including changes in scale or application to other projects. The contents of this report are based on a professional appraisal of the conditions that existed at the time of our investigation. Where subsurface investigations have been done the results are only applicable to the specific sampling or testing locations and only to the depth(s) investigated. Because of natural geological variability, and/or because of possible anthropogenic influences, the subsurface conditions reported can change abruptly. Such changes can also occur after the site investigation. The accuracy of the conditions provided in this report is limited by these possible variations and influences and/or is limited by budget constraints imposed by others and/or by adequate accessibility.

Copyright

Document Issue Table

Version	Date	Author	Reviewed	Notes
Draft A	8/04/2020	CB	AM & LO	
0A	8/04/2020	CB	Client	
0B	17/04/2020	CB	Client	
01 Final	28/04/2020	CB		

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

1.1 Scope of Work

Strategic Environmental and Engineering Consulting (SEEC) has been commissioned by Carlo Ranieri & Associates Pty Ltd, on behalf of the property owners, to provide this wastewater site assessment. It is required to accompany an application for a proposed recycling facility at Lot 5 DP 655046 No. 344 Park Road, Wallacia. At the time of inspection there was an existing residential dwelling onsite (Figure 1).The existing dwelling will be converted into a site office. Wastewater in the existing dwelling is currently being treated in a septic tank. The associated absorption system could not be located during the site inspection. The existing septic tank and absorption system will be decommissioned during this development. An amenities block will be constructed on the northern side of the proposed material recovery facility (Figure 1). Therefore, this assessment is required to show how treated wastewater generated from the site office and amenities block can be sustainably managed onsite.

1.2 Site Description

Lot 5 DP 655046 is a 20 ha (approx.) rural lot located on the southern side of Park Road, Wallacia. The proposed recycling facility will occupy the eastern extent of the lot (Figure 1). It will consist of a site office, staff/visitor carpark, truck carpark and resource recovery facility (Figure 1). The proposed Effluent Management Area (EMA) will be located to the west of the resource recovery facility where the site grades at 2% to the west (Figure 1). There is a dam and several drainage depressions affecting this site.

According to Penrith City Council's flood information for this site, the EMA is more than 0.5m above the 1% Average Exceedance Probability (AEP) flood height and the corresponding overland flow path and has been located >40 m away from this feature (Figure 1 and Appendix 1). A search of WaterNSW's ground water map did not identify any bores used for potable water within 250 m of the proposed EMA.

The proposed EMA is currently non-vegetated and has 100 mm of hardstand in the upper soil profile. Hardstand material will need to be stripped from the proposed EMA nad the immediate surrounding area. A minimum of 200 mm of good quality topsoil must be placed over the entire EMA and a good covering of vegetation (preferably pasture grasses) immediately established. Once vegetation has been established the proposed EMA can be commissioned.

Soil investigations revealed 150 mm of greyish brown clay loam topsoil over light brown medium clay down to 1,200+ mm in Borehole 1. Borehole 2 revealed 300 mm of dark brown clay loam topsoil over 400 mm of brown light/medium clay over slightly mottled light brown medium clay down to 1,200+ mm. Borehole 3 revealed 100 mm of gravely dark brown hardstand material over massive light brown medium clay down to 1,200+ mm. Soil chemistry testing revealed the soils are non-acidic and are unlikely to be dispersive.

1.3 Proposed Wastewater Management System

Penrith City Council's *On-site Sewage Management and Greywater Reuse Policy* (2014) was used to calculate the daily expected wastewater load for this development. The figure for "Rural Factories and Shopping Centers" with access to tank water has been used to estimate the likely wastewater load. SEEC has been informed that there will be no more than 35 staff onsite per day and no more than three visitors to the site per day. As all staff and visitors will have access to the toilets and basins, the estimated wastewater load is 30 L/person/day. Therefore the design daily wastewater flow has been calculated as 38 persons x 30 L/day = 1140 L/day.

It is proposed to decommission the existing septic tank and absorption system and to install an approved Aerated Wastewater Treatment System (AWTS) to secondary-treat all wastewater generated in the proposed site office and proposed amenities block. If the required fall between the amenities block and AWTS cannot be achieved to allow gravity drainage to the AWTS, a 1,100 L pump well must be installed next to the amenities block to pressure-dose wastewater into the AWTS (Figure 1). Secondary-treated effluent from the AWTS will then be disposed of by semi-fixed surface spray irrigation. Hydraulic modelling requires a minimum EMA of 570 m^2. However, nutrient modelling requires a minimum total EMA of 1,040 m^2. This calculation has been based on the assumption that the vegetation over the EMA will be maintained as unmanaged lawn (i.e. pasture). This is considered the conservative approach in Penrith City Council. The larger of these areas must be adopted. Therefore, the total EMA will be 1,040 m^2 of semi-fixed surface spray irrigation built to the requirements of AS/NZS1547:2012 and be located in the position shown in Figure 1.

1.4 Conclusions and Recommendations

We conclude the site is suited to dispose secondary-treated effluent by semi-fixed spray irrigation. Specifically, our recommendations are:

1. To decommission the existing septic tank and absorption area;
2. To strip the hardstand material off the proposed EMA;
3. To apply a minimum 200 mm of good quality topsoil over the entire EMA and immediately establish a good cover of vegetation (preferably pasture grasses);
4. To install an approved AWTS to secondary-treat all wastewater generated in the proposed site office and amenities block;
5. To install at least "three-star" plumbing fixtures, or better, in the proposed site office and amenities block to reduce wastewater loads;
6. If gravity drainage cannot be achieved from the amenities block to the AWTS, install a 1,100 L pump well to pressure-dose wastewater generated in the amenities block to the AWTS;
7. To ensure that no other structures (existing or planned) are connected to the proposed AWTS;
8. As per Figure 2, install 1,040 m^2 of semi-fixed surface spray irrigation built to the requirements of AS/NZS1547:2012 (in the area shown in Figure 1, following the details in Figure 2) to dispose treated wastewater from the AWTS;
9. To maintain a good cover of vegetation (preferably pasture grass) over the entire EMA;

10. To protect the EMA from vehicle access (fence off if necessary);
11. To erect a minimum of two Warning Signs along the edge of the EMA. Refer to Section 6.8;
12. To preferentially select low phosphorus, liquid detergents; and
13. To install and manage the wastewater system according to the details of this report, its appendices and the manufacturer's recommendations.

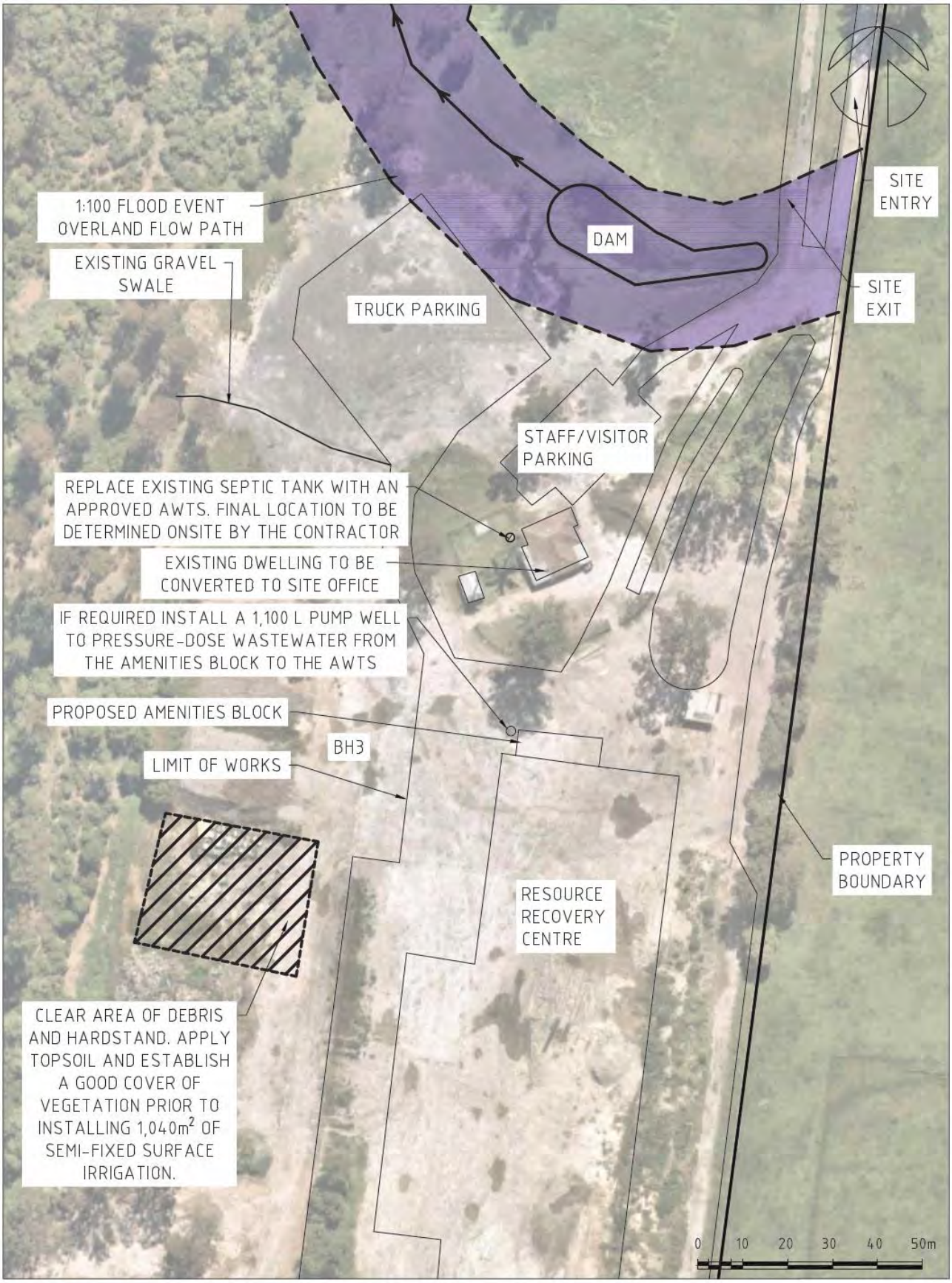

Figure 1 - Site map and Effluent Management Area. This Figure must be read in conjunction with the accompanying report by SEEC.

2 SITE DETAILS

Table 1 Site details.

Site Address	Lot 5 DP 655046 No. 344 Park Road, Wallacia
GPS Reading	N. -33.873174 E. 150.67821
Developer	Carlo Ranieri & Associates Pty Ltd
Developer Address	203-233 Chain O Ponds Road, Mulgoa
Developer Phone	-
Allotment Size	20 ha (approx.)
Proposed Development	Recycling Facility
Water Supply	Tank
Local Government Authority	Penrith City Council

Table 2 Design wastewater loading rates (Penrith City Council, 2014)

Source	Typical wastewater flow allowance in L/person/day	
	On-site roof water tank supply	Reticulated community or a bore-water supply
Motels/hotels		
• guests, resident staff	120	150
• non-resident staff	30	40
• reception rooms	20	30
• bar trade (per customer)	20	25
• restaurant (per diner)	20	30
Community halls		
• banqueting	20	35
• meetings	10	15
Restaurants (per diner)		
• dinner	20	30
• lunch	15	25
Tea Rooms (per customer)		
• without restroom facilities	10	15
• with restroom facilities	15	25
School (pupils plus staff)	30	40
Rural factories, shopping centres	30	50
Camping grounds		
• fully serviced	100	130
• recreation areas	50	65
Note: *1 These flows are minimum rates unless actual flows from past experience can be demonstrated.*		

2.1 Design Wastewater Loading

It is proposed to build a Recycling Facility at this site. The facility will have no more than 35 staff present per day with no more than three visitors per day. Therefore, the Design Wastewater Loading Rate is 1,140 L/day (Penrith City Council, 2014).

3 PHYSICAL SITE ASSESSMENT

The site and soil evaluation has been undertaken following AS/NZS 1547:2012: *On-site Domestic Wastewater Management,* Sections 2.1 & 2.2 of the WaterNSW's *Designing and Installing On-Site Wastewater Systems* (2019) and Appendix 2 of the Environment & Health Protection Guidelines: *On-site Sewage Management for Single Households* (the 'Silver Book', Department of Local Government, 1998).

3.1 Climate

Climate is an important factor in onsite wastewater management. It is particularly important when designing irrigation areas as the dual parameters of incidental rainfall and evaporation have a direct effect on the required size. Areas that have high evaporation and low rainfall are better suited to effluent management by irrigation than those with a cold and/or wet climate. In particularly wet and/or cold areas, wet weather storage might be required, especially during the winter months. We have found the site is in an area where evaporation exceeds rainfall for most, if not all of, the year.

3.2 Flood Potential

It is required to locate all effluent management areas (EMAs) above the 1:20 ARI flood level. This is to reduce the risk of effluent being transported off the site. In addition all electrical components, vents and inspection holes must be located above the 1:100 ARI flood level. This might involve locating the electrical components remote from the tanks, e.g. on a wall or similar. According to Penrith City Council's flood information for this site, the EMA is more than 0.5m above the 1% AEP (equivalent to the 100-year ARI) local catchment overland flow path and has been located 40 m away from this feature (Figure 1 and Appendix 1).

3.3 Exposure

Sun and wind exposure on the EMA must be maximised to help with evaporation. Factors that affect this are local topography, vegetation and the built environment. Improper location of an EMA in the shade can reduce evaporation by up to 30 percent. We have found that the proposed EMA is subject to some shading due to the presence of existing trees. The trees must be removed prior to commissioning the EMA

3.4 Slope Gradient

Slope is an important parameter affecting the choice of effluent management systems. Excessive slope increases the risk of effluent leaving the site, particularly during wet weather. The design irrigation rates are adjusted to account for slope. We have found that slopes in the proposed EMAs are between 0 and 10 percent and so are suitable for all irrigation types. If cost is the main factor then surface spray irrigation might be the most economical.

3.5 Landform

Different landforms pose different limitations to effluent management. The risk of run-on and hence the risk of runoff from an EMA is directly related to the type of landform and

the position of the EMA on it. We have found that the proposed EMA is either on a crest or an upper side slope. Therefore, the risk of effluent runoff is considered low.

3.6 Run on and Seepage

Surface stormwater run-on must not be permitted onto an effluent management area. This is because it could transport effluent offsite and into receiving waters. In addition regular run-on might inhibit vegetative growth. We have found that there is either no risk, or a minimal risk, of stormwater running onto the proposed EMA.

3.7 Erosion Potential

Sites where there is active erosion must be avoided for effluent management. We have found that there are no signs of erosion at this well vegetated site.

3.8 Site Drainage

An EMA must not be placed in wet or damp areas. This is to reduce the risk of effluent leaving the site by either surface waters or groundwater. The type of vegetation and the condition of the soils give good indications of the site's drainage. We have found that there are no signs of moisture tolerant vegetation such as sedges, ferns or Juncus sp. In addition there are no signs of grey mottling in the subsoils within 500 mm of the surface.

3.9 Fill

The presence of fill might affect the choice of an effluent management system, particularly if very high or very low permeability soils have been imported. Fill might also be prone to settlement and might also be detrimental to the establishment of good vegetative cover. We have found that there are no signs of fill at this site.

3.10 Surface Rock

The presence of frequent rock outcrops and surface rock is usually an indication of shallow and variable soils and/or erosion. In such conditions it might be necessary to import soil to enable the establishment of a good vegetative cover suitable for irrigation. We have found the site has less than 10 percent rock outcrops.

3.11 Groundwater Use

The NSW Department of Health recommends that effluent management areas are not located within 250 m of bores that are used for domestic potable water. A search of WaterNSW's groundwater map did not identify any bores within close proximity to the EMA.

3.12 Vegetation

The suitability of the existing vegetation (if any) must be considered. The most common, and one of the most suitable, types of vegetation for effluent management is turf. Turf efficiently covers large areas and provides a good opportunity for evapotranspiration and nutrient uptake (particularly nitrogen). Some native vegetation, particularly that which has developed on poor sandy soils, will not respond well to nutrient-rich wastewater and, if possible, must be avoided or replaced with more suitable species. We have found the

existing vegetation onsite is improved pasture where the proposed EMAs have a poor cover of suitable vegetation. However, with some soil improvement it will be possible to establish it. Once the EMA is commissioned it is expected that the vegetation over it will be maintained as pasture grass.

3.13 Proximity to Watercourses

The proximity of natural watercourses or dams is one of the most important factors in the selection of an EMA. It will be necessary to maintain buffers anywhere from 40 m to 150 m between the EMA and a watercourse or dam.

A 40 m buffer is required between an EMA and a drainage depression or a dam, a 100 m buffer is required from a permanent or an intermittent watercourse.

Section 6.5 provides further information on buffer distances.

We have found that there are drainage depressions and a dam affecting the site (Figure 1). Once the small localised depression marked in Figure 1 has been filled in the proposed EMA will located outside the prescribed buffer distances to these features.

3.14 Land Availability

After summarising all of the above, particularly regarding buffer distances, land that is suitable for effluent management on site has been identified. We have found that more than enough land is suitable for effluent management. Figure 1 identifies the area(s) suitable for the effluent management system adopted. Effluent must not be applied outside of those areas, unless at the discretion of the supervising authority.

3.15 Stock Present

Stock can cause damage to irrigation systems and must be kept out of the EMA by fencing or other physical barrier. There are no stock present on this site.

3.16 Risk of Frost

Frost can affect the irrigation system. All distribution pipes must be well buried to protect them. All irrigation pipes must drain after pumping. There is minimal risk of frost on this site.

4 SOIL ASSESSMENT

The site and soil evaluation has been undertaken following AS/NZS 1547:2012: *On-site Domestic Wastewater Management* and Appendix 2 of the 'Environment & Health Protection Guidelines: *On-site Sewage Management for Single Households* (the 'Silver Book', Department of Local Government, 1998).

4.1 Geology and Soil Landscape

The eSPADE, 2020 mapping identifies the site to be on the Blacktown Soil Landscape.

4.2 Soil Description

4.2.1 Soil Profile Descriptions

Borehole 1

Layer 1	0	to	150	Greyish brown clay loam topsoil. 40 mm ribbon.
Layer 2	150	to	1,200+	Massive light brown medium clay. 75-90 mm ribbon.

Borehole 2

Layer 1	0	to	300	Strongly pedal dark brown clay loam topsoil. 35 mm ribbon.
Layer 2	300	to	700	Moderately pedal brown light/medium clay. 75 mm ribbon.
Layer 3	700	to	1,200+	Massive light brown medium clay. Mottled from 800 mm. 75+ mm ribbon.

Borehole 3

Layer 1	0	to	100	Gravelly dark brown hardstand material.
Layer 2	100	to	1,200+	Massive light brown medium clay. 75+ mm ribbon.

4.2.2 Soil Classification and Design Irrigation Rate

Table 3 Selected soil classification and corresponding design loading rate.

Soil Category	Soil Texture	Structure	Indicative Permeability		Design Irrigation Rate (DIR) (mm/day) (AS/NZS 1547:2012) Drip Irrigation 0-10% Slope
1	Gravels & Sands	Massive	>3.0		
2	Sandy Loams	Weak	>3.0		
		Massive	1.4 - 3.0		
3	Loams	High/ Moderate	1.5 - 3.0		
		Weak or Massive	0.5 - 1.5		
4	Clay Loams	High/ Moderate	0.5 - 1.5		
		Weak	0.12 - 0.5		
		Massive	0.06 - 0.12		
5	Light Clays	Strong	0.12 - 0.5		
		Moderate	0.06 - 0.12		
		Weak/ Massive	< 0.06		
6	Medium to Heavy Clays	Strong	0.06 - 0.5		
		Moderate	< 0.06		
		Weak/ Massive	< 0.06	x	2

4.3 Soil Constraints

4.3.1 Soil Depth to a Limiting Layer (e.g. bedrock or watertable)

Soil depth is an important factor in choosing a suitable effluent disposal method. The depth of soil is measured to a limiting layer - i.e. bedrock or a periodically high watertable (shown by grey mottling in the soils). Generally, soil is a very good medium for providing treatment to effluent. As the effluent passes through soil it is filtered and there is adsorption of chemicals (particularly phosphorous) onto the soil particles. In addition, this allows time for viruses to die (as they are usually outside of their preferred environment). At least 500 mm of soil is required to provide treatment in an irrigation area. We have found that the soil depth is more than 1.0 m. This is considered a minor limitation

4.3.2 Coarse Fragments

Coarse fragments are those over 2 mm in diameter. They can pose limitations to vegetative growth by lowering the soil's ability to supply water and nutrients. We have found that there are less than 20 percent coarse fragments present.

4.3.3 pH of Soils

The pH of a soil influences its ability to supply nutrients to vegetation. If the soil is too acidic vegetative growth would be inhibited. We have found that the pH of the soil is more than 6.0. This would not inhibit vegetative growth.

4.3.4 Electrical Conductivity

The electrical conductivity (EC) of the soil relates to the amount of salts present. A high salt concentration would inhibit vegetative growth. Electrical conductivity has been measured in deciSemens per metre (dS/m). We have found the electrical conductivity of the soil is less than 4 dS/m. This would not inhibit vegetative growth.

4.3.5 Emerson Aggregate Test (EAT)

The Emerson Aggregate Test (EAT) is a measure of soil dispersibility and susceptibility to erosion. It assesses the physical changes that occur to a single ped of soil when immersed in water - specifically whether it slakes and falls apart or disperses and clouds the water. We have classed the soil as Class 7 which means that the soil is unlikely to be dispersive.

4.3.6 Phosphorus Sorption

The capacity of a soil to adsorb phosphorus is expressed as its phosphorus sorption capacity. Soils with a high capacity to sorb phosphorous are preferred and can result in smaller application areas. The phosphorous sorption capacity is used in the nutrient balance. Values have been obtained from WaterNSW, 2019.

TOPSOIL Estimated P-Sorp (mg/kg) = 400
SUBSOIL Estimated P-Sorp (mg/kg) = 600

5 HYDRAULIC AND NUTRIENT BALANCE

Wastewater Volume	1140 (L/day)
Vegetation in EMA	Lawn - Unmanaged
Soil in EMA	Med-Heavy Clays

Hydraulic Balance

A=Q/DIR
Where:

A=Area (m^2)		
Q = Wastewater Flow =	1140	L/day
DLR=Design Irrigation Rate =	2	(mm/day)
Area Requred:		
A=	570	m^2

Nitrogen Balance

A = 3.65(C x Q) / Lx
Where:

A = Area (m^2)			
C = Concentration of Nutrient =	30	mg/L	
Q = Wastewater Flow =	1140	L/day	
Lx = Critical Loading Rate =	120	(Kg/ha/year)	
Area Required:			
A =	1040	m^2 of	Lawn - Unmanaged

Phosphorus Balance

$A=3.65(CxQ)/U_R+0.2d(1-n_p)G_sX_{sorp}$ Basalt soils?

Where:

Phosphorus Sorption (X_{sorp})=	600	mg/kg	
Design Soil Depth (d)=	0.8	mm	
Bulk Density	1.3	g/cm^3	
G_s=	2.65	g/cm^3	
P uptake (U_R)=	12	kg/ha/year	
Concentration of phosphorus =	12	mg/L	
Area Required:			
A =	365	m^2 of	Lawn - Unmanaged

Adapted from WaterNSW, 2015 and WaterNSW, 2019

6 RECOMMENDATIONS

6.1 Wastewater System

The following disposal method has been chosen by the client and/or is considered the most suitable:

Semi-fixed surface spray irrigation following treatment in an AWTS.

6.2 Sizing of the Disposal System

Hydraulic and nutrient balance modelling has been undertaken to determine the require irrigation area. The design irrigation rate (DIR) given in Section 4.2.2 has been adopted in the hydraulic balance. Hydraulic modelling requires a minimum EMA of 570 m^2. Nutrient modelling requires a minimum total EMA of 1,040 m^2. This calculation has been based on the assumption that the vegetation over the EMA will be maintained as pasture grass. This is considered the conservative approval in Penrith City Council. The larger of these areas must be adopted. Therefore, the total EMA will be 1,040 m^2 of semi-fixed spray irrigation built to the requirements of AS/NZS1547:2012 and located in the position shown in Figure 1.

6.3 Calculations and References

The hydraulic balance was calculated as per AS/NZS1547:2012. The nutrient balance was calculated per the WaterNSW document *Neutral or Beneficial Effect on Water Quality Assessment Tool CONSULTANTS AND CONSULTANT ADMINISTRATORS*, 2015. Calculations are based on pages 47-48.

6.4 Professional Construction

A typical irrigation design is given in Figure 2, however, a licensed irrigation contractor or plumber must be used to install the irrigation system. Council (or an approved certifier) will be responsible for monitoring the installation and ensuring it is done to the requirements of this document. The irrigation system must incorporate a flushing line connected to either the settling chamber of the AWTS or to a small absorption trench/pit. The effluent distribution pipe from the AWTS to the EMA must be buried at a minimum depth of 300 mm, and/or 500 mm when crossing an access way, and laid to maximise protection against mechanical damage or deformation. The distribution laterals in the EMA must be buried at a minimum depth of 100 mm or 250 mm for Category 6 subsoils. The installer must provide a pump of sufficient capacity to ensure even distribution of effluent throughout the EMA. If required an Auto/Manual Zone Sequencing Valve must be installed to ensure the even distribution of effluent over multiple irrigation fields. The licensed contractor will submit a certificate of installation that will clearly refer to this wastewater design. The certificate will be presented to Council.

6.5 Buffer Distances

DLG (1998) (The Silver Book) requires buffers to be maintained from an effluent management area to different land application areas. These are outlined in Table 4.

Table 4 Specified Buffer Distances.

All Systems	100 m to permanent waters (rivers and lakes) 40 m to intermittent water features (watercourses, depressions, dams and 1:100 flood level overland flow path) 250 m to potable water bores
Spray Irrigation	6 m if area upslope and 3 m if area downslope of property boundaries and driveways 15 m to dwellings 3 m to walkways and paths 6 m to swimming pools
Subsurface and Drip Irrigation	6 m if area upslope and 3 m if area downslope of swimming pools, boundaries driveways and buildings

6.6 Detergent Use

Liquid detergents must be used in the household as powders contain elevated concentrations of salt which could alter the soil's chemistry and reduce its ability to percolate water. All cleaning products must be "Septic Friendly".

6.7 Water Saving Fixtures

This design assumes at least three-star rated plumbing fixtures are used in any new home.

6.8 Signs

A minimum if two Warning Signs must be installed along the edge of the EMA. The signs shall read “WARNING: RECLAIMED EFFLUENT/RECYCLED WATER, DO NOT DRINK, AVOID CONTACT” or similar. Lettering must be clearly visible from three meters away.

7 SYSTEM DESIGN

Note: The system design might be altered slightly by the Conditions of Consent - it is important to check these before work commences.

This design assumes a certain design wastewater load. It will be invalidated if that load were to significantly increase (>10 percent): This might occur due to (but not limited to):

- If a spa bath or in-sink food grinder were installed.
- If a home is occupied by more than 2 persons per bedroom.
- If water fixtures are not at least three-star rated.
- If plumbing leaks are not attended to.

The design is warranted to meet the required design guidelines and standards at the time of writing. However, that does not preclude the requirement of the land owner to satisfactorily use and maintain the system to the requirements of the manufacturers and to the generic guidelines given in the following Appendix. In particular there are requirements to:

- Ensure that only "septic-friendly" substances are disposed into the system (materials and chemicals).
- Periodically (once per 3-5 years) clean out the septic tank or septic chamber of the AWTS.
- Regularly (once per three months) clean the septic outlet filter or the in-line filter.
- Regularly (once per three months) manually flush the system.
- Periodically (one per year) check the disposal area for signs of seepage.
- Periodically (one per year) check the upslope diversion drain (if applicable) to ensure stormwater is adequately diverted.

Your system will be inspected as required by Council. The Wastewater Contractor must inspect both the treatment system and the disposal area following the checklist given in Appendix 1 and submit the results to Council. Should there be a problem with your system you must initially consult the licensed contractors who installed the system and/or your regular maintenance contractor.

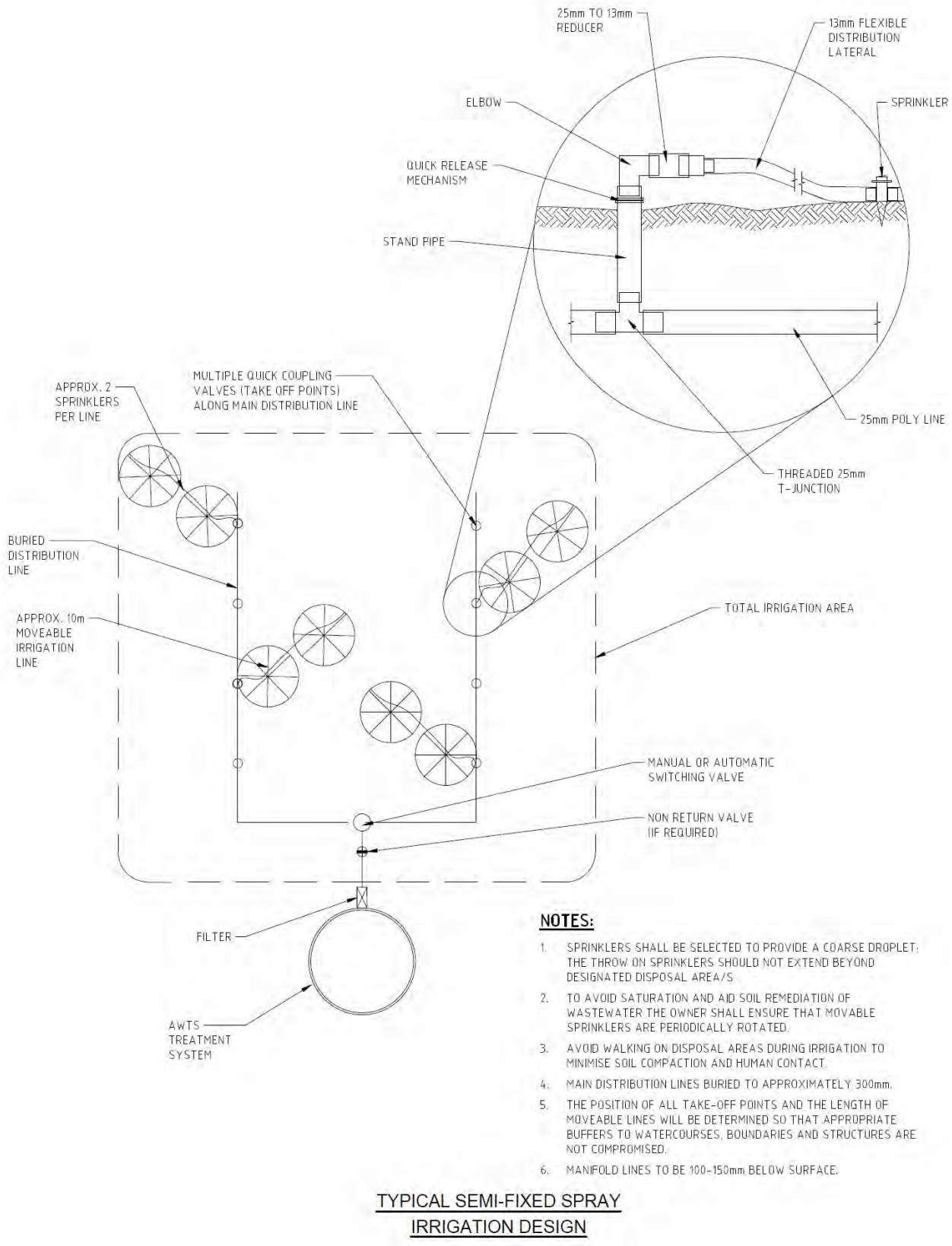

Figure 2 – Proposed Disposal System (Typical details). This Figure must be read in conjunction with the accompanying report by SEEC.

8 REFERENCES

Department of Local Government (1998). Environment and Health Protection Guidelines: *Onsite Sewage Management for Single Household.*

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9 APPENDICES

9.1 Appendix 1: Penrith City Council Overland Flow Path

PENRITH

Our reference: ECM 9081647
Contact: Dr Elias Ishak
Telephone: (02) 4732 7579

2 April 2020

Ms Kim Passfield
68-70 Station Street
BOWRAL NSW 2576

Dear Ms Passfield

Flood Level Enquiry
Lot 5 DP 655046 - No. 344 Park Road, Wallacia

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7579.

Yours sincerely

Dr Elias Ishak
Acting Engineering Stormwater Supervisor

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

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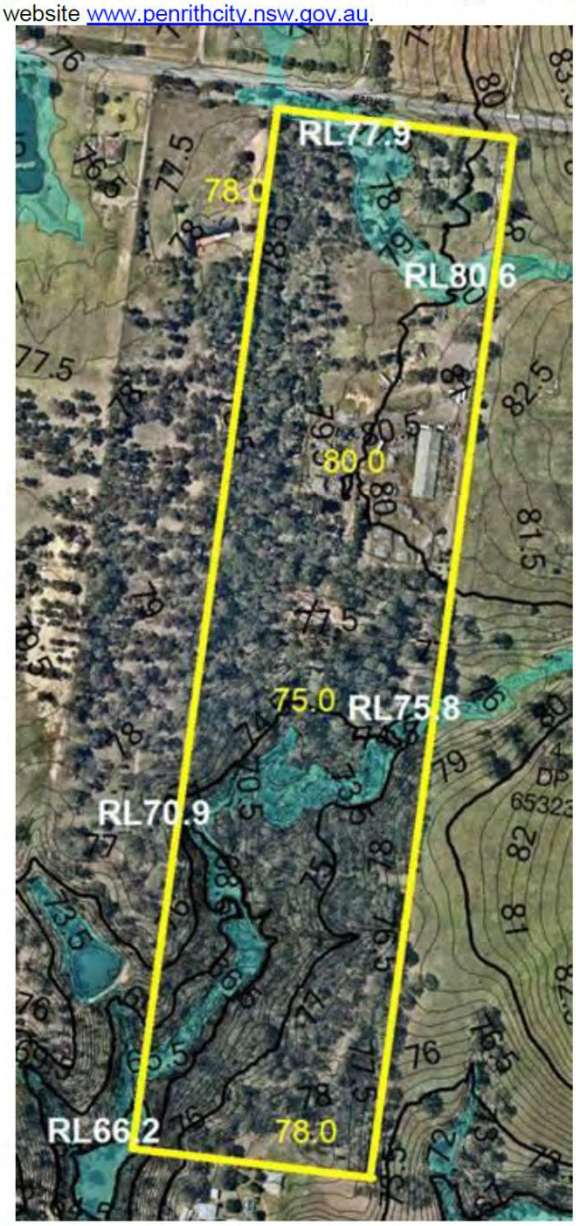
Flood Information
Lot 5 DP 655046 - No. 344 Park Road, Wallacia

Date of issue: 2 April 2020

The 1% AEP local overland flow flood levels affecting the above property are as indicated on the map below in white colour.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website www.penrithcity.nsw.gov.au.



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Definitions
AEP – *Annual Exceedance Probability* – the chance of a flood of this size occurring in any one year.
AHD – *Australian Height Datum* – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

PENRITH CITY COUNCIL

PENRITH

Legend

	Extent of 1% AEP local catchment overland flow path. Generally depths less than 150mm is not shown.

Notes:

1. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.

2. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.

3. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.

4. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1", "2". As such you should carry out and rely upon your own investigations.

Dr Elias Ishak
Acting Engineering Stormwater Supervisor

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9.2 Appendix 2: Annual Checklist for Owners

Checklist 13.2 Operation inspection(1) of land application area for use by service agents, Council inspectors and system owners				
Does the system owner have a set of plans of the irrigation system and an Operational and Maintenance Manual?			☐ Yes	☐ No
Land Application Area				
Is there evidence of irrigation area damage by vehicle, livestock or domestic animal activities?	☐ Yes	☐ No	Comment:	
Is a good vegetation cover established over the effluent irrigation area?	☐ Yes	☐ No	Comment:	
Are there any green or boggy areas or surface ponding of effluent liquid in the irrigation area?	☐ Yes	☐ No	Comment:	
Are there dry areas or areas lacking vegetation in the irrigation area?	☐ Yes	☐ No	Comment:	
Is the effluent irrigation area associated with an unpleasant smell that would suggest untreated or poorly treated effluent is being used to irrigate?	☐ Yes	☐ No	Comment:	
Has the effluent irrigation area been mown to maintain the grass short?			☐ Yes	☐ No
Treatment and Irrigation System				
Is any stormwater run-on effectively diverted around the irrigation area?			☐ Yes	☐ No
Is the irrigation pump working?			☐ Yes	☐ No
Is the irrigation system working without leaks?			☐ Yes	☐ No
Has the effluent irrigation area been back flushed?			☐ Yes	☐ No
Have the irrigation filters been checked and cleaned?			☐ Yes	☐ No
Does the system require air bleeding?			☐ Yes	☐ No
If an automatic sequencing valve is fitted, does it appear to switch between the different fields sequentially?			☐ Yes	☐ No
If a manual valve is fitted, has it been switched between the different fields?			☐ Yes	☐ No
Is the irrigation area still adequately protected from livestock, vehicles, children etc through the use of fencing, or shrub barriers etc.			☐ Yes	☐ No
Is there any inappropriate use of the irrigation area eg vegetable growing?			☐ Yes	☐ No
Note, if as a system owner, you answered 'No' to any of the above questions, or there are any other problems, you should contact your service provider immediately.				
Service provider: **Contact number:**				

9.3 Appendix 3: Fact Sheets for Owners

Managing Wastewater In Your Backyard

DO

- ✓ Learn how your sewage management system works and its operational and maintenance requirements.
- ✓ Learn the location and layout of your sewage management system.
- ✓ Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- ✓ Keep a record of desludgings, inspections, and other maintenance.
- ✓ Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- ✓ Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- ✓ Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

DON'T

- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with effluent.
- ✗ Don't extract untreated groundwater for cooking and drinking.
- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System
Your Aerated Wastewater Treatment System
Your Composting Toilet
Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an off-site management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard
2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

Septic Tank
Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

AWTS
Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

Composting Toilets
Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

Your Aerated Wastewater Treatment System

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your AWTS. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system entering a nearby river, creek or dam.

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.

Your AWTS is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your AWTS. Ensure that these problems are attended to immediately to protect your health and the environment.

Look out for the following warning signs:

- Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- Water backing up into your sink which may indicate that your system is already failing.
- Wastewater pooling over the land application area.
- Black coloured effluent in the aerated tank.
- Excess noise from the blower or pumping equipment
- Poor vegetation growth in irrigated area.

Odour problems from a vent on the AWTS can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained AWTSs are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your treatment system you can do your part in helping to protect the environment and the health of you and your family.

If you would like more information please contact:

Aerated Wastewater Treatment Systems (AWTS)

In unsewered areas, the proper treatment and utilisation of household wastewater on-site is critical in preserving the health of the public and the environment. AWTS have been developed as a way of achieving this.

What is an AWTS?

An AWTS is a purpose built system used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

It consists of a series of treatment chambers combined with an irrigation system. An AWTS enables people living in unsewered areas to treat and utilise their wastewater.

How does an AWTS work?

Wastewater from a household is treated in stages in several separate chambers. The first chamber is similar to a conventional septic tank. The wastewater enters the chamber where the solids settle to the bottom and are retained in the tank forming a sludge layer. Scum collects at the top, and the partially clarified wastewater flows into a second chamber. Here the wastewater is mixed with air to assist bacteria to further treat it. A third chamber allows additional clarification through the settling of solids, which are returned for further treatment to either the septic chamber (as shown) or to the aeration chamber. The clarified effluent is disinfected in another chamber (usually by chlorination) before irrigation can take place.

Bacteria in the first chamber break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the chamber and must be pumped out periodically.

Regulations and recommendations

Local councils are primarily responsible for approving the smaller, domestic AWTSs in their area. The Environment Protection Authority (EPA) approves larger units, whilst the NSW Department of Health determines the design and structural requirements for all AWTSs.

At present AWTSs need to be serviced quarterly by an approved contractor at a cost to the owner. Local councils should also maintain a register of the servicing of each system within their area.

AWTSs should be fitted with an alarm having visual and audible components to indicate mechanical and electrical equipment malfunctions. The alarm should provide a signal adjacent to the alarm and at a relevant position inside the house. The alarm should incorporate a warning lamp which may only be reset by the service agent.

Cross section of an AWTS

Maintaining your AWTS

The effectiveness of the system will, in part, depend on how it is used and maintained. The following is a guide on good maintenance procedures that you should follow:

DO

- ✓ Have your AWTS inspected and serviced four times per year by an approved contractor. Assessment should be applicable to the system design.
- ✓ Have your system service include assessment of sludge and scum levels in all tanks, and performance of irrigation areas.
- ✓ Have all your tanks desludged at least every three years.
- ✓ Have your disinfection chamber inspected and tested quarterly to ensure correct disinfectant levels.
- ✓ Have your grease trap (if installed) cleaned out at least every two months.
- ✓ Keep a record of pumping, inspections, and other maintenance.
- ✓ Learn the location and layout of your AWTS and land application area.
- ✓ Use biodegradable liquid detergents such as concentrates with low sodium and phosphorous levels.
- ✓ Conserve water.

DON'T

- ✗ Don't put bleaches, disinfectants, whiteners, nappy soakers and spot removers in large quantities into your AWTS via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't use more than the recommended amounts of detergents.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't switch off power to the AWTS, even if you are going on holidays

Your Land Application Area

Maintaining your land application area

The effectiveness of the application area is governed by the activities of the owner.

DO

- ✓ Construct and maintain diversion drains around the top side of the application area to divert surface water.
- ✓ Ensure that your application area is kept level by filling any depressions with good quality top soil (not clay).
- ✓ Keep the grass regularly mowed and plant small trees around the perimeter to aid absorption and transpiration of the effluent.
- ✓ Ensure that any run off from the roof, driveway and other impermeable surfaces is directed away from the application area.
- ✓ Fence irrigation areas.
- ✓ Ensure appropriate warning signs are visible at all times in the vicinity of a spray irrigation area.
- ✓ Have your irrigation system checked by the service agent when they are carrying out service on the treatment system.

DON'T

- × Don't erect any structures, construct paths, graze animals or drive over the land application area.
- × Don't plant large trees that shade the land application area, as the area needs sunlight to aid in the evaporation and transpiration of the effluent.
- × Don't plant trees or shrubs near or on house drains.
- × Don't alter stormwater lines to discharge into or near the land application area.
- × Don't flood the land application area through the use of hoses or sprinklers.
- × Don't let children or pets play on land application areas.
- × Don't water fruit and vegetables with the effluent.
- × Don't extract untreated groundwater for potable use.

Warning signs

Regular visual checking of the system will ensure that problems are located and fixed early.

The visual signs of system failure include:

- surface ponding and run-off of treated wastewater
- soil quality deterioration
- poor vegetation growth
- unusual odours

Volume of water

Land application areas and systems for on site application are designed and constructed in anticipation of the volume of waste to be discharged. Uncontrolled use of water may lead to poorly treated effluent being released from the system.

If the land application area is waterlogged and soggy the following are possible reasons:

- ^ Overloading the treatment system with wastewater.
- ^ The clogging of the trench with solids not trapped by the septic tank. The tank may require desludging.
- ^ The application area has been poorly designed.
- ^ Stormwater is running onto the area.

HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained land application areas are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your sewage management system you can do your part in helping to protect the environment and the health of you and your family.

For more information please contact:

LAND APPLICATION AREAS

The reuse of domestic wastewater on-site can be an economical and environmentally sound use of resources.

What are land application areas?

These are areas that allow treated domestic wastewater to be managed entirely on-site.

The area must be able to utilise the wastewater and treat any organic matter and wastes it may contain. The wastewater is rich in nutrients, and can provide excellent nourishment for flower gardens, lawns, certain shrubs and trees. The vegetation should be suitably tolerant of high water and nutrient loads.

How does a land application area work?

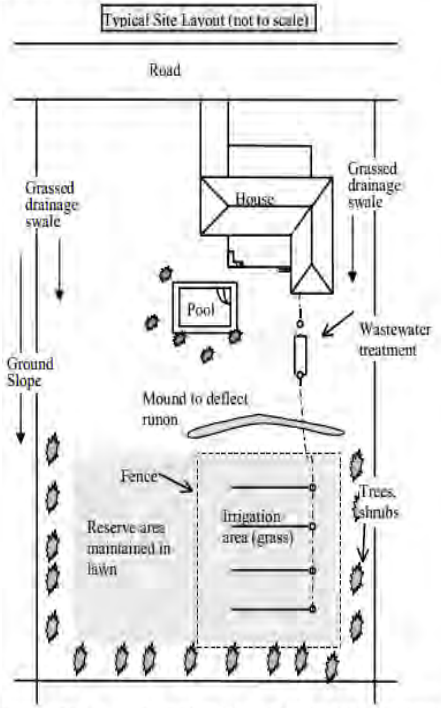
Treated wastewater applied to a land application area may be utilised or simply disposed, depending on the type of application system that is used. The application of the wastewater can be through a soil absorption system (based on disposal) or through an irrigation system (based on utilisation).

Soil absorption systems do not require highly treated effluent, and wastewater treated by a septic tank is reasonable as the solids content in the effluent has been reduced. Absorption systems release the effluent into the soil at a depth that cannot be reached by the roots of most small shrubs and grasses. They rely mainly on the processes of soil treatment and then transmission to the water table, with minimal evaporation and up-take by plants. **These systems are not recommended in sensitive areas as they may lead to contamination of surface water and groundwater.**

Irrigation systems may be classed as either subsurface or surface irrigation. If an irrigation system is to be used, wastewater needs to be pre-treated to at least the quality produced by an aerated wastewater treatment system (AWTS).

Subsurface irrigation requires highly treated effluent that is introduced into the soil close to the surface. The effluent is utilised mainly by plants and evaporation.

Surface irrigation requires highly treated effluent that has undergone aeration and disinfection treatments, so as to reduce the possibility of bacteria and virus contamination.



The effluent is then applied to the land area through a series of drip, trickle, or spray points which are designed to eliminate airborne drift and run-off into neighbouring properties.

There are some public health and environmental concerns about surface irrigation. There is the risk of contact with treated effluent and the potential for surface run-off. Given these problems, subsurface irrigation is arguably the safest, most efficient and effective method of effluent utilisation.

Regulations and recommendations

The design and installation of land application areas should only be carried out by suitably qualified or experienced people, and only after a site and soil evaluation is done by a soil scientist. Care should be taken to ensure correct buffer distances are left between the application area and bores, waterways, buildings, and neighbouring properties.

Heavy fines may be imposed under the Clean Waters Act if effluent is managed improperly.

At least two warning signs should be installed along the boundary of a land application area. The signs should comprise of 20mm high Series C lettering in black or white on a green background with the words:

RECLAIMED EFFLUENT
NOT FOR DRINKING
AVOID CONTACT

Depending on the requirements of your local council, wet weather storage and soil moisture sensors may need to be installed to ensure that effluent is only irrigated when the soil is not saturated.

Regular checks should be undertaken of any mechanical equipment to ensure that it is operating correctly. Local councils may require periodic analysis of soil or groundwater characteristics

Humans and animals should be excluded from land application areas during and immediately after the application of treated wastewater. The longer the period of exclusion from an area, the lower the risk to public health.

The householder is required to enter into a service contract with the installation company, its agent or the manufacturer of their sewage management system, this will ensure that the system operates efficiently.

Location of the application area

Treated wastewater has the potential to have negative impacts on public health and the environment. For this reason the application area must be located in accordance with the results of a site evaluation, and approved landscaping must be completed prior to occupation of the building. Sandy soil and clayey soils may present special problems.

The system must allow even distribution of treated wastewater over the land application area.

EIS Appendix 5: Water Cycle Management Report

WATER CYCLE MANAGEMENT REPORT

344 PARK ROAD WALLACIA

PROJECT NO:7410

VERSION R.2

CANBERRA
Level 1 Equinox 4
Kent Street
DEAKIN ACT 2600
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SYDNEY
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PARRAMATTA NSW 2150
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G01/35
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Prepared By:	Troy Nguyen	Date:	05/08/2021
Reviewed By:	Kha Nguyen	Date:	06/08/2021
Approved By:	Darren Flynn	Date:	06/08/2021

Base Template:	Version B October 2018

External Issue

Revision Control Register			
DSR Version No:	**Issue Date:**	**Issued To:**	**Name:**
Version R.0	07/05/2020	Penrith City Council	Council Engineer
Version R.1	28/09/2020	Penrith City Council	Council Engineer
Version R.2	06/08/2021	Penrith City Council	Council Engineer

Version Amendment Record

Document	**Outline of Amendments**	**Amended By**	**Date Amended**
Version R.0	First document issue for DA approval	DG	07/05/2020
Version R.1	Address Council RFI dated 16 July 2020	DG	28/09/2020
Version R.2	Address Council RFI dated 17 May 2021	TN	05/08/2021

Internal Circulation

Circulation To:	Initial
PD Engineer to amend	TN
S Engineer to review 1'st draft	KN
A Director to review final report	DF

TABLE OF CONTENS

ACRONYMS AND ABBREVIATIONS

AEP	ANNUAL EXCEEDANCE PROBABILITY
AHD	AUSTRALIAN HEIGHT DATUM
CL	CONTINUOUS LOSS
DA	DEVELOPMENT APPROVAL
GIS	GEOGRAPHIC INFORMATION SYSTEM
GPT	GROSS POLLUTANT TRAP
IL	INITIAL LOSS
LGA	LOCAL GOVERNMENT AUTHORITY
MUSIC	MODEL FOR URBAN STORMWATER IMPROVEMENT CONCEPTUALISATION
OSD	ONSITE DETENTION
POI	POINT OF INTEREST
PSD	PERMISSIBLE SITE DISCHARGE
SCMA	SYDNEY CATCHMENT MANAGEMENT AUTHORITY
WSUD	WATER SENSITIVE URBAN DESIGN
LEP	LOCAL ENVIRONMENTAL PLAN

1. INTRODUCTION

This Water Cycle Management Report has been prepared to support a Development Application to council pre lodgement advice ref PL/0115 at 344 Park Road Wallacia.

The scope of this report includes an assessment of the water cycle management requirements to support the proposed development. Accordingly, this report includes findings of the assessment and proposes a best practice water cycle management strategy.

1.1 SITE

The site is 344 Park Road Wallacia (Lot 5 DP655046) is located on the southern side of Park Road. The Lot site has total area of 20.15Ha with the north eastern portion of subject site is developed RU1 Primary Production zone under Penrith LEP 2010. The lot site is located in the Duncan Creek catchment with creek forming the south boundary of the lot site and existing local overland flow travel across the subject site towards north western boundary to Mulgoa Creek catchment.

The site falls evenly from RL 80m AHD at the eastern boundary of the site to RL 78m AHD on the western boundary. The south eastern of lot site, the subject site area 2.76 Ha has been substantially cleared from previous uses and is covered with grass, bitumen, single house and trees.

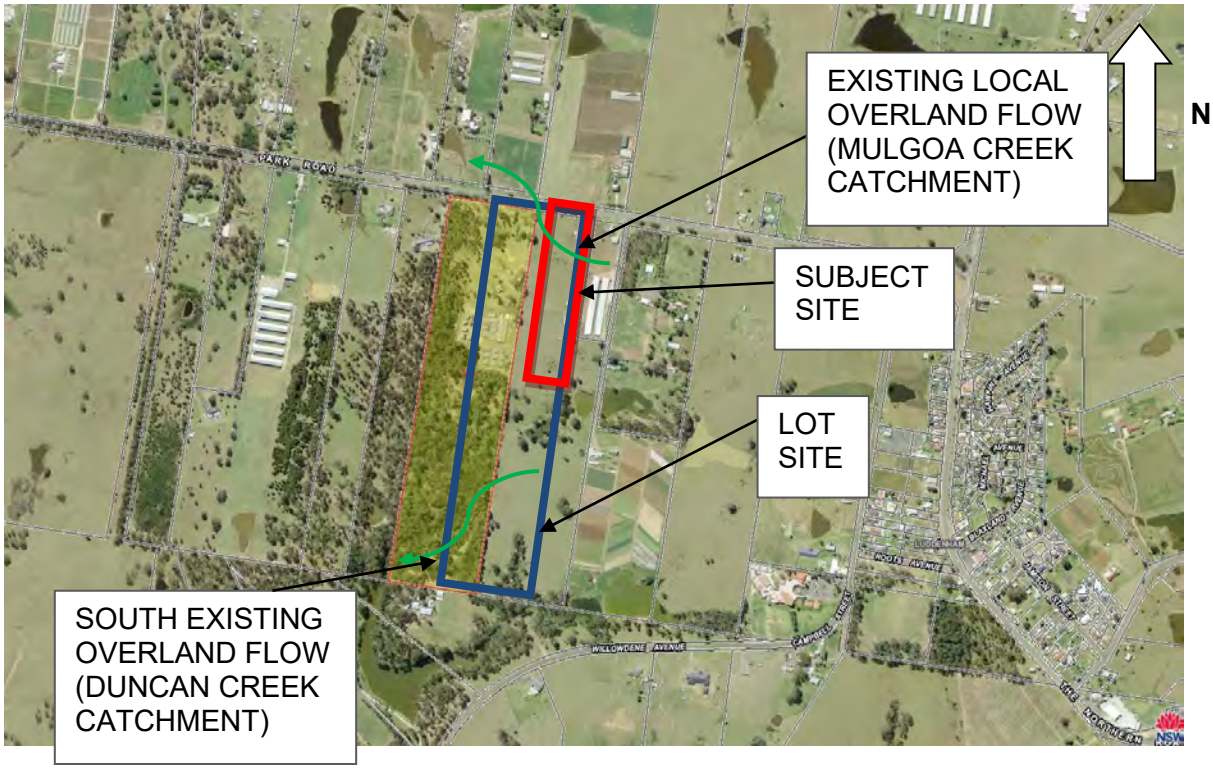


Figure 1.1 - Locality Map

SOURCE: SIXMAP

1.2 PROPOSED DEVELOPMENT

The proposed development is to build resource recovery facility means a building used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste and temporary storage. The future use comprises of a private road, building, landscape/pavement and existing house as shown in Appendix A.

To address the Council's stormwater requirements for on-site detention and storm water quality treatment ie: Bioretention, Gross Pollutant Trap and rainwater tank are to be built as described in Onsite Detention and Water Quality Strategy section.

Proposed culverts and to maintain existing riparian corridor within overland flow path travel under proposed internal road within subject site which as per council advise will be described in Overland flow Analysis section.

Engineering concept design on the proposed water cycle management strategy are provided in figure 1.2 below below to comply with council planning requirement.

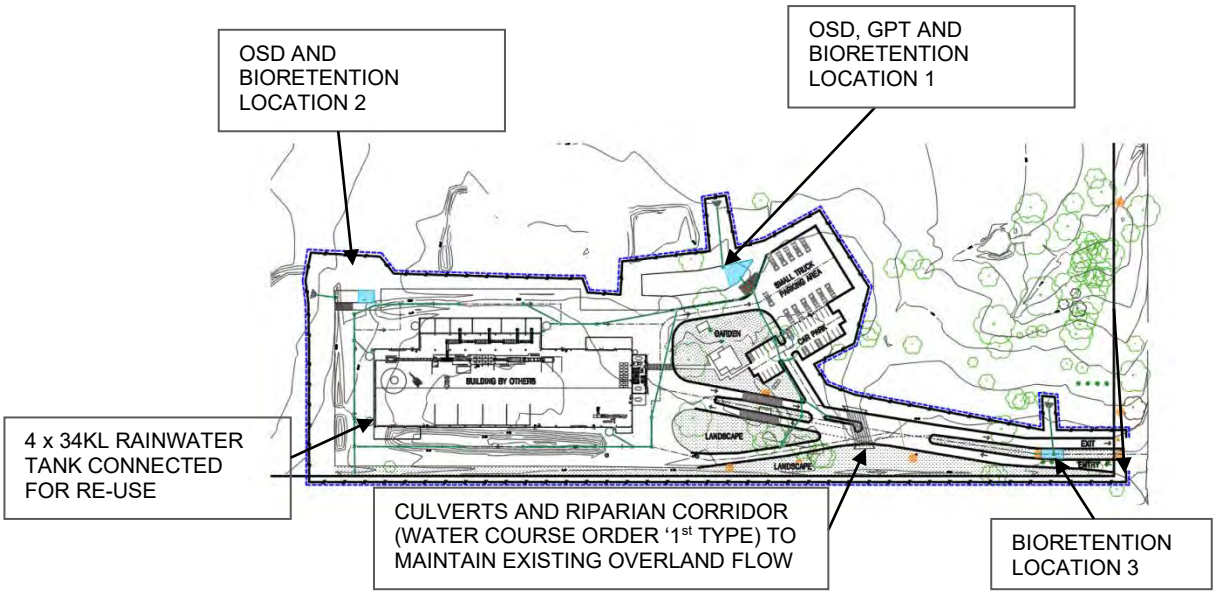


Figure 1.2 – Proposed Stormwater Drainage SOURCE: ENGINEERING CONCEPT PLAN

2. COUNCIL REQUIREMENTS

The site is located within the Penrith City Council LGA and as such the following specific requirements and guidelines have been adopted:

- Pre-Logdment Advice Ref; PL17/0115 dated 23 November 2017
- Penrith Development Control Plan 2014

- Penrith Stormwater Drainage Policy ES002 dated 28 November 2016
- Penrith City Council WSUD Technical Guidelines Addendum 1 – Deemed to Comply Toolkit dated June 2015 (Version 1)
- Guidelines for Riparian Corridors on Waterfront lands – NSW Department of Primary Industries Office of Water
- Penrith Flood Information dated 26 March 2020

3. STORMWATER ANALYSIS OVERVIEW

To determine the appropriate discharge control for the site and external flow, QGIS water shed analysis was used to define an existing stream flow and subcatchment within lot site. As seen from figure 3.1 below, there are 3 local streamflows arriving from subject site.

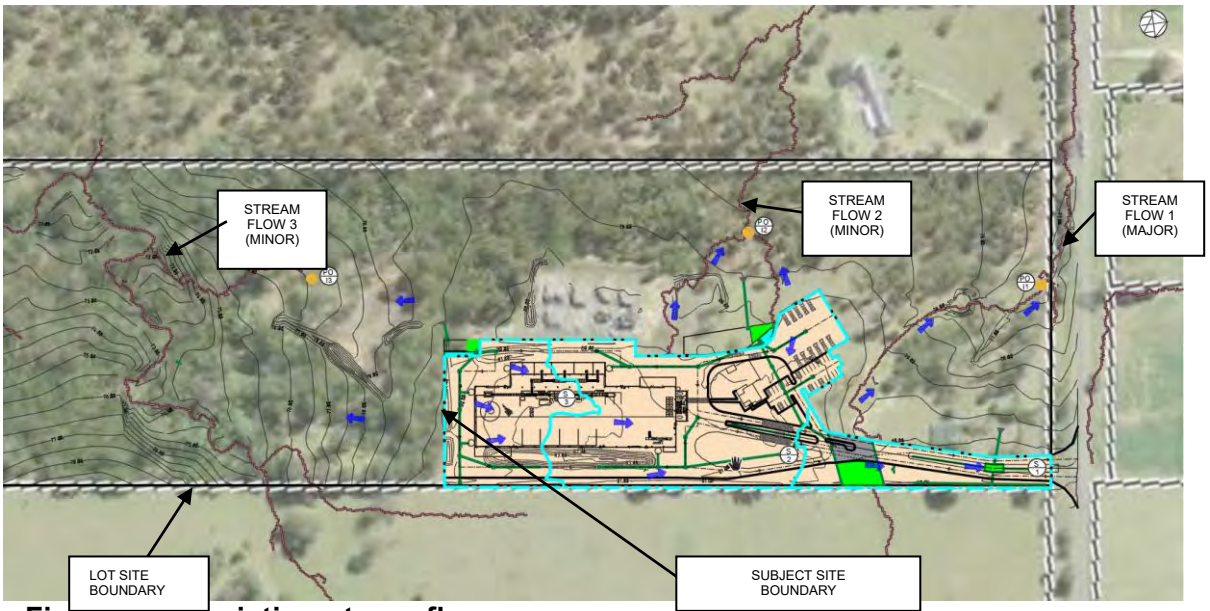


Figure 3.1 – existing streamflow source: QGIS watershed

The purpose of this analysis is to maintain existing major streamflow 1 by constructing proposed culverts for internal road.

As per Penrtih Onsite Detention Policy, DRAINS hydrological computer software was set up to maintain permissible site discharge and site storage requirement for subject site.

A site specific MUSIC model was developed to analyse the stormwater quality treatment train. These models are discussed in the following sections.

3.1 HYDROLOGICAL ANALYSIS

3.1.1 Hydrological model setup

The IFD data was obtained from IFD 1987 for subject site location as the following Table 3.1 below.

Table 3.1 – IFD1987 data

2_{I_1}	$^{2}I12$	$^{2}I72$	50_{I_1}	$50_{I_{12}}$	$50_{I_{72}}$	F2	F50	G
29.29	6.65	1.93	59.52	13.24	4.39	4.3	15.79	0.02

The DRAINS parameter shall be used as the following table 3.2

Table 3.2 –DRAINS Parameter

HORTON/ILSAX TYPE HYDROLOGY MODEL	
Paved (impervious) area depression storage (mm)	1
Supplementary area depression storage (mm)	1
Grassed (pervious) area depression storage (mm)	5
Soil Type	3
Overland flow Use	Kinematic wave equation

3.2 CATCHMENT AREAS

A Combination of orthophoto map imagery, GIS information, detailed survey and confirmation was used to determine the internal and external catchment areas into the existing site conditions. The total drainage area to the outlet receiving nodes (RN1 & RN2) are shown in figure 3.2 below.

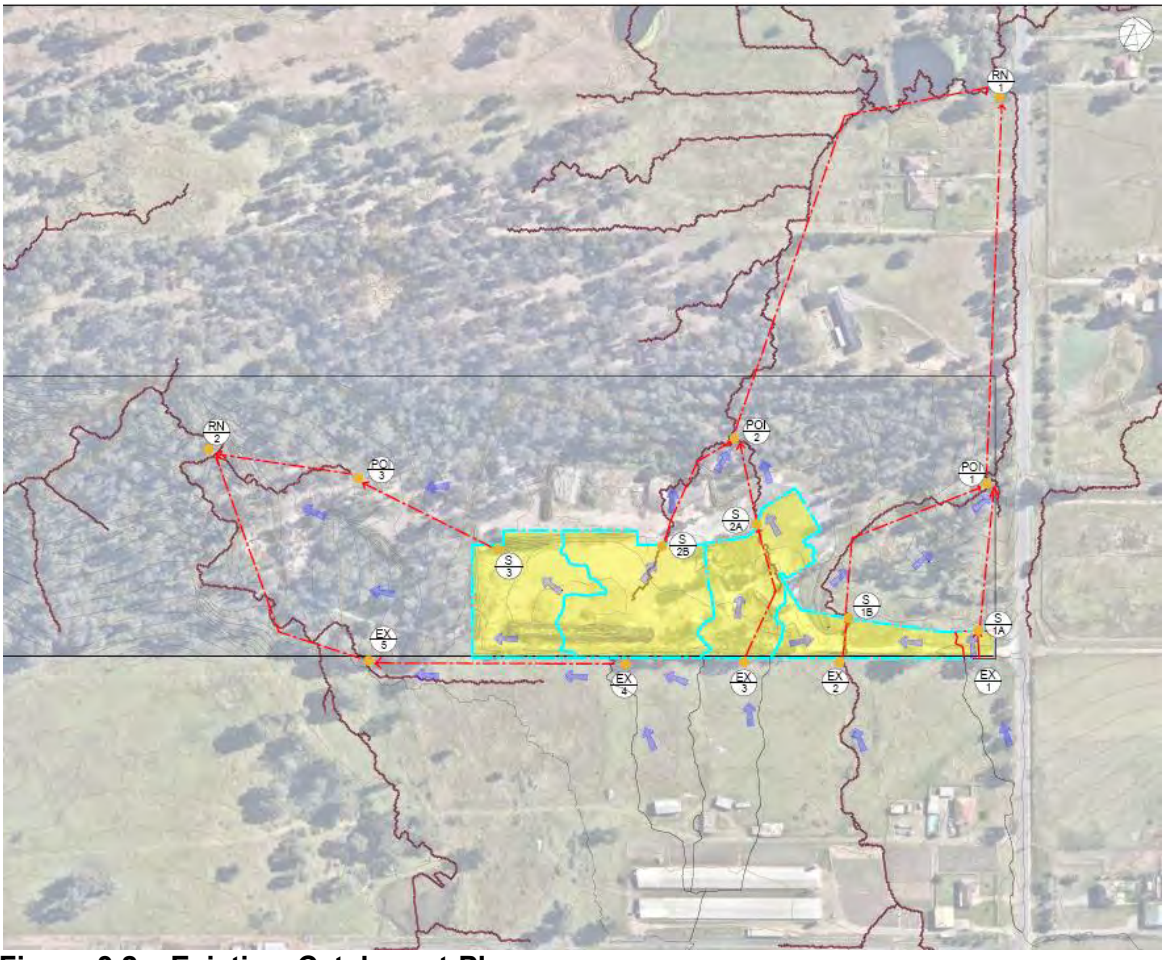


Figure 3.2 – Existing Catchment Plan Source: QGIS Model

The catchment is divided into internal and external (upstream) subcatchments as in Table 3.3.

Table 3.3 – Existing Subcatchment

SUBCATCHMENT ID	SUBCATCHMENT	AREA (Ha)
INTERNAL		
S1A	EXISTING	0.057
S1B	EXISTING LAND	0.413
S2A	EXISTING HOUSE	0.703
S2B	EXISTING HOUSE	0.951
S3	EXISTING	0.652
	TOTAL	2.777
EXTERNAL		
EX1	EXISTING	0.444
EX2	EXISTING	13.505
EX3	EXISTING	0.840
EX4	EXISTING	0.702
EX5	EXISTING	1.814
	TOTAL	17.305

3.3 EXISTING FLOWS

The existing flows at RN1 (middle west boundary) and RN2 (south west boundary) are critical locations and the adopted Permissible Site Discharge (PSD) for the site (Existing) at is summarised in table 3.4:

Table 3.4 – Permissible Site Discharge

FLOW SUMMARY NODE RN1

STORM EVENTS AEP (%)	EXISTING (m^3/s)
0.5EY	1.325
0.2EY	2.401
10	2.953
5	3.686
2	4.416
1	5.16

FLOW SUMMARY NODE RN2

STORM EVENTS AEP (%)	EXISTING (m^3/s)
0.5EY	0.386
0.2EY	0.638
10	0.777
5	0.953
2	1.142
1	1.326

4. OVERLAND FLOW ANALYSIS ON PROPOSED INTERNAL ROAD

Flood information from council shown that 1%AEP local overland flow flood level as indicated on the map below in white colour RL does not affect proposed building and only impact on the proposed driveway.

Figure 4.2 1%AEP Flood Level

Source: Council Flood Information

The protection, restoration of vegetated riparian corridors is important for maintaining the shape, stability and ecological functions of a watercourse and overland flow channel.

According to watercourse type in sixmap, this existing watercourse does not exhibit the features of a defined channel with bed bank. Therefore, the watercourse under the proposed driveway is not waterfront land for the purposes of Water Management Act. However, 10m riparian corridor both side and 6.6m wide existing channel will be maintained in landscape area.

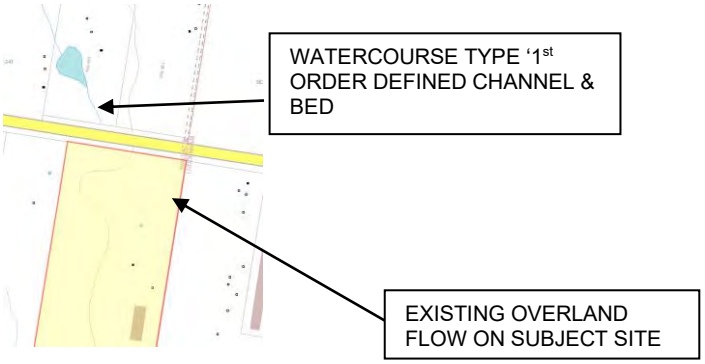


Figure 4.1 Watercourse Type map

Source: Six Map

4.1 PROPOSED CULVERT

The existing overland flow channel width is maintained by designing new culverts underneath proposed driveway as shown in Figure 4.2:

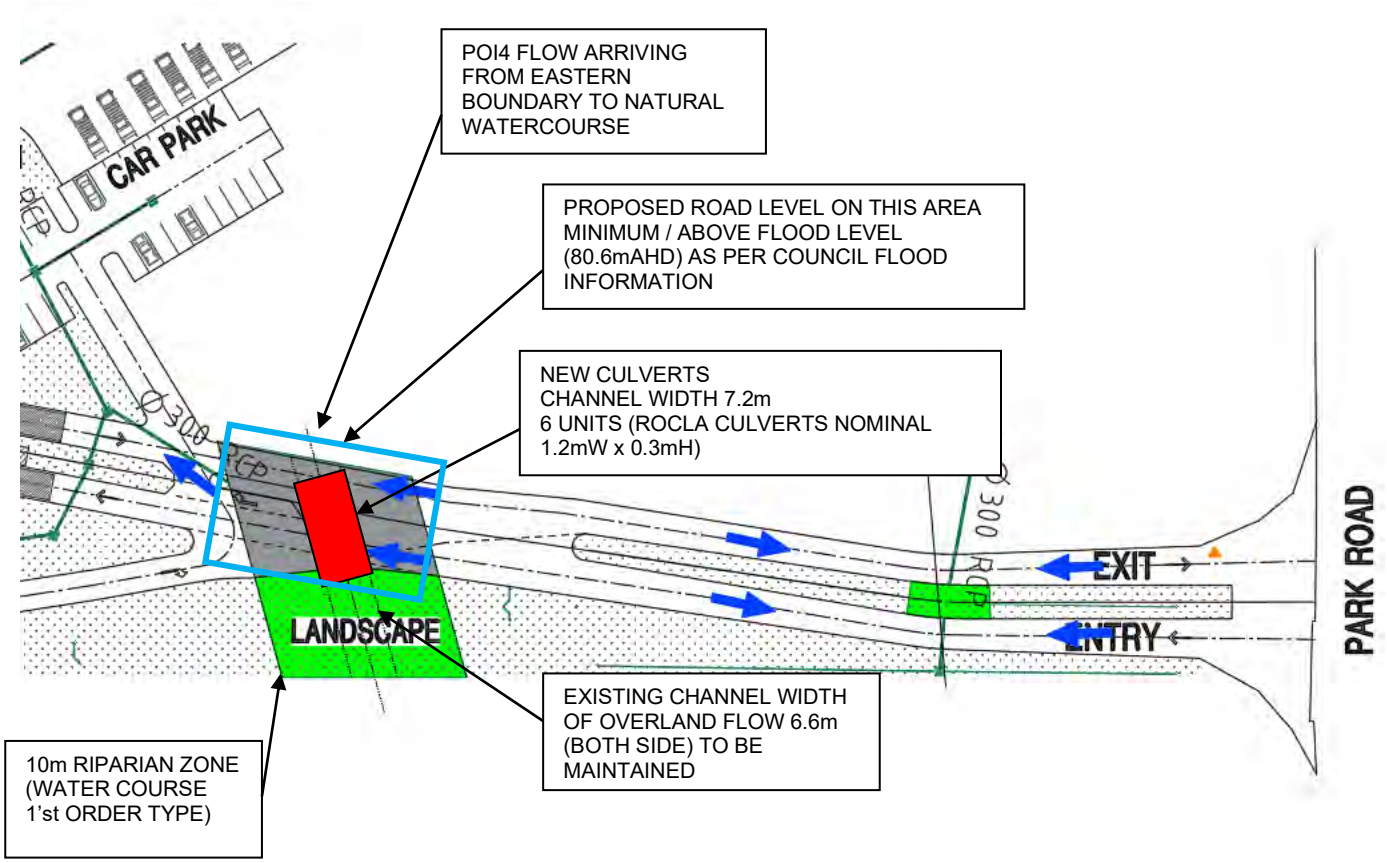


Figure 4.2 – New Culverts Location

Source: Engineering Plan

Refer to engineering drawing sheet no 7410-DA-415 for culvert design calculation and detailed drawing.

4.1.1 UPSTREAM CATCHMENT

Upstream catchment flow into node POI4 is approximately 14.99Ha

Table 4.1 – OVERLAND FLOW CATCHMENT SCHEDULE

SUBCATCHMENT ID	SUBCATCHMENT	AREA (Ha)
INTERNAL		
E	LANDSCAPE	0.206
EXTERNAL		
EX1	EXISTING	0.444
EX2	EXISTING	13.505
EX3	EXISTING	0.840
TOTAL		14.995

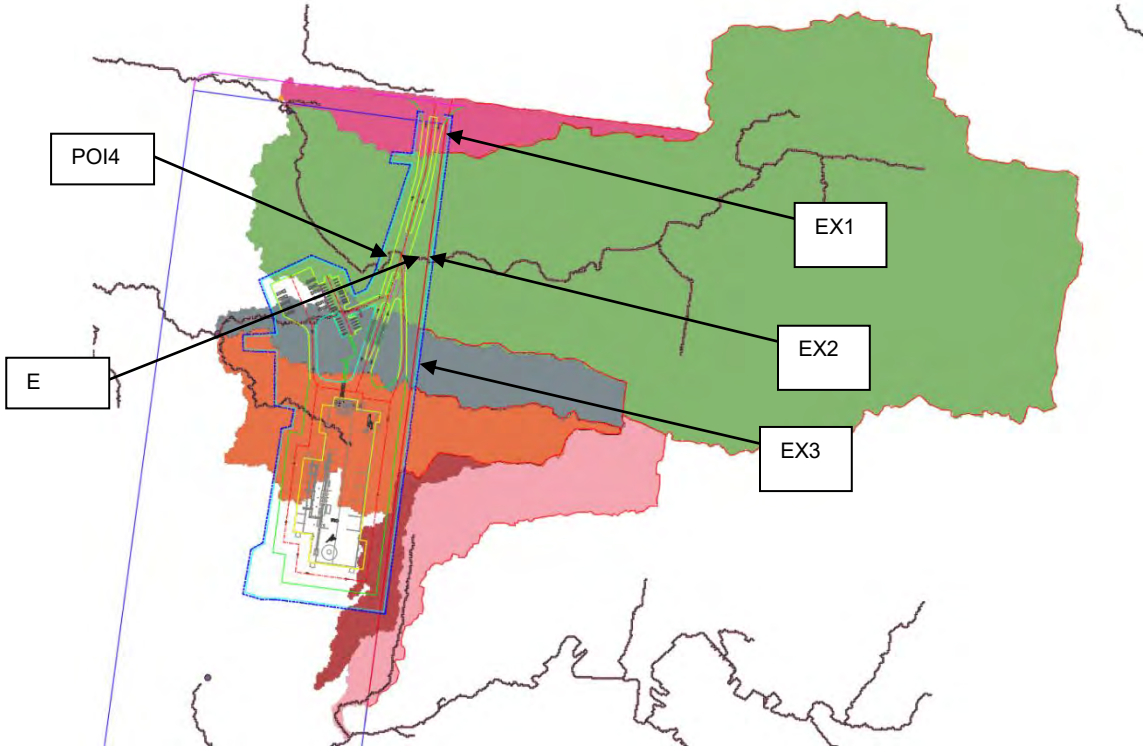


Figure 4.3 Upstream Catchment Source QGIS watershed analysis

The upstream inflow arriving at POI4 flow was calculated in a DRAINS model.

Table 4.1 – FLOW SUMMARY NODE POI4

STORM EVENTS AEP (%)	FLOW (m3/s)
0.5EY	1.03
0.2EY	1.89
10	2.41
5	3.08
2	3.76
1	4.39

5. ONSITE DETENTION DESIGN

Given the configuration of existing streamflow through the site, 2 OSD are required to locate in middle and southern west boundary to maintain permissible site discharge as per existing discharge point. The proposed internal road area at northern side primarily is bypass discharged to north western boundary.

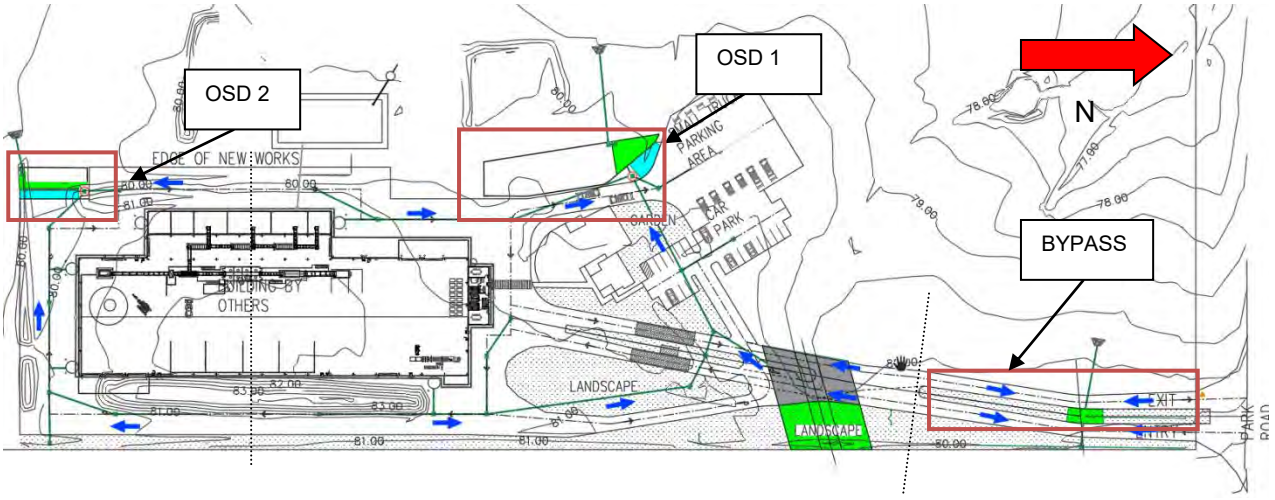


Figure 5.1 Engineering Concept Plan

Source Engineering Plan

The developed case DRAINS model has been structured to simulate the post-development flows from the site with a simplified predevelopment model. Whilst this model is of a uncomplicated structure, it provides a robust indication of the stormwater runoff and storage requirements, as well as readily comparing the pre and post development flows from the site. The design DRAINS model layout is shown in Appendix B

To determine a compliance with the OSD requirement (which is to compare the total peak post development flow rates with the predevelopment for a range of storm events) the basin's outlets will need to be capable of detaining the range of flows for all these events. In the event of total blockage of the outlet pipe from the basin, an emergency overflow weir is provided and it will drain into the open space at the bottom of the site and into the existing watercourse.

The table below summarises the peak flow from the developed site compared to the PSD:

Table 5.1 – FLOW SUMMARY

Source: DRAINS Output

FLOW SUMMARY NODE RN1

STORM EVENTS AEP (%)	PRE_DEVELOPMENT (m^3/s)	POST DEVELOPMENT (WITH OSD) (m^3/s)
0.5EY	1.325	1.143
0.2EY	2.401	2.048
10	2.953	2.605
5	3.686	3.325
2	4.416	4.028
1	5.16	4.686

FLOW SUMMARY NODE RN2

STORM EVENTS AEP (%)	PRE_DEVELOPMENT (m^3/s)	POST DEVELOPMENT (WITH OSD) (m^3/s)
0.5EY	0.386	0.38
0.2EY	0.638	0.581
10	0.777	0.694
5	0.953	0.842
2	1.142	0.997
1	1.326	1.145

Table 5.2 – Post Development Flow & Onsite Detention 1

Source: DRAINS Output

AEP (%)	STORM EVENTS YEAR ARI	Q ENTRY m3/s	Q EXIT m3/s	Q REDUCTION m3/s	PONDING DEPTH m	WATER LEVEL mAHD	VOLUME m3	ORIFICE mm
0.5EY	2	0.276	0.103	0.173	0.24	79.44	338.24	400
0.2EY	5	0.353	0.138	0.215	0.28	79.48	370.51	400
10	10	0.393	0.176	0.217	0.32	79.52	410.28	400
5	20	0.495	0.215	0.28	0.4	79.6	475	400
2	50	0.62	0.239	0.381	0.5	79.7	559.05	400
1	100	0.701	0.258	0.443	0.58	79.78	635.88	400

OSD RL BASE 79.2

Table 5.3 – Post Development Flow & Onsite Detention 2

Source: DRAINS Output

AEP (%)	STORM EVENTS YEAR ARI	Q ENTRY m3/s	Q EXIT m3/s	Q REDUCTION m3/s	PONDING DEPTH m	WATER LEVEL mAHD	VOLUME m3	ORIFICE mm
0.5EY	2	0.139	0.093	0.046	0.32	79.12	76.5	280
0.2EY	5	0.157	0.103	0.054	0.39	79.19	89.7	280
10	10	0.17	0.108	0.062	0.42	79.22	96.5	280
5	20	0.187	0.114	0.073	0.47	79.27	105.9	280
2	50	0.204	0.126	0.078	0.52	79.32	116.6	280
1	100	0.22	0.125	0.095	0.57	79.37	126.5	280

OSD RL BASE 78.8

To detain the post development flows to pre-development conditions an OSD basin as shown in table 5.4 and DRAINS Output in Appendix B

Table 5.4 – Post Development Flow & Onsite Detention

Source: DRAINS Output

BASIN 1%AEP	BASIN VOLUME REQUIRED (m3)	MAXIMUM BASIN STAGE (m)	BASIN VOLUME PROVIDED (m3)
OSD 1	635.88	0.58	692
OSD 2	126.5	0.57	154
TOTAL	762.38		

6. STORMWATER QUALITY TREATMENT

6.1 PROPOSED TREATMENT MEASURES

This WSUD strategy has been developed in accordance with the Penrith City Council's requirements and guidelines, as well as industry best practice. The proposed treatment trains consists of the following table 6.1:

Table 6.1 – MUSIC Treatment Train Source: MUSIC treatment Node

TREATMENT TRAIN	TYPE	UNIT	SIZE	QTY
BIORETENTION 1	400 mm FILTER MEDIA	m2	100	1
BIORETENTION 2	400 mm FILTER MEDIA	m2	50	1
BIORETENTION 3	400 mm FILTER MEDIA	m2	50	1
GPT SPEL	VORTCEPTOR SVI.055M	N/A	1	1
GPT SPEL	VORTCEPTOR SVI.025	N/A	1	1
RAINWATER TANK	RT-40 KINGSPAN	kL	40KL *	4

* Rainwater tank was designed with 20% LOSS (32KL)

Bioretention's and GPT SPEL (or approved equivalent) located near the private road for future maintenance access. Refer to Appendix D WSUD Maintenance Activity. This system has been designed to manage the pollutant loads from the site to meet the required targets.

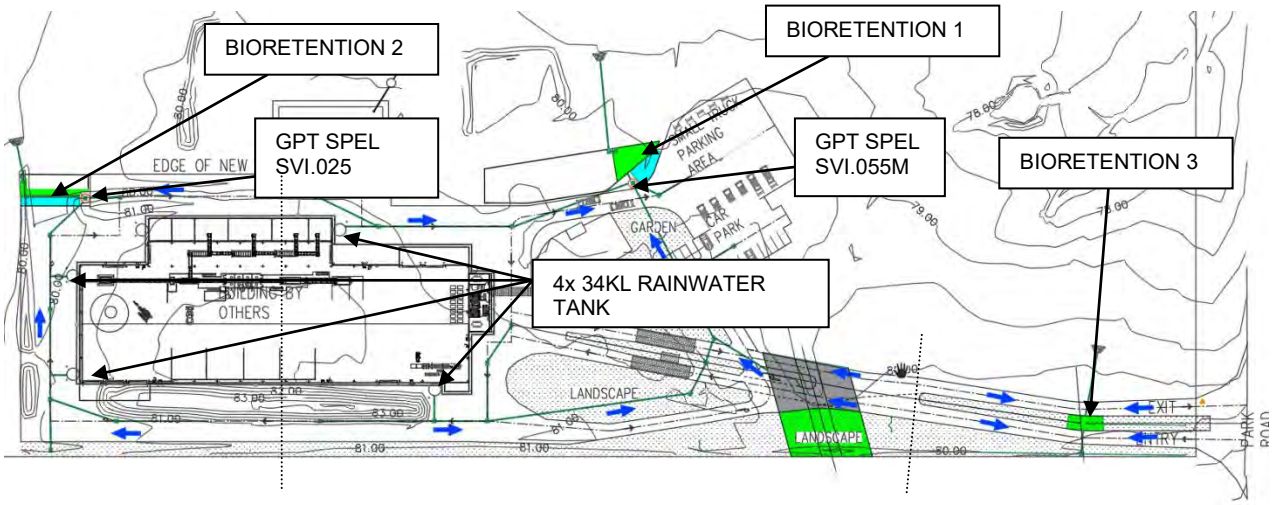


Figure 6.1 Concept Plan Source Engineering Plan

The treatment train for the site has been modelled using the MUSIC stormwater quality modelling software, as required by Council. The modelling parameters have been adopted from Penrith City Council MUSIC Link template for all inputs including rainfall and evaporation, rainfall-runoff, pollution generation and treatment node parameters.

The objective of the WSUD strategy is to capture the following percentage of the following pollutant loadings:

- Total Suspended Solids 85 %
- Total Phosphorus 60 %
- Total Nitrogen 45 %

- Total Gross Pollutant 90 %

6.2 PROPOSED TREATMENT MEASURES

This WSUD strategy prescribes the use of 3 major components, as described below.

6.2.1 Bioretention

A standard biorientation consists of 400mm depth filter media planted to collect stormwater runoff from driveway. The total filter area is 200m^2 with 300 mm Extension Detention Depth are located in 3 different locations on each outflow.

6.2.2 Rainwater Tanks

At this stage, the MUSIC model has a four x 34KL tank to simulate stormwater harvesting for washing facility building ie: floor at daily use and toilet. An overflow from the tank is to be connected to the stormwater system and conveyed to the stormwater management system for the site. It is assumed 100% Roof catchment drains to rainwater tank. Half or roof area drain to OSD 1 and the other half drain to OSD 2.

The water demand is estimated for industrial development is as follows:

Table 6.2 - Water Reuse Calculation Source: Blacktown Council Developer HandBook Water Sensitive Urban Design pg 92

DEMAND USE TYPE	NO	RATE	UNIT	TOTAL DEMAND	UNIT
WASHING MACHINE FACILITY	1	100	kL/day	100	kL/day
TOILETS	3	0.1	KL/day/toilet	0.3	kL/day
				100.3	kL/day

6.2.3 Gross Pollutant Trap (GPT)

The proposed GPT SPEL Vortceptor (refer to Appendix D) or equivalent also can take into account industrial catchment characteristics, hydraulic site, system capacities, velocity, backwater as well as the location of services and access for maintenance shown in Figure 6.2 below as inline system.

ISOMETRIC VIEW

Figure 6.2 – GPT Inline Structure Source: SPEL info

The MUSIC model layout is shown in Figure 6.3.

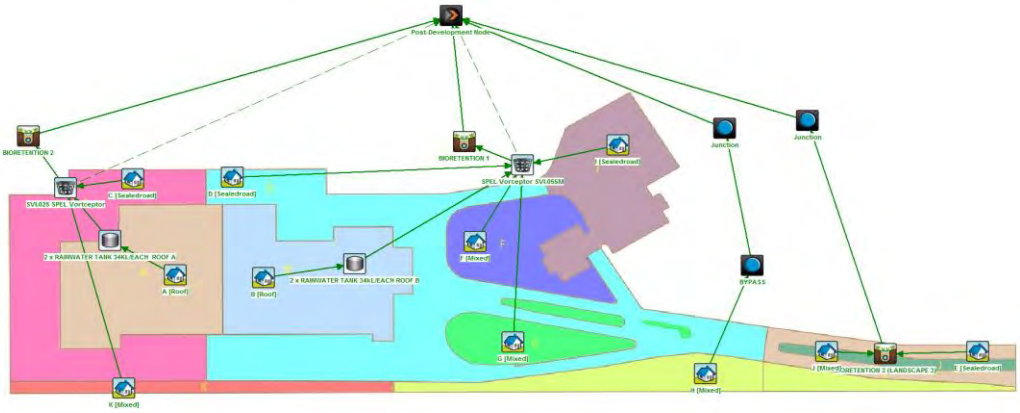


Figure 6.3 – MUSIC MODELLING – Post Development Source: MUSIC Model

6.3 RESULTS

The estimated treatment train effectiveness is summarised in the table below:

Table 6.3 – MUSIC Result Source: MUSIC Output

POLLUTANT DICHARGE TREATMENT	SOURCES	RESIDUAL LOAD	% REDUCTION
Flow (ML/yr)	13.8	9.95	27.9
Total Suspended Solids (kg/yr)	3340	356	89.4
Total Phosphorus (kg/yr)	6	1.45	75.7
Total Nitrogen (kg/yr)	32	13.6	57.3
Gross Pollutants (kg/yr)	380	2.54	99.3

Refer Appendix C to MUSIC link result.

7. CONCLUSION

This report is submitted for Council's review and approval and should be read in conjunction with the water cycle plan drawings submitted for a planning proposal of proposed works.

Based on the proposed stormwater drainage concept the key features are:

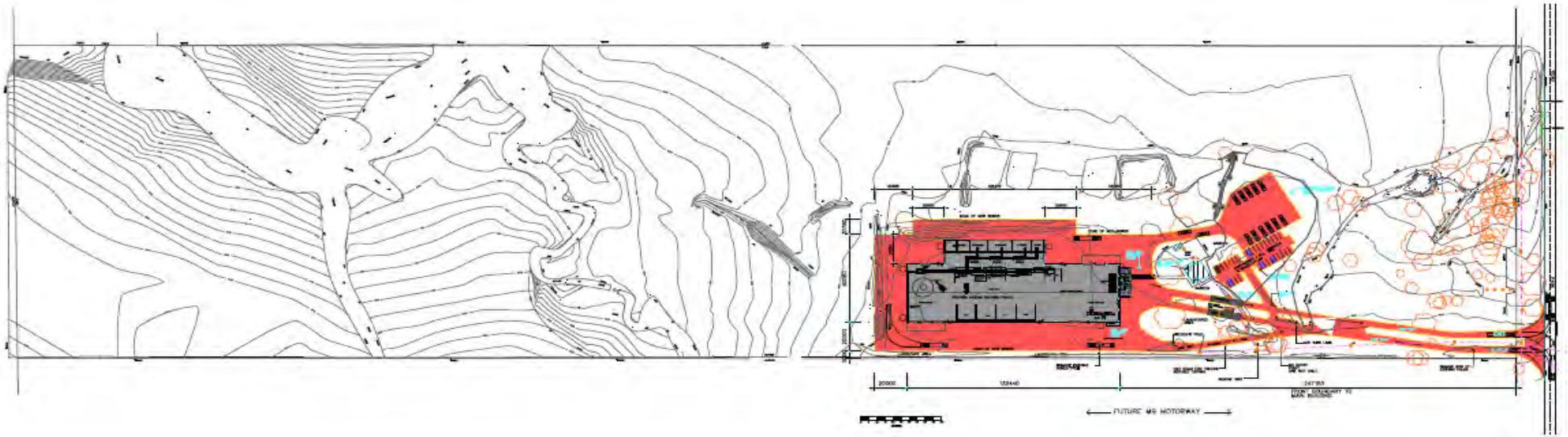
- Post-development flows will be attenuated to at least pre-development rates for the range of events up to the 1% AEP event.
- An OSD basin will be provided with a minimum detention total volume of 754.9m^3.
- 4 units 34KL Rainwater tank will capture the runoff from the 100% roof areas and reused onsite.
- 3 units of bioretentions total area 200m^2
- 2 units GPT SPEL VORTCEPTOR or equivalent will be provided to remove gross pollutants.
- 6 units Culverts channel width 7.2m to maintain an existing overland flow arriving on middle Eastern boundary as shown in flood map do not impact to a proposed

internal road access at developed site.

It is therefore concluded that the drainage design for the site addresses the Council's water cycle management requirements for the development.

APPENDIX A

CONCEPT LAYOUT PLAN



APPENDIX B

DRAINS MODEL RESULT

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
B7-1	80.62			0.033		0.01	0.009 Inlet Capacity
B1-6	80.47			0.121		0	0.123 Outlet System
B1-5	80.34			0.132		0.01	0.088 Inlet Capacity
B1-4	80.07			0.16		0	0.204 Outlet System
B1-3	80.01			0.271		0.06	0.097 Inlet Capacity
B1-2	79.91			0.374		0.01	0.282 Inlet Capacity
B1-1	79.4			0		0.74	None
OUTLET TO OSD1	79.28			0.282			
A1-1	80.3			0.081		0.02	0.024 Inlet Capacity
OUTLET DISCHARGE 3	79.45			0.024			
B2-7	80.9			0.043		0	0.045 Outlet System
B2-6	80.9			0.087		0	0.08 Outlet System
B2-5	80.9			0.159		0	0.143 Outlet System
B2-4	80.9			0.143		0	0.151 Outlet System
B2-3	80.9			0.203		0	0.202 Outlet System
B2-2	80.66			0.355		0.01	0.233 Inlet Capacity
B2-1	80.1			0.255		0	0.276 Outlet System
C3-1	80.17			0.036		0	0.13 Outlet System
C1-5	80.45			0		0.45	0 None
C1-4	80.83			0.115		0.07	None
C1-3	80.76			0.13		0.14	0.031 Inlet Capacity
C1-2	80.28			0		0.7	None
C1-1	80.11			0		0.79	None
C1-0	79.63			0		0.4	None
DISCHARGE OUTLET TO O	79.13			0			
B3-3	80.9			0.04		0	0.037 Outlet System
B3-2	80.9			0.126		0	0.139 Outlet System
B3-1	80.9			0.139		0	0.124 Inlet Capacity
C1-7	80.9			0.039		0	0.018 Inlet Capacity
C1-6	80.87			0.034		0.03	0 None
B1-9	80.53	80.62		0.029	1.7	0	0.005 Outlet System
B1-8	80.47			0.056		0	0.076 Outlet System
B1-7	80.47			0.122		0	0.121 Outlet System
C2-2	80.88			0.025		0.02	0.004 Inlet Capacity
C2-1	80.81			0.043		0.09	0 None
B6-1	80.22			0.027		0	0.058 Outlet System
B5-1	80.16			0.031		0.05	0 None
B4-1	79.92			0.057		0	0.034 Inlet Capacity
OUTLET DISCHARGE OSD1	78.65			0			
OUTLET DISCHARGE OSD2	78.29			0			

SUB-CATCHMENT DETAILS

Name	Max Flow Q	Paved Max Q	Grassed Max Q	Paved Tc	Grassed Tc	Supp. Tc	Due to Storm

	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)	
C.B7-1	0.033	0.024	0.009	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B1-5	0.01	0.001	0.01	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B1-4	0.02	0.02	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B1-3	0.076	0.004	0.071	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B1-2	0.053	0.053	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.A1-1	0.081	0.059	0.022	5	5	0	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B2-7	0.043	0.043	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B2-6	0.042	0.042	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B2-5 (R4)	0.081	0.081	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B2-3	0.062	0.062	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B2-2	0.042	0.042	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B2-1	0.039	0.039	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.C3-1	0.036	0.002	0.034	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C1-4 + R2	0.115	0.115	0	8	8	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.C1-3 + R1	0.13	0.13	0	8	8	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B3-3	0.04	0.04	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B3-2 (R3)	0.096	0.096	0	8	8	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.C1-7	0.039	0.039	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.C1-6	0.019	0.019	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B1-9	0.029	0.029	0	5	5	2	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B1-8	0.052	0.003	0.049	5	5	2	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B1-7	0.047	0.034	0.013	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.C2-2	0.025	0.025	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.C2-1	0.038	0.038	0	8	8	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
C.B6-1	0.024	0.024	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B5-1	0.031	0.031	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.B4-1	0.057	0.057	0	5	5	5	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
C.E	0.097	0.006	0.091	5	5	5	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
EX1	0.199	0.012	0.187	6	6	0	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
EX2	3.865	0.237	3.635	17	17	0	AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1
EX3	0.363	0.021	0.342	7	7	0	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
EX4	0.314	0.018	0.296	6	6	0	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
EX5	0.784	0.046	0.739	7	7	0	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1

Outflow Volumes for Total Catchment (3.00 impervious + 17.1 pervious = 20.1 total ha)

Storm	Total Rainfall	Total Runoff	Impervious Runoff	Pervious Runoff
	cu.m	cu.m (Runoff %)	cu.m (Runoff %)	cu.m (Runoff %)
AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1	3681.59	1876.99 (51.0%)	520.30 (94.5%)	1356.69 (43.3%)
AR&R 100 year, 10 minutes storm, average 168 mm/h, Zone 1	5622.79	3494.44 (62.1%)	810.47 (96.4%)	2683.97 (56.1%)
AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1	8166.44	5553.20 (68.0%)	1190.69 (97.5%)	4362.50 (62.8%)
AR&R 100 year, 30 minutes storm, average 98.6 mm/h, Zone 1	9900.13	6799.49 (68.7%)	1449.84 (98.0%)	5349.65 (63.5%)
AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1	13454.37	9402.22 (69.9%)	1981.13 (98.5%)	7421.09 (64.9%)
AR&R 100 year, 6 hours storm, average 22.6 mm/h, Zone 1	27229.38	18209.59 (66.9%	4040.23 (99.3%)	14169.36 (61.2%)
AR&R 100 year, 12 hours storm, average 14.9 mm/h, Zone 1	35907.55	22495.46 (62.6%	5337.53 (99.4%)	17157.93 (56.2%)

PIPE DETAILS

Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	

Pipe3699	0.03	0.74	80.613	80.47	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3723	0.042	1.06	80.406	80.342	AR&R 100 year, 6 hours storm, average 22.6 mm/h, Zone 1
Pipe3725	0.054	1.35	80.201	80.07	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3698	0.069	1.75	80.032	80.015	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3697	0.183	1.66	80.015	79.906	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3718	0.429	2.24	79.523	79.404	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3696	0.429	2.5	79.357	79.288	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3700	0.057	1.55	79.734	79.445	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3703	0.016	0.4	80.9	80.9	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3728	0.023	0.57	80.9	80.9	AR&R 100 year, 30 minutes storm, average 98.6 mm/h, Zone 1
Pipe3704	0.029	0.74	80.9	80.9	AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1
Pipe3701	0.046	1.15	80.899	80.9	AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1
Pipe3727	0.063	1.58	80.844	80.662	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3702	0.195	1.77	80.37	80.1	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3717	0.23	2.08	79.957	79.906	AR&R 100 year, 10 minutes storm, average 168 mm/h, Zone 1
Pipe3712	0.011	0.1	80.169	80.446	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3730	0.032	0.81	80.446	80.831	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3706	0.061	0.87	80.795	80.756	AR&R 100 year, 12 hours storm, average 14.9 mm/h, Zone 1
Pipe3707	0.134	1.21	80.334	80.278	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3708	0.134	1.21	80.17	80.113	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
P40216	0.189	1.72	79.644	79.63	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3709	0.189	1.9	79.213	79.134	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3713	0.022	0.56	80.9	80.9	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3729	0.06	1.51	80.898	80.896	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3714	0.065	1.64	80.896	80.662	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3715	0.031	0.77	80.887	80.872	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3705	0.047	1.17	80.604	80.446	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3720	0.022	0.55	80.489	80.47	AR&R 100 year, 30 minutes storm, average 98.6 mm/h, Zone 1
Pipe3721	0.02	0.5	80.47	80.47	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3722	0.039	0.99	80.47	80.47	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3716	0.025	0.63	80.838	80.814	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3710	0.057	1.42	80.215	80.113	AR&R 100 year, 20 minutes storm, average 122 mm/h, Zone 1
Pipe3724	0.013	0.32	80.22	80.342	AR&R 100 year, 30 minutes storm, average 98.6 mm/h, Zone 1
Pipe3719	0.031	0.77	80.091	80.07	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3726	0.034	0.86	79.909	79.906	AR&R 100 year, 5 minutes storm, average 220 mm/h, Zone 1
Pipe3695	0.258	1.8	78.803	78.653	AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1
Pipe3711	0.125	1.47	78.338	78.288	AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18952	0.009	0.009	1.201	0.046	0.03	0.67	0.68	AR&R 100 year, 5 minutes storm, a
OF18993	0.123	0.123	0.288	0.034	0.02	10.1	0.56	AR&R 100 year, 20 minutes storm,
OF18995	0.088	0.088	0.288	0.03	0.02	9.26	0.51	AR&R 100 year, 20 minutes storm,
OF18999	0.204	0.204	0.029	0.124	0.02	19.12	0.13	AR&R 100 year, 20 minutes storm,
OF19001	0.097	0.097	0.029	0.088	0.01	15.43	0.11	AR&R 100 year, 20 minutes storm,
OF19004	0.282	0.282	0.029	0.144	0.02	20.63	0.15	AR&R 100 year, 20 minutes storm,

OF18923	0.701	0.701	0.288	0.075	0.07	14.2	0.98 AR&R 100 year, 20 minutes storm,
OF18944	0.024	0.024	0.288	0.017	0.01	6.68	0.34 AR&R 100 year, 20 minutes storm,
L.A1-POI1	0.081	0.081	0.288	0.029	0.01	9.14	0.48 AR&R 100 year, 20 minutes storm,
OF18974	0.045	0.045	0.302	0.102	0.01	4	0.13 AR&R 100 year, 5 minutes storm, a
OF18976	0.08	0.08	0.302	0.141	0.02	4	0.16 AR&R 100 year, 5 minutes storm, a
OF18978	0.143	0.143	0.302	0.194	0.04	4	0.2 AR&R 100 year, 20 minutes storm,
OF18980	0.151	0.151	0.302	0.2	0.04	4	0.2 AR&R 100 year, 20 minutes storm,
OF18982	0.202	0.202	0.302	0.237	0.05	4	0.23 AR&R 100 year, 20 minutes storm,
OF19496	0.233	0.233	0.263	0.288	0.06	7.79	0.21 AR&R 100 year, 20 minutes storm,
OF18972	0.276	0.276	1.201	0.143	0.17	3.9	1.18 AR&R 100 year, 20 minutes storm,
OF19758	0.13	0.13	0.029	0.1	0.01	16.72	0.12 AR&R 100 year, 20 minutes storm,
OF19691	0	0	0.029	0	0	0	0
OF19695	0.031	0.031	0.302	0.085	0.01	4	0.11 AR&R 100 year, 20 minutes storm,
OF18926	0.189	0.189	0.288	0.041	0.03	10.8	0.65 AR&R 100 year, 20 minutes storm,
OF19489	0.037	0.037	0.302	0.093	0.01	4	0.12 AR&R 100 year, 20 minutes storm,
OF19491	0.139	0.139	0.302	0.191	0.04	4	0.2 AR&R 100 year, 20 minutes storm,
OF19494	0.124	0.124	0.302	0.179	0.03	4	0.19 AR&R 100 year, 20 minutes storm,
OF19687	0.018	0.018	0.302	0.065	0.01	4	0.09 AR&R 100 year, 20 minutes storm,
OF19689	0	0	0.302	0	0	0	0
OF18929	0.005	0.005	0.288	0.009	0	5.16	0.21 AR&R 100 year, 20 minutes storm,
OF18931	0.076	0.076	0.288	0.028	0.01	8.9	0.49 AR&R 100 year, 20 minutes storm,
OF18933	0.121	0.121	0.288	0.034	0.02	10.1	0.55 AR&R 100 year, 20 minutes storm,
OF19697	0.004	0.004	0.302	0.036	0	4	0.05 AR&R 100 year, 20 minutes storm,
OF19699	0	0	0.302	0	0	0	0
OF18959	0.058	0.058	0.288	0.025	0.01	8.32	0.44 AR&R 100 year, 5 minutes storm, a
OF18962	0	0	1.201	0	0	0	0
OF18964	0.034	0.034	1.201	0.073	0.06	1.55	0.81 AR&R 100 year, 30 minutes storm,
EMERGENCY WEIR OSD1	0	0	0.302	0	0	0	0
L.OSD1-POI2	0.258	0.258	0.288	0.048	0.03	11.44	0.71 AR&R 100 year, 1 hour storm, aver
EMERGENCY WEIR OSD2	0	0	0.302	0	0	0	0
L.OSD2 - POI3	0.125	0.125	0.288	0.035	0.02	10.16	0.56 AR&R 100 year, 1 hour storm, aver
L.E-POI4	4.394	4.394	0.288	0.175	0.3	22.49	1.7 AR&R 100 year, 1 hour storm, aver
L.POI1-RN1	4.427	4.427	0.288	0.175	0.3	22.53	1.7 AR&R 100 year, 1 hour storm, aver
OF19711	0.258	0.258	0.288	0.048	0.03	11.44	0.71 AR&R 100 year, 1 hour storm, aver
POI3-RN2	0.125	0.125	0.288	0.035	0.02	10.16	0.56 AR&R 100 year, 1 hour storm, aver
L.EX1-EX2	0.199	0.199	0.288	0.042	0.03	10.92	0.65 AR&R 100 year, 20 minutes storm,
L.EX2-E	4.342	4.342	0.288	0.174	0.29	22.46	1.68 AR&R 100 year, 1 hour storm, aver
L.EX3-EX2	0.363	0.363	0.288	0.055	0.04	12.21	0.8 AR&R 100 year, 20 minutes storm,
L.EX4-EX5	0.314	0.314	0.288	0.052	0.04	11.85	0.76 AR&R 100 year, 20 minutes storm,
LEX5-RN2	1.015	1.015	0.288	0.09	0.1	15.66	1.09 AR&R 100 year, 20 minutes storm,
L.POI4-POI1	4.394	4.394	0.288	0.175	0.3	22.49	1.7 AR&R 100 year, 1 hour storm, aver

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level	
OSD 1	79.78	635.9	0.258	0.258	0	
OSD2	79.37	126.5	0.125	0.125	0	

CONTINUITY CHECK for AR&R 100 year, 1 hour storm, average 67.0 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
B7-1	37.39	37.4	0	0
B1-6	177.75	182.57	0	-2.7
B1-5	158.05	158.14	0	-0.1
B1-4	278.36	278.38	0	0
B1-3	350.71	350.85	0	0
B1-2	1053.55	1053.6	0	0
B1-1	927.29	927.32	0	0
OUTLET TO OSD1	1053.63	1053.63	0	0
A1-1	92.58	92.54	0	0
OUTLET DISCHARGE 3	92.54	92.54	0	0
B2-7	48.84	49.59	0	-1.5
B2-6	97.77	100.24	0	-2.5
B2-5	193.3	194.31	0	-0.5
B2-4	194.31	204.35	0	-5.2
B2-3	275.63	294.86	0	-7
B2-2	532.47	532.42	0	0
B2-1	576.64	577.03	0	-0.1
C3-1	34.59	34.62	0	-0.1
C1-5	0.25	0.3	0	-19.7
C1-4	154.74	144.92	0	6.3
C1-3	319.15	319.27	0	0
C1-2	304.64	304.74	0	0
C1-1	384.54	384.64	0	0
C1-0	384.64	384.7	0	0
DISCHARGE OUTLET TO O	384.7	384.7	0	0
B3-3	46.2	47.02	0	-1.8
B3-2	176.38	184.34	0	-4.5
B3-1	184.34	190.09	0	-3.1
C1-7	44.88	44.82	0	0.1
C1-6	66.6	66.56	0	0.1
B1-9	33	32.96	0	0.1
B1-8	82.38	82.4	0	0
B1-7	135.81	140.35	0	-3.3
C2-2	28.38	28.32	0	0.2
C2-1	79.8	79.8	0	0
B6-1	27.72	27.74	0	0
B5-1	34.98	34.98	0	0
B4-1	65.34	65.35	0	0
OSD 1	1053.63	780.87	272.76	0
OUTLET DISCHARGE OSD1	780.87	780.63	0	0
OSD2	399.32	363.83	35.5	0
OUTLET DISCHARGE OSD2	363.83	363.81	0	0
N.E	6675.5	6675.5	0	0
RN02	1593.2	1593.2	0	0
POI1	6768.04	6768.04	0	0
POI2	780.63	777.14	0	0.4
RN01	7545.18	7545.18	0	0
POI3	363.81	363.46	0	0.1

N.EX1	199.32	199.32	0	0
N.EX2	6582.95	6582.95	0	0
N.EX3	376.79	376.79	0	0
N.EX4	315.13	315.13	0	0
N.EX5	1229.74	1229.74	0	0
POI4	6675.5	6675.5	0	0

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
B7-1	80.52			0.018	0.11	0	None
B1-6	80.47			0.067	0	0.065	Outlet System
B1-5	80.33			0.07	0.02	0.014	Inlet Capacity
B1-4	80.07			0.068	0	0.078	Outlet System
B1-3	79.73			0.115	0.34	0.014	Inlet Capacity
B1-2	79.67			0.038	0.25	0.01	Inlet Capacity
B1-1	79.34			0	0.8		None
OUTLET TO OSD1	79.23			0.01			
A1-1	79.97			0.045	0.35	0	None
OUTLET DISCHARGE 3	79.43			0			
B2-7	80.9			0.025	0	0.025	Outlet System
B2-6	80.9			0.048	0	0.047	Outlet System
B2-5	80.9			0.089	0	0.084	Outlet System
B2-4	80.9			0.084	0	0.09	Outlet System
B2-3	80.9			0.12	0	0.089	Inlet Capacity
B2-2	80.54			0.114	0.13	0.022	Inlet Capacity
B2-1	79.99			0.031	0.11	0	None
C3-1	80.17			0.019	0	0.066	Outlet System
C1-5	80.23			0	0.67	0	None
C1-4	80.28			0.069	0.62		None
C1-3	80.16			0.078	0.74	0.009	Inlet Capacity
C1-2	79.81			0	1.17		None
C1-1	79.69			0	1.21		None
C1-0	79.4			0	0.63		None
DISCHARGE OUTLET TO O	79.09			0			
B3-3	80.9			0.023	0	0.016	Outlet System
B3-2	80.9			0.072	0	0.061	Outlet System
B3-1	80.89			0.061	0.01	0.018	Inlet Capacity
C1-7	80.56			0.023	0.34	0	None
C1-6	80.47			0.011	0.43	0	None
B1-9	80.5	80.57		0.017	0.8	0	Outlet System
B1-8	80.47			0.027	0	0.039	Outlet System

B1-7	80.47	0.066	0	0.067	Outlet System
C2-2	80.35	0.014	0.55	0	None
C2-1	80.19	0.023	0.71	0	None
B6-1	80.22	0.014	0	0.044	Outlet System
B5-1	80.1	0.018	0.11	0	None
B4-1	79.75	0.033	0.17	0.008	Inlet Capacity
OUTLET DISCHARGE OSD1	78.56	0			
OUTLET DISCHARGE OSD2	78.26	0			

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm	
C.B7-1	0.018	0.014	0.005	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.B1-5	0.005	0	0.005	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.B1-4	0.012	0.012	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B1-3	0.04	0.002	0.037	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.B1-2	0.03	0.03	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.A1-1	0.045	0.034	0.011	5	5	0	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.B2-7	0.025	0.025	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B2-6	0.024	0.024	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B2-5 (R4)	0.047	0.047	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B2-3	0.036	0.036	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B2-2	0.024	0.024	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B2-1	0.022	0.022	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.C3-1	0.019	0.001	0.018	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C1-4 + R2	0.069	0.069	0	8	8	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.C1-3 + R1	0.078	0.078	0	8	8	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B3-3	0.023	0.023	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B3-2 (R3)	0.058	0.058	0	8	8	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.C1-7	0.023	0.023	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.C1-6	0.011	0.011	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B1-9	0.017	0.017	0	5	5	2	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B1-8	0.027	0.002	0.025	5	5	2	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.B1-7	0.026	0.02	0.007	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1	
C.C2-2	0.014	0.014	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.C2-1	0.023	0.023	0	8	8	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	
C.B6-1	0.014	0.014	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1	

C.B5-1	0.018	0.018	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
C.B4-1	0.033	0.033	0	5	5	5	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
C.E	0.051	0.003	0.047	5	5	5	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
EX1	0.103	0.007	0.097	6	6	0	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
EX2	1.757	0.142	1.634	17	17	0	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
EX3	0.182	0.012	0.17	7	7	0	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
EX4	0.163	0.01	0.153	6	6	0	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
EX5	0.393	0.026	0.367	7	7	0	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1

Outflow Volumes for Total Catchment (3.00 impervious + 17.1 pervious = 20.1 total ha)

Storm	Total Rainfall	Total Runoff	Impervious Runoff	Pervious Runoff
	cu.m	cu.m (Runoff %)	cu.m (Runoff %)	cu.m (Runoff %)
AR&R 5 year, 5 minutes storm, average 12	2091.81	432.90 (20.7%)	282.66 (90.4%)	150.24 (8.4%)
AR&R 5 year, 10 minutes storm, average 9	3209.68	1144.35 (35.7%)	449.76 (93.7%)	694.59 (25.4%)
AR&R 5 year, 20 minutes storm, average 6	4658.88	2143.40 (46.0%)	666.39 (95.7%)	1477.02 (37.3%)
AR&R 5 year, 30 minutes storm, average 5	5662.79	2670.15 (47.2%)	816.45 (96.5%)	1853.69 (38.5%)
AR&R 5 year, 1 hour storm, average 38.3 r	7691.01	3805.44 (49.5%)	1119.63 (97.4%)	2685.82 (41.1%)
AR&R 5 year, 6 hours storm, average 13.1	15782.98	7495.38 (47.5%)	2329.20 (98.7%)	5166.18 (38.5%)
AR&R 5 year, 12 hours storm, average 8.6	20723	9589.64 (46.3%)	3067.66 (99.0%)	6521.99 (37.0%)

PIPE DETAILS

Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	
Pipe3699	0.018	0.46	80.505	80.47	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
Pipe3723	0.04	1.01	80.399	80.331	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3725	0.053	1.33	80.196	80.07	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
Pipe3698	0.068	1.7	79.872	79.726	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3697	0.132	1.2	79.725	79.67	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
Pipe3718	0.347	2.1	79.503	79.343	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3696	0.348	2.44	79.298	79.229	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3700	0.045	1.34	79.614	79.427	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1
Pipe3703	0.014	0.35	80.9	80.9	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3728	0.023	0.58	80.9	80.9	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3704	0.03	0.74	80.9	80.9	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3701	0.046	1.16	80.897	80.896	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3727	0.064	1.62	80.799	80.543	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3702	0.179	1.63	80.261	79.993	AR&R 5 year, 30 minutes storm, average 56.4 mm/h, Zone 1

Pipe3717	0.2	1.81	79.774	79.67	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3712	0.01	0.09	80.169	80.232	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3730	0.03	0.75	80.232	80.277	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3706	0.06	0.84	80.22	80.158	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3707	0.113	1.03	79.854	79.812	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3708	0.113	1.03	79.734	79.693	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
P40216	0.148	1.34	79.406	79.397	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3709	0.148	1.69	79.215	79.095	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3713	0.019	0.47	80.899	80.9	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3729	0.056	1.4	80.892	80.886	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3714	0.064	1.61	80.886	80.543	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3715	0.023	0.57	80.535	80.473	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3705	0.034	0.84	80.358	80.232	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3720	0.015	0.38	80.472	80.47	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3721	0.017	0.42	80.47	80.47	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3722	0.029	0.74	80.469	80.47	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1
Pipe3716	0.014	1.1	80.28	80.189	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3710	0.035	1.55	80.023	79.908	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3724	0.013	0.34	80.22	80.331	AR&R 5 year, 5 minutes storm, average 125 mm/h, Zone 1
Pipe3719	0.018	0.44	80.078	80.07	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3726	0.025	0.64	79.719	79.671	AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1
Pipe3695	0.138	1.52	78.715	78.565	AR&R 5 year, 12 hours storm, average 8.6 mm/h, Zone 1
Pipe3711	0.103	1.4	78.313	78.263	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zone 1

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF18952	0	0	0.307	0	0	0	0	0
OF18993	0.065	0.065	0	0.026	0.01	8.55	0.46	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF18995	0.014	0.014	0	0.014	0	6.09	0.28	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF18999	0.078	0.078	0	0.079	0.01	14.61	0.1	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF19001	0.014	0.014	0	0.036	0	10.27	0.06	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF19004	0.01	0.01	0	0.031	0	9.61	0.05	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18923	0.353	0.353	0	0.055	0.04	12.15	0.79	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18944	0	0	0	0	0	0	0	

L.A1-POI1	0.045	0.045	0	0.022	0.01	7.73	0.42	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF18974	0.025	0.025	0.091	0.077	0.01	4	0.1	AR&R 5 year, 5 minutes storm, average 125 mm/h, Z
OF18976	0.047	0.047	0.091	0.105	0.01	4	0.13	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18978	0.084	0.084	0.091	0.144	0.02	4	0.16	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18980	0.09	0.09	0.091	0.149	0.02	4	0.17	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18982	0.089	0.089	0.091	0.147	0.02	4	0.17	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF19496	0.022	0.022	0.031	0.133	0.02	3.58	0.11	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18972	0	0	0.307	0	0	0	0	
OF19758	0.066	0.066	0	0.074	0.01	14.02	0.1	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF19691	0	0	0	0	0	0	0	
OF19695	0.009	0.009	0.091	0.048	0	4	0.07	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF18926	0.148	0.148	0	0.037	0.02	10.39	0.6	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF19489	0.016	0.016	0.091	0.063	0.01	4	0.09	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF19491	0.061	0.061	0.091	0.121	0.02	4	0.14	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF19494	0.018	0.018	0.091	0.065	0.01	4	0.09	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
OF19687	0	0	0.091	0	0	0	0	
OF19689	0	0	0.091	0	0	0	0	
OF18929	0	0	0	0	0	0	0	
OF18931	0.039	0.039	0	0.021	0.01	7.5	0.4	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF18933	0.067	0.067	0	0.027	0.01	8.67	0.46	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF19697	0	0	0.091	0	0	0	0	
OF19699	0	0	0.091	0	0	0	0	
OF18959	0.044	0.044	0	0.022	0.01	7.73	0.41	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
OF18962	0	0	0.307	0	0	0	0	
OF18964	0.008	0.008	0.307	0.045	0.03	0.62	0.65	AR&R 5 year, 20 minutes storm, average 69.6 mm/h
EMERGENCY WEIR OSD1	0	0	0.091	0	0	0	0	
L.OSD1-POI2	0.138	0.138	0	0.036	0.02	10.27	0.58	AR&R 5 year, 12 hours storm, average 8.6 mm/h, Zo
EMERGENCY WEIR OSD2	0	0	0.091	0	0	0	0	
L.OSD2 - POI3	0.103	0.103	0	0.032	0.02	9.72	0.53	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor
L.E-POI4	1.891	1.891	0	0.12	0.16	18.71	1.3	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor
L.POI1-RN1	1.907	1.907	0	0.12	0.16	18.71	1.31	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor
OF19711	0.138	0.138	0	0.036	0.02	10.27	0.58	AR&R 5 year, 12 hours storm, average 8.6 mm/h, Zo
POI3-RN2	0.103	0.103	0	0.032	0.02	9.72	0.53	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor
L.EX1-EX2	0.103	0.103	0	0.032	0.02	9.72	0.53	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
L.EX2-E	1.875	1.875	0	0.12	0.16	18.65	1.3	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor
L.EX3-EX2	0.182	0.182	0	0.041	0.03	10.74	0.64	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
L.EX4-EX5	0.163	0.163	0	0.039	0.02	10.57	0.61	AR&R 5 year, 30 minutes storm, average 56.4 mm/h
LEX5-RN2	0.478	0.478	0	0.063	0.05	12.97	0.87	AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor

L.POI4-POI1	1.891	1.891	0	0.12	0.16	18.71	1.3 AR&R 5 year, 1 hour storm, average 38.3 mm/h, Zor

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
OSD 1	79.48	370.5	0.138	0.138	0
OSD2	79.19	89.7	0.103	0.103	0

CONTINUITY CHECK for AR&R 5 year, 20 minutes storm, average 69.6 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
B7-1	11.57	11.54	0	0.3
B1-6	51.52	51.73	0	-0.4
B1-5	43.95	43.98	0	-0.1
B1-4	82.78	82.81	0	0
B1-3	98.98	99.11	0	-0.1
B1-2	326.77	326.95	0	-0.1
B1-1	322.5	322.54	0	0
OUTLET TO OSD1	326.99	326.99	0	0
A1-1	28.64	28.55	0	0.3
OUTLET DISCHARGE 3	28.55	28.55	0	0
B2-7	16.43	16.77	0	-2.1
B2-6	32.97	33.85	0	-2.6
B2-5	65.15	65.42	0	-0.4
B2-4	65.42	67.73	0	-3.5
B2-3	91.7	94.81	0	-3.4
B2-2	170.15	170.41	0	-0.2
B2-1	185.29	185.43	0	-0.1
C3-1	7.73	7.74	0	-0.1
C1-5	3.87	3.83	0	1.1
C1-4	55.77	53.94	0	3.3
C1-3	112.55	112.53	0	0
C1-2	109.46	109.5	0	0
C1-1	136.24	136.28	0	0
C1-0	136.28	136.32	0	0
DISCHARGE OUTLET TO O	136.32	136.32	0	0
B3-3	15.54	15.53	0	0.1

B3-2	59.04	59.37	0	-0.6
B3-1	59.37	59.35	0	0
C1-7	15.1	14.99	0	0.7
C1-6	22.31	22.23	0	0.4
B1-9	11.1	11.05	0	0.4
B1-8	22.1	22.06	0	0.2
B1-7	38.59	39.98	0	-3.6
C2-2	9.55	9.48	0	0.7
C2-1	26.8	26.74	0	0.2
B6-1	9.32	9.3	0	0.2
B5-1	11.77	11.73	0	0.3
B4-1	21.98	21.93	0	0.2
OSD 1	326.99	80.68	246.3	0
OUTLET DISCHARGE OSD1	80.68	80.56	0	0.2
OSD2	139.39	102.96	36.42	0
OUTLET DISCHARGE OSD2	102.96	102.94	0	0
N.E	1378.14	1378.14	0	0
RN02	380.03	380.03	0	0
POI1	1406.69	1406.69	0	0
POI2	80.56	78.73	0	2.3
RN01	1485.41	1485.41	0	0
POI3	102.94	102.44	0	0.5
N.EX1	44.52	44.52	0	0
N.EX2	1357.45	1357.45	0	0
N.EX3	83.86	83.86	0	0
N.EX4	70.39	70.39	0	0
N.EX5	277.59	277.59	0	0
POI4	1378.14	1378.14	0	0

APPENDIX C

MUSIC LINK RESULT

PENRITH CITY COUNCIL

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MUSIC-*link* Report

Project Details		Company Details	
Project:	344 PARK ROAD WALLACIA	**Company:**	INDESCO CONSULTING
Report Export Date:	18-Sep-20	**Contact:**	DAVID GUNAWAN
Catchment Name:	7421 MUSIC	**Address:**	Suite 401, Level 4 24 Hunter Street PARRAMATTA NSW 2150
Catchment Area:	0.156ha	**Phone:**	02 7809 8953
Impervious Area*:	73.24%	**Email:**	david.gunawan@indesco.com.au
Rainfall Station:	67113 PENRITH		
Modelling Time-step:	6 Minutes		
Modelling Period:	1-01-1999 - 31-12-2008 11:54:00 PM		
Mean Annual Rainfall:	691mm		
Evapotranspiration:	1158mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	Penrith		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Junction	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	12.2%	Bio Retention Node	3	Urban Source Node	11
TSS	99.2%	Rain Water Tank Node	2		
TP	89.7%	GPT Node	2		
TN	73.9%				
GP	100%				

Comments

USE PENRITH COUNCIL MUSIC LINK

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	BIORETENTION 1	PET Scaling Factor	2.1	2.1	2.1
Bio	BIORETENTION 2	PET Scaling Factor	2.1	2.1	2.1
Bio	BIORETENTION 3 (LANDSCAPE 3)	PET Scaling Factor	2.1	2.1	2.1
GPT	SPEL Vorceptor SVI.055M	Hi-flow bypass rate (cum/sec)	None	99	0.055
GPT	SVI.025 SPEL Vortceptor	Hi-flow bypass rate (cum/sec)	None	99	0.026
Post	Post-Development Node	% Load Reduction	None	None	27.9
Post	Post-Development Node	GP % Load Reduction	90	None	99.3
Post	Post-Development Node	TN % Load Reduction	45	None	57.3
Post	Post-Development Node	TP % Load Reduction	60	None	75.7
Post	Post-Development Node	TSS % Load Reduction	85	None	89.4
Urban	A	Area Impervious (ha)	None	None	0.338
Urban	A	Area Pervious (ha)	None	None	0
Urban	A	Total Area (ha)	None	None	0.338
Urban	B	Area Impervious (ha)	None	None	0.337
Urban	B	Area Pervious (ha)	None	None	0
Urban	B	Total Area (ha)	None	None	0.337
Urban	C	Area Impervious (ha)	None	None	0.382
Urban	C	Area Pervious (ha)	None	None	0
Urban	C	Total Area (ha)	None	None	0.382
Urban	D	Area Impervious (ha)	None	None	0.714
Urban	D	Area Pervious (ha)	None	None	0
Urban	D	Total Area (ha)	None	None	0.714
Urban	E	Area Impervious (ha)	None	None	0.112
Urban	E	Area Pervious (ha)	None	None	0
Urban	E	Total Area (ha)	None	None	0.112
Urban	F	Area Impervious (ha)	None	None	0.091
Urban	F	Area Pervious (ha)	None	None	0.091
Urban	F	Total Area (ha)	None	None	0.182
Urban	G	Area Impervious (ha)	None	None	0.00690499999999999
Urban	G	Area Pervious (ha)	None	None	0.127
Urban	G	Total Area (ha)	None	None	0.134
Urban	H	Area Impervious (ha)	None	None	0.010
Urban	H	Area Pervious (ha)	None	None	0.195
Urban	H	Total Area (ha)	None	None	0.206
Urban	I	Area Impervious (ha)	None	None	0.25
Urban	I	Area Pervious (ha)	None	None	0
Urban	I	Total Area (ha)	None	None	0.25
Urban	J	Area Impervious (ha)	None	None	0.002
Urban	J	Area Pervious (ha)	None	None	0.041
Urban	J	Total Area (ha)	None	None	0.044

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	K	Area Impervious (ha)	None	None	0.003
Urban	K	Area Pervious (ha)	None	None	0.073
Urban	K	Total Area (ha)	None	None	0.077

Only certain parameters are reported when they pass validation

PENRITH CITY COUNCIL

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	BIORETENTION 1	Filter depth (m)	0.5	0.8	0.4
Bio	BIORETENTION 1	Hi-flow bypass rate (cum/sec)	None	99	100
Bio	BIORETENTION 2	Filter depth (m)	0.5	0.8	0.4
Bio	BIORETENTION 2	Hi-flow bypass rate (cum/sec)	None	99	100
Bio	BIORETENTION 3 (LANDSCAPE 3)	Filter depth (m)	0.5	0.8	0.4
Bio	BIORETENTION 3 (LANDSCAPE 3)	Hi-flow bypass rate (cum/sec)	None	99	100
Rain	2 x RAINWATER TANK 34KL/EACH ROOF A	% Reuse Demand Met	80	None	4.4517
Rain	2 x RAINWATER TANK 34kL/EACH ROOF B	% Reuse Demand Met	80	None	4.44282

Only certain parameters are reported when they pass validation

APPENDIX D

WSUD MAINTENANCE

OSD Maintenance Schedule

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Outlets			
Inspect & remove any blockage of orifices	Six monthly	Owner	Remove grate & screen to inspect orifice. See plan for location of outlets
Check attachment of orifice plates to wall of chamber and/or pit (gaps less than 5 mm)	Annually	Maintenance Contractor	Remove grate and screen. Ensure plates are mounted securely, tighten fixings if required. Seal gaps as required.
Check orifice diameters are correct and retain sharp edges	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Inspect screen and clean	Six monthly	Owner	Remove grate(s) and screens if required to clean them.
Check attachment of screens to wall of chamber or pit	Annually	Maintenance Contractor	Remove grate(s) and screen(s). Ensure screen fixings are secure. Repair as required.
Check screen(s) for corrosion	Annually	Maintenance Contractor	Remove grate(s) and examine screen(s) for rust or corrosion, especially at corners or welds.
Inspect walls (internal and external, if appropriate) for cracks or spalling	Annually	Maintenance Contractor	Remove grate(s) to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect outlet sumps & remove any sediment/sludge	Six monthly	Owner	Remove grate(s) and screen(s). Remove sediment/sludge build-up and check orifices are clear.
Inspect grate(s) for damage or blockage	Six monthly	Owner	Check both sides of a grate for corrosion, (especially corners and welds) damage or blockage.
Inspect outlet pipe & remove any blockage	Six monthly	Maintenance Contractor	Remove grate(s) and screen(s). Ventilate underground storage if present. Check orifices and remove any blockages in outlet pipe. Flush outlet pipe to confirm it drains freely. Check for sludge/debris on upstream side of return line.
Check step irons for corrosion	Annually	Maintenance Contractor	Remove grate. Examine step irons and repair any corrosion or damage.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Check fixing of step irons is secure	Six monthly	Maintenance Contractor	Remove grate(s) and ensure fixings are secure prior to placing weight on step iron.
Storage			
Inspect storage & remove any sediment/sludge	Six monthly	Owner	Remove grate(s) and screen(s) where required. Remove sediment/sludge build-up.
Inspect internal walls of storage (and external, if appropriate) for cracks, spalling or any other defects	Annually	Maintenance Contractor	Remove grate(s) to inspect internal walls if required. Repair as required. Clear vegetation from internal and external walls if necessary and repair as required.
Inspect & remove any debris/litter/mulch etc blocking grates	Six monthly	Owner	Remove blockages from grate(s) and check if storage is blocked.
Inspect areas draining to the storage(s) & remove debris/mulch/litter etc likely to block screens/grates	Six monthly	Owner	Remove debris and floatable material likely to be carried to grates.
Compare storage volume to volume approved. (Rectify if loss > 5%)	Annually	Maintenance Contractor	Compare actual storage available with Work-as Executed plans. If volume loss is greater than 5%, arrange for reconstruction to replace the volume lost. Council to be notified of the proposal.
Inspect storages for subsidence near pits	Annually	Maintenance Contractor	Check along drainage lines and at pits for subsidence likely to indicate leakages.

WSUD Maintenance and Monitoring Schedule

Maintenance Action	Frequency	Responsibility	Procedure
Rainwater Tanks			
Prevent mosquito breeding	*Monthly	Owner	In accordance with tank manufacturer maintenance specifications
Clean tank of sludge	2-3 yearly	Maintenance Contractor	In accordance with tank manufacturer maintenance specifications

Bio-Retention Basins and Swales			
Inspect screen and clean	*Six monthly	Owner	Remove grate(s) and screens if required to clean them.
Check attachment of screens to wall of pits	*Annually	Maintenance Contractor	Remove grate(s) and screen(s). Ensure screen fixings are secure. Repair as required.
Check screen(s) for corrosion	*Annually	Maintenance Contractor	Remove grate(s) and examine screen(s) for rust or corrosion, especially at corners or welds.
Inspect walls (internal and external, if appropriate) for cracks or spalling	*Annually	Maintenance Contractor	Remove grate(s) to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect grate(s) for damage or blockage	*Six monthly	Owner	Check both sides of a grate for corrosion, (especially corners and welds) damage or blockage.
Inspect outlet pipe & remove any blockage	*Six monthly	Maintenance Contractor	Remove grate(s) and screen(s). Ventilate underground storage if present. Check orifices and remove any blockages in outlet pipe. Flush outlet pipe to confirm it drains freely. Check for sludge/debris on upstream side of return line.
Inspect subsoil drainage system	*Six monthly	Maintenance Contractor	Inspect, clean and flush subsoil drainage system.
Basin vegetated/open areas	*Two monthly	Owner	Inspect basins for litter, debris and weeds and clear as required.

SPEL ENVIRONMENTAL
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SPEL Vortceptor

Operation & Maintenance Manual

www.spel.com.au

Introduction

The frequency of cleaning will depend on the pollutant loads of the catchment, so inspections are recommended to confirm the maintenance intervals, which could be either three, six or twelve months.

The following cleaning options allow asset owners to choose the best option available for ongoing maintenance and the required cleaning frequency with the right cleaning services and resources available.

Depending on the size, access and depth of the system, the three following methods can be used to maintain the SPEL Vortceptor;

When considering maintenance costs and procedures, these three maintenance options can offer operational flexibility and low life-cycle cost considerations.

1. VACUUM SUCTION CLEANING

Due to the time and costs of water disposal, the vacuum suction cleaning is generally the most expensive option.
By taking advantage of the optional large sump volumes available in SPEL Vortceptor systems, it still may be a cost effective option.

Suction cleaning is used for most proprietary GPT's. Even if a more cost effective method is used at shorter intervals, suction cleaning is recommended for Vorceptor® Units at one to two year intervals so that a thorough inspection of the screen and lower chambers can be carried out. Physical entry may or may not be required.

2. GRAB CLEANER

The Grab Cleaner can be carried out without dewatering the system and is a generally a single person operation.

This cleaning technique is generally quicker, cheaper and safer. It also allows an inspection of the pollution captured, as opposed to the other options.

Check access opening size to ensure this option will suit the system installed.

The grab truck cleaning option offers the removal of 80 – 90% of the pollution stored in a sump and is subjected to similar constraints as the removable basket option.

3. REMOVABLE BASKET

If a removal waste basket is fitted, it can be lifted at any time, without the need for dewatering. Also it provides a safe and cost effective method of cleaning. The cost benefit depends on the design and waste disposal set up.

Normally an appropriate sump volume to allow cleaning 3 or 4 times per year. These maintenance cleans would be carried out either by using a basket or a grab, with a single clean per year completed by suction.

Maintenance options will depend on tidal or backwater impact, pollution load and cleaning frequency as well as access and disposal costs for pump-down water.

Sometimes valves are used to isolate the unit during maintenance operations. This would be essential where a unit is affected by backwater and/or high levels of tidal inundation.

The main benefit of removable baskets is their speed and ease of cleaning, particularly in tidal zones. But the storage basket must be smaller than the screen to allow its removal.

Consequently, whilst it may be cheaper, cleaning removable baskets might also be required 4 or 5 times more often.

SPEL Vorceptor Maintenance Capacities & Dimensions

Models	Treatable Flow rate (L/s)	Dimensions (mm)				Capacities		
		Internal Diameter	Overall Height	Manhole Size	Depth below invert	Sump Capacity (m^3)	Light Liquid Volume (L)	Floatables Volume (m^3)
IN-LINE SERIES								
SVI.025	26	1200	2300	600x600	1400	0.6	110	0.06
SVI.055	55	1800	2750	900x900	1650	1.4	246	0.22
SVI.055.M	55	2200	2885		1585	1.9	394	0.22
OFFLINE SERIES								
SVO.096	96	1500	3340	900x900	2340	2.8	239	0.39
SVO.140	140	1500	3670		2670	2.8	239	0.39
SVO.180	180	1500	3625		2325	2.8	239	0.39
SVO.220	220	2200	3390		2390	4.0	515	1.1
SVO.360	360	2200	3990		2990	4.0	515	1.1
SVO.530	530	3000	4800		3500	10.5	1263	2.8
SVO.800	800	3000	5780		4480	10.5	1263	2.8
SVO.810	800	4000	4290		2990	11.95	2155	5.65
SVO.1200	1200	4000	5320		3720	11.95	2155	5.65
SVO.1600	1200	4000	6010		4410	11.95	2155	5.65

Maintenance

The Vorceptor system should be inspected at regular intervals and maintained when necessary to ensure optimum performance.

The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable ground conditions and high silt areas will cause the silt chamber to fill more quickly but regular cleaning of catchment area will help slow the process.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year however more frequent inspections may be necessary where operations may lead to accumulations, or in washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the Vorceptor unit is typically achieved through access covers. These allow for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. Also allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The Vorceptor system should be cleaned when the level of sediment has reached 75% of capacity in the sump or when an appreciable level of hydrocarbons and trash has accumulated.

If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of the Vorceptor systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump.

The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment.

However, the system should be cleaned out immediately in the event of an oil or fuel spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Access covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Vorceptor system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins.

Inspection & Maintenance Log

SPEL Model: _____ **Location:**_____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintence Preformed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

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APPENDIX E

PENRITH PRE DA LOGDEMENT

Our Ref: PL17/0115
Contact: Allison Cattell
Telephone: (02) 4732 7909

23 November 2017

C/- Adam Coburn
Mecone Pty Ltd
Suite 1204B Level 12
179 Elizabeth Street
SYDNEY NSW 2000

Dear Mr Coburn,

Pre-lodgement Advice
Proposed Extractive Industry
Lot 5 DP 655046, 344 Park Road WALLACIA NSW 2745

We welcome your initiative to undertake a project in the Penrith Area.

Thank you for taking part in Council's pre-lodgement meeting on 14 November 2017**.** The meeting was useful for Council in gaining an understanding of your proposal.

Unfortunately, the proposal in its current form is not considered suitable as outlined in the attached information.

As I am sure you are aware, Council's full assessment and determination can only be made after you lodge an application.

If we can help you any further regarding the attached advice, please feel free to contact me on (02) 4732 7909.

Yours sincerely

Allison Cattell
Senior Environmental Planner

PROPERTY AND PLANNING INFORMATION	
Attendees	**Proponent** Adam Coburn – Mecone Pty Ltd Georgia Sedgemen – Mecone Pty Ltd **Penrith City Council** Allison Cattell – Senior Environmental Planner Fred Shockair – Senior Development Engineer Paul Reynolds – Team Leader for Environmental Health and Compliance Graham Green – Senior Traffic Engineer
Proposal	Extractive Industry
Address	Lot 5 DP 655046, 344 Park Road WALLACIA NSW 2745
Zoning and permissibility	The site is zoned RU1 – Primary Production under Penrith Local Environmental Plan 2010. A Section 149 Planning Certificate will confirm the zone of the site, and you are encouraged to obtain this document to confirm the zone of the site. 'Extractive industries' is a permissible land use in the zone, with Council consent, and subject to compliance with relevant planning legislation including, but not limited to, State Environmental Planning Policy (SEPP) No.33 – Hazardous and Offensive Development. 'Extractive industry' means "*the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming".* Please note that potentially hazardous or offensive industries are prohibited if the development is proposed on a floodway in accordance with SREP No.20 – Hawkesbury Nepean River. A '*waste or resource management facility'* is permissible in the RU1 zone under Part 3, Division 23 of State Environmental Planning Policy (SEPP) (Infrastructure) 2007. A '*waste or resource management facility'* includes '*resource recovery facility*' and '*waste or resource transfer station'*.
Site constraints	• Flood-related development controls • Bushfire prone land • Scenic and landscape values • Native vegetation on site • Located on a main road • Mapped watercourse(s) traverse the site • Assessment is required to confirm the contamination status of the land • Site is located on the boundary of two local government areas, being Penrith and Liverpool
Development	Designated and integrated development (refer to **Appendix A**)

KEY ISSUES AND OUTCOMES

The proposal is to address the following issues:

RELEVANT EPI's POLICIES AND GUIDELINES

Planning provisions applying to the site, the provisions of all plans and policies are contained in **Appendix B**.

PLANNING REQUIREMENTS

The following advice is provided for your information regarding the key matters discussed at the meeting in relation to the proposal.

Permissibility and site suitability
The subject land is zoned *RU1 Primary Production* under Penrith Local Environmental Plan (LEP) 2010. The proposal is most closely categorised as a "resource recovery facility" (refer to land use definition below). Resource recovery facilities are a prohibited form of development in the *RU1* zone.

"Resource recovery facility means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration".

It is noted that resource recovery facilities are a permissible form of development in the *RU1 Primary Production* zone under Clause 121 of State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP).

Alternatively, if the use were considered 'extractive industry', this is a permissible land use on the RU1 zone.

However, notwithstanding permissibility, it is considered that the site is not suitable for the proposed development based on the following considerations:

- The proposed development is located in a significant overland flow path which will have adverse impacts on the surrounding properties.

- Inconsistency with several objectives of the *RU1 Primary Production* zone under Penrith LEP 2010, as detailed below.
  - *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
  - *To protect and enhance the existing agricultural landscape character of the land.*
  - *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*
  - *To preserve and improve natural resources through appropriate land management practices.*

- Earth mounds and hardstand areas would adversely affect the visual amenity and scenic quality of the area. In this regard, the site is identified as having scenic character and landscape values under Clause 6.5 of Penrith LEP 2010. The location and layout of the proposed development would result in unacceptable visual impacts.

- The development would have the potential to adversely affect the environmental values of the site. In this regard, the site is mapped as containing:

  - Cumberland Plain Woodland - a Critically Endangered Ecological Community under both State and Federal legislation;
  - Shale Plains Woodland which is listed as a critically endangered ecological community under State legislation; and
  - *Dillwynia Tenuifolia* , a vulnerable plant species under the Threatened Species Conservation Act 1995.

  In addition, the site is mapped as bush fire prone land, and being subject to flood-related development controls, increasing the likelihood for required vegetation removal to facilitate the proposed use.

- The development would significantly impact on the surrounding rural and residential environment, particularly by way of noise, dust, flood and traffic generation. Mitigation measures to these issues may then result in visual impacts that are not acceptable in rural settings.

- The site is relatively proximate to more appropriately zoned, serviced and unconstrained land within the industrial areas of the City.

- The site is identified as being subject to flood-related development controls. The use of the site and any necessary supporting development is likely to create unacceptable flooding impacts on adjoining properties.

- The site is traversed by a natural watercourse. No filling or altering of watercourses is permitted.

- It is noted that the site has recently been used for the storage of used wooden packaging pallets. Concern is raised as to whether this use of the land has resulted in land contamination. This matter will need to be investigated via a Phase 2 land contamination assessment including soil sampling and analysis to confirm the site is suitable for use.

- Concern is raised over the compatibility of the proposed development with dwelling house development adjoining, surrounding and on site.

In summary, the proposal is unlikely to be supported in its current form. Should it be intended to pursue the proposal in a modified form, a follow-up meeting with Council officers is recommended. It is preferable that Roads and Maritime Service (RMS) pre-lodgement comments are obtained should a second meeting be arranged.

Documents to be submitted with development application	The application is not supported in its current form, and the site is unlikely to be suitable for the proposed use for reasons raised earlier in this advice. Should you choose to pursue consent on this site for the proposed use despite this advice, the following documents would be required to make a complete application: ▪ **Survey Drawing (to AHD)** ▪ **Site Plan** ▪ **Floor Plan(s)** ▪ **Elevation and Section Plans** ▪ **Environmental Impact Statement** This is to accord with any Secretary's Environmental Assessment Requirements (SEARs) obtained from the Department of Planning ▪ **Roads and Maritime Service pre-lodgement advice** ▪ **Overland Flow Flood Report prepared by a suitably qualified person** ▪ **Stormwater Concept Plan (with report and calculations)** ▪ **Waste Management Plan** ▪ **Overland Flow Flood Report** ▪ **Water Sensitive Urban Design (WSUD) Strategy** ▪ **Landscape Plan** ▪ **Traffic and Access Report** Prepared by a suitably qualified person addressing but not limited to traffic generation, impact on the road network (including the intersection of Park Road and The Northern Road, Park Road and the development access at Park Road), size, type and volume of vehicle access to site, driveway access, heavy vehicle access, management of staff/visitor vehicle conflict with heavy vehicle access, loading areas, manoeuvring areas and car parking in accord with RMS Guidelines, Austroads guidelines, Australian Standard (AS) 2890 Parts 1, 2 and Council Development Control Plans) clearly demonstrating satisfactory manoeuvring on-site and forward entry and exit to and from the public road ▪ **Flora and fauna assessment report** The impacts of noise, dust and vibration on animals in the immediate vicinity is to be considered ▪ **A Wastewater Report** ▪ **An air quality impact assessment** This is to be prepared in accordance with relevant NSW EPA guidelines ▪ **A Water Quality Management Plan** ▪ **Contamination Assessment (SEPP 55) – Phase 2** A Remediation Action Plan is required where remediation is required ▪ **A noise impact assessment** This is to be prepared in accordance with the NSW EPA's Noise Policy for Industry (October 2017) and other relevant guidelines. The report must assess noise associated with all processing and transport activities including the operation of plant and equipment, and the movement of vehicles at the site. ▪ **Operational Plan of Management**

	One (1) printed and 2 x CD copies of your development application Please refer to Council's Development Application checklist, as attached, for further details of submission requirements and ensure that plans submitted illustrate consistent detail. Please ensure you contact Council's duty officer on 4732 7991 to make an appointment for lodgement of this application. **ALL DOCUMENTS ON THE REQUIRED DISCS MUST BE IN PDF FORMAT**
Fees	Please call the Development Services Department Administrative Support on (02) 4732 7991 to enquire about fees and charges.

APPENDIX A

Category of development ('Designated' and 'Integrated' development)

The category of development will need to be addressed in any development application including:

- ***Designated development***
  There a few categories of 'designated development' that can be triggered for uses involving glass recycling, some of which involve consideration of the capacity of the operations and others that do not. Of most relevance to your proposal is 'concrete works' and/or 'crushing, grinding or separating works'. Processing capacity, the distance to residential dwellings, or distance to natural waterbodies/mapped watercourse triggers this requirement.

  It appears the application represents 'designated development' under Schedule 3 of the Environmental Planning and Assessment (EP&A) Regulation 2000. It is noted that you have advised the handling of substances under the Australian Dangerous Goods Code does not occur as part of the proposed use.

  You are encouraged to discuss this proposal with the Department of Planning prior to pursuit of a development application to confirm their requirements in preparing any required Environmental Impact Statement.

- ***Integrated development***
  The application is integrated development under the Protection of the Environmental Operations Act (POEO) 1997. The triggers for 'integrated' development include, though are not limited to, 'concrete works', 'crushing, grinding, or separating', 'resource recovery', and/or 'waste storage'.

  Based on the type of development described in the meeting and pre-lodgement documents, the proposal represents "Crushing, grinding or separating works". The threshold in Schedule 1 of POEO for crushing, grinding and separating works is a capacity to process more than 150 tonnes per day or 30,000 tonnes per year. Based on the information provided, including the specifications for the crusher and frequency of vehicles relative to their size, the proposal exceeds this capacity threshold and is likely to require an environment protection licence from the NSW EPA.

  You are encouraged to discuss the proposal with the Environmental Protection Authority for their licensing requirements.

APPENDIX B

- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Threatened Species Conservation Act 1995
- Sydney Regional Environmental Plan No.20 – Hawkesbury Nepean River (No.2 - 1997)
- State Environmental Planning Policy (SEPP). No 55 – Remediation of Land
- SEPP No.33 – Hazardous and Offensive Development
- State Environmental Planning Policy (Infrastructure) 2007
- Protection of the Environment Operations Act 1997
- Penrith Local Environmental Plan 2010
- Penrith Development Control Plan 2014

Important Note

The pre-lodgement panel will endeavour to provide information which will enable you to identify issues that must be addressed in any application. The onus remains on the applicant to ensure that all relevant controls and issues are considered prior to the submission of an application.

Information given by the pre-lodgement panel does not constitute a formal assessment of your proposal and at no time should comments of the officers be taken as a guarantee of approval of your proposal.

It is noted that there is no Development Application before the Council within the meaning of the Environmental Planning and Assessment Act 1979. This response is provided on the basis that it does not fetter the Council's planning discretion and assessment of any Development Application if lodged. It is recommended that you obtain your own independent expert advice.

The response is based upon the information provided at the time of the meeting.

EIS Appendix 6: Noise Impact Assessment

NOISE IMPACT ASSESSMENT
PREPARED FOR
344 PARK ROAD, WALLACIA NSW 2745

Prepared for: Greenfields Resource Recovery Facility
Ellie Barikhan, Site Owner
Carlo Ranieri, Carlo Ranieri and Associates Pty Ltd

Prepared by: Victoria Hale, Senior Environmental Scientist
R T Benbow, Principal Consultant

Report No: 191318_NIA_Rev3
January 2022
(Released: 21 January 2022)

Benbow ENVIRONMENTAL

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1	24-4-2020	Greenfields Resource Recovery Facility	Benbow Environmental
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EXECUTIVE SUMMARY

Benbow Environmental has been engaged by Greenfields Resource Recovery Facility to prepare a noise impact assessment for a resource recovery facility at Lot 5, DP 655046 (344 Park Road, Wallacia). The site will have a processing capacity of 95,000 tonnes per year.

The nearest receivers and the noise generating activities have been identified. Noise criteria for the project have been formed, with assessment of the proposed site activities conducted against the NSW Noise Policy for Industry (EPA, 2017) and the NSW Road Noise Policy (DECCW, 2011). Modelling of the activities was conducted using the noise modelling software SoundPlan.

The operational noise levels was predicted to comply with the $L_{Aeq(15\ minute)}$ project specific criteria and L_{AMax} sleep disturbance criteria at all receptors for all scenarios, for all weather conditions.

The noise assessment in Section 7 predicted that if the assumptions listed in 7.1.3 are carried out, noise levels would be met at all surrounding receivers.

Controls important to note are the following:

- No truck deliveries during the evening and night time periods 6pm – 7am;
- No front end loader movement outside during the night time period 10pm-7am;
- The walls must have an R_w of at least 36 dB, double corrugated steel;
- The roof must have an R_w of at least 32 dB, corrugated steel with miwo;
- The conveyor to the aggregate bays must be enclosed such that noise from inside the building cannot directly propagate through these exit holes;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended; and
- Pedestrian access doors should also be kept close when not in use.

Further proactive noise management practices are described in Section 7.3.

Compliance with the guidelines set out in the NSW Road Noise Policy was predicted at all considered receptors.

Construction noise is predicted to comply with the Interim Construction Guidelines at all surrounding receivers.

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1. INTRODUCTION

Benbow Environmental has been engaged by Greenfields Resource Recovery Facility to prepare a noise impact assessment for a resource recovery facility at Lot 5, DP 655046 (344 Park Road, Wallacia). The site will have a processing capacity of 95,000 tonnes per year.

The principal noise sources associated with the site include noise from crushing and screening equipment, as well as mobile plant, including truck movements, excavators, and front end loaders.

The potential noise impacts of operational and road traffic activities on the nearby receivers have been predicted utilising noise modelling software, SoundPlan. This noise impact assessment has been prepared in accordance with the following guidelines and documents:

- NSW Noise Policy for Industry (EPA, 2017);
- Interim Construction Noise Guideline (DECC, 2009) and
- NSW Road Noise Policy (RNP) (DECCW, 2011).

1.1 SCOPE OF WORKS

This noise impact assessment has been limited to the following scope of works:

a) Review of proposed plans and operations;
b) Long term and short term ambient and background noise monitoring in accordance with relevant guidelines;
c) Identify project specific noise levels;
d) Determine all potential noise sources associated with the proposed development;
e) Collect required noise source data;
f) Predict potential noise impacts at the nearest potentially affected receptors to the site;
g) Assess potential noise impacts against relevant legislation and guidelines;
h) Recommend control measures where required; and
i) Compile this report with concise statements of potential noise impact.

To aid in the review of this report, supporting documentation has been included within the Attachments. A glossary of terminology is included in Attachment 1.

2. PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The site is located at 344 Park Road, Wallacia NSW 2745, in Sydney's west and within the local government area of Penrith City Council. The property is also known as Lot 5 in DP 655046.

The total land area of the property is approximately 200,732 m^2 and the proposed active working area is approximately 84,960 m^2. The site is accessed from Park Road via a lockable access gate. Figure 2-1 shows the location of the subject site.

2.2 HOURS OF OPERATIONS

The proposed facility would operate to the following hours:

Monday – Friday 7am – 6pm
Saturday – 8am – 1pm
Sunday and public Holidays – No operation.

2.3 PROPOSED ACTIVITY

The proposal involves the construction of a purpose-built building to house the resource recovery facility and development of internal access driveways, car park, truck parking area, hardstand areas and associated infrastructure on the north eastern portion of the site. The existing dwelling will be converted into a site office and two weighbridges would be provided on the access driveway from Park Road. The proposed development area would be located in the previously disturbed north-eastern section of the site. The remaining area of the site would not be developed. Extensive landscaping to re-establish areas of native vegetation would enhance the existing visual appearance of the site.

The facility would operate Monday – Friday 1am – 6pm and Saturday 8am – 1pm and accept up to 95,000 tonnes per year of C&D and C&I waste mainly from the local and Sydney metropolitan area. This waste would be separated to generate a range of materials mainly for use in the construction industry and civil works. Due to the quantity of waste to be processed and stored, the facility will require an Environment Protection Licence.

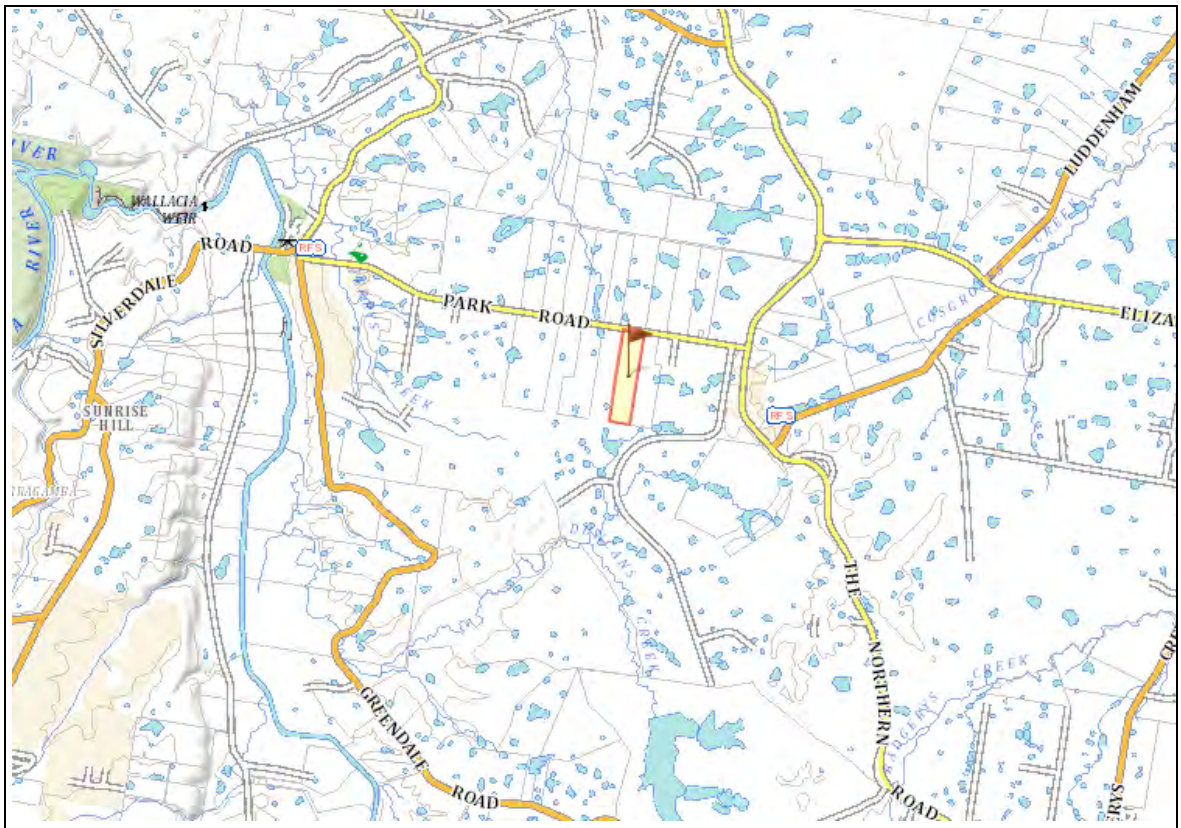
The proposed facility is ideally located, being 10km from the Western Sydney Airport and in close proximity to the associated infrastructure projects required to establish growth centres in Western and Southern Sydney. The proposal would generate 30 new employment positions.

The waste accepted would consist of C&D and C&I waste, classified as "General Solid Waste (Non-putrescible) under the *NSW Waste Classification Guidelines*. The recyclable material accepted at the facility would be made up of:

Construction & Demolition (C&D)	Commercial & Industrial (C&I)
• Wood • Gyprock – plaster board • Concrete • Brick • Aggregates • Steel	• Cardboard • Paper • Plastic • Steel • Aluminium • Wood

The site location is shown in Figure 2-1 and the site aerial is shown in Figure 2-2.

Figure 2-1: Site Location



Source: Six Maps 2020

↑N Not to scale	**Legend**: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Site Aerial

Source: Six Maps 2020

↑N **Not to scale**	**Legend:** Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

2.3.1 Process Description

The plant will be designed to process 95,000 tonnes of C&D and C&I waste materials collected from various businesses across the local and metropolitan Sydney area. The materials will be sorted through the plant in separate runs, the C&I and C&D will not be mixed. This will ensure maximum recovery of recyclables. The following provides the typical steps involved in the day time process that would be undertaken at the facility.

1. All trucks arriving at the site would be directed over the weighbridge and inspected for any abnormal contamination;

2. Trucks with conforming loads would be weighed on the weighbridge then directed inside the building. Non-conforming loads would be turned away via the turning bay adjacent to the weighbridge.

3. Loads of C&I material would be unloaded in a designated storage bunker for processing . Loads of C&D material to be unloaded in the pre-sorting area inside the building for initial separation;

4. A front end loader would transfer the pre-sorted material to the infeed hopper/shredder at the start of the process or to the appropriate storage bunker.

5. The material would be fed into the system and conveyed to an electrical magnet for the removal of steel. Any ferrous material would be separated at this point and fall into a storage bin.

6. The waste stream would then be conveyed through a waste screen where aggregates would be removed and further screened into varying sizes and then directed to external storage bunkers via the conveyor system.

7. The waste stream would be directed to the manual picking station where it is separated into paper/cardboard, wood, plastic and other waste. Paper and cardboard is transferred to the paper baling area for baling. Bales are stored in a designated area within the building.

8. The remaining waste stream is conveyed where it is further separated into heavy and light wastes. The light waste is “solid recovered fuel” or SRF which is the waste that would be suitable for use in a waste to energy plant which is a potential future stage to this development.

9. Recovered waste would be loaded into trucks for transport to various facilities for reuse or further processing.

No retail sales will be made on site. There will be no public access to the premises.

2.3.2 Noise Generating Equipment and Activities

The following noise generating equipment and activities will be used on site

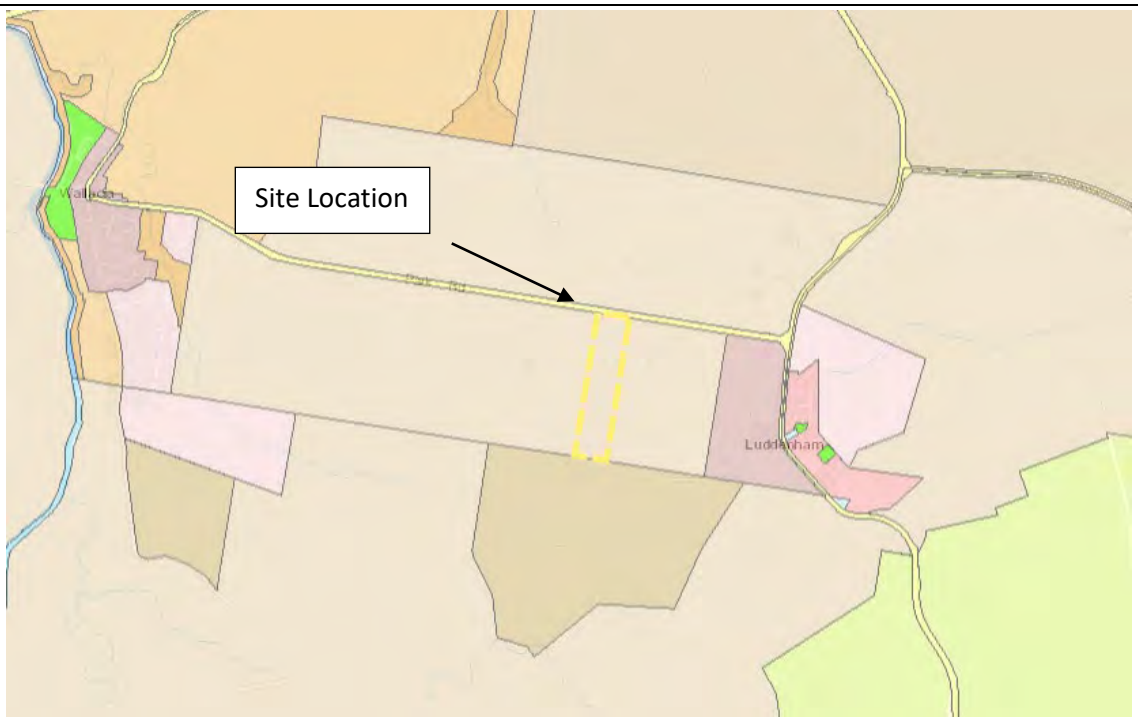
- Shredder;
- Mobile crusher;
- Conveyor belt;
- Vibrating screens x 3;
- Waste trommel screen;
- Air separator;
- Bounce separator;
- Paper Baler;
- 30T Excavator;
- 20T Excavator;
- Front end loader x 2;
- Forklift LPG;
- Sweeper; and
- Aggregate fall x 4.

2.4 DESCRIPTION OF THE SURROUNDING AREA

Surrounding land zoning to the north, east and west is also RU1 – Primary Production under the Penrith City Council Local Environmental Plan 2010 shown below in Figure 2-3. To the south of the site, the existing land zoning is RU4 – Primary Production Small Lots. In the township of Luddenham, to the east of the site, there are areas of RU5 – Village, R2 – Low Density Residential and R5 – Large Lot Residential and small areas of RE1 – Public Recreation and B1 – Neighbourhood Centre land zoning. These land zonings can provide essential services that enable positive relationships between rural and industrial services.

The most major nearby road is The Northern Road – A9 to the east of the site.

Figure 2-3: Land Zoning Map



Source: NSW Planning Portal 2020

↑N
Not to scale

Legend:

Site Boundaries

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

B1	Neighbourhood Centre	R2	Low Density Residential
B2	Local Centre	R3	Medium Density Residential
B3	Commercial Core	R4	High Density Residential
B4	Mixed Use	R5	Large Lot Residential
B5	Business Development	RE1	Public Recreation
B6	Enterprise Corridor	RE2	Private Recreation
E1	National Parks and Nature Reserves	RU1	Primary Production
E2	Environmental Conservation	RU2	Rural Landscape
E3	Environmental Management	RU4	Primary Production Small Lots
IN1	General Industrial	SP1	Special Activities
IN2	Light Industrial	SP2	Infrastructure
IN3	Heavy Industrial	W1	Natural Waterways
R1	General Residential	WSP	SEPP Western Sydney Parklands

3. NEAREST SENSITIVE RECEPTORS

Table 3-1 lists the location of representative potentially affected receivers that are considered in this assessment. The locations are shown in Figure 3-1.

Table 3-1: Table of Nearest Receptors

Receptor ID	Address	Direction from Site	Lot and DP	Approximate distance to proposed development	Easting	Northing	Type of receiver
R1	334 Park Road Wallacia	W	Lot 1 DP1145597	120 m	285021.638	6249439.302	Residential
R2	322 Park Road Wallacia	W	Lot 1 DP1145716	225 m	284933.078	6249512.917	Residential
R3	323-341 Park Road Wallacia	NW	Lot 8 DP666928	170 m	285037.927	6249646.635	Residential
R4	343-351 Park Road Wallacia	NNW	Lot 71 DP594632	175 m	285134.703	6249714.806	Residential
R5	353-361 Park Road Wallacia	N	Lot 72 DP594632	220 m	285292.865	6249747.295	Residential
R6	363 Park Road Luddenham	NE	Lot 6 DP651102	200 m	285481.825	6249581.294	Residential
R7	364 Park Road Luddenham	E	Lot 4 DP653236	115 m	285403.646	6249481.174	Residential
R8	386 Park Road Luddenham	E	Lot 1 DP557920	245 m	285485.226	6249150.151	Residential
R9	384 Park Road Luddenham	E	Lot 2 DP557920	275 m	285490.185	6248944.237	Residential
R10	45 Willowdene Avenue Luddenham	S	Lot 3 DP248069	565 m	285042.472	6248548.515	Residential
R11	115 Willowdene Avenue Luddenham	SW	Lot 4 DP248069	720 m	284827.59	6248489.29	Residential
R12	288A Park Road Wallacia	WSW	Lot 1 DP1195400	610 m	284516.692	6249018.95	Residential
R13	32 Willowdene Avenue Luddenham	SE	Lot 32 DP771596	865 m	285871.683	6248638.714	School
R14	288A Park Road Wallacia	W	Lot 1 DP1195400	445 m	284654.005	6249225.993	Industrial
R15	380 Park Road Luddenham	E	Lot 1 DP215057	185 m	285441.875	6249297.194	Industrial

Note: distances measured from the boundaries of the site development area

Figure 3-1: Map of Nearest Receptors

Source: Six Maps 2020

N Not to scale	**Legend:** Site development location Receiver location	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

4. EXISTING ACOUSTIC ENVIRONMENT

The level of background noise varies over the course of any 24 hour period, typically from a minimum at 3.00am to a maximum during morning and afternoon traffic peak hours. Therefore the NSW EPA Noise Policy for Industry (2017) requires that the level of background and ambient noise be assessed separately for the daytime, evening and night time periods. The Noise Policy for Industry defines these periods as follows:

- **Day** – the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays;
- **Evening** – the period from 6pm to 10pm; and
- **Night** – the remaining periods.

4.1 NOISE MONITORING EQUIPMENT AND METHODOLOGY

Background noise level measurements were carried out using a Svantek SVAN 957 Precision Sound Level Meter (attended noise monitoring) and one (1) Acoustic Research Laboratories statistical Environmental Noise Logger, type EL-215 (unattended noise monitoring). The instrument sets were calibrated by a NATA accredited laboratory within two years of the measurement period. Calibration certificates have been included in Attachment 2.

To ensure accuracy and reliability in the results, field reference checks were applied both before and after the measurement period with an acoustic calibrator. There were no excessive variances observed in the reference signal between the pre-measurement and post-measurement calibration. The instruments were set on A-weighted Fast response and noise levels were measured over 15-minute statistical intervals. QA/QC procedures applied for the measurement and analysis of noise levels have been presented in Attachment 3. The microphones were fitted with windsocks and were positioned between 1.2 metres and 1.5 metres above ground level. Details of the instrumentation and setting utilised are provided in Table 4-1.

Table 4-1: Instrumentation and Setup Details

Type of Monitoring	Equipment	Serial Number	Setup Details
Long-term Unattended	ARL-215	194702	A-weighted Fast Response 15 minute integration period
Short-term Attended	Svantek SVAN957 Type 1 Integrating Sound and Vibration analyser	15335	Three channels: A-weighted Fast Response C-weighted Fast Response A-weighted Impulse Response 15 minute integration period 1/3 octave band recorded every 100 ms Logger file Recorded at steps of 100 ms

4.2 MEASUREMENT LOCATION

Unattended long-term noise monitoring was undertaken from 17th March 2020 to 29th March 2020 at one representative location at 344 Park Road, Wallacia.

Attended noise monitoring was undertaken at the same location on 17th March 2020. The attended and noise logging locations are shown in Figure 3-1 below. Noise Logger Charts are presented in Attachment 3.

Figure 4-1: Noise Logging Location

Source: Google Maps 2020

N Not to scale	**Legend**: Noise logging locations Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

4.3 MEASURED NOISE LEVELS

4.3.1 Long-Term Unattended Noise Monitoring Results

The data was analysed to determine a single assessment background level (ABL) for each day, evening and night time period, in accordance with the NSW EPA Noise Policy for Industry. That is, the ABL is established by determining the lowest tenth-percentile level of the L_{A90} noise data over each period of interest. The background noise level or rating background level (RBL) representing the day, evening and night assessment periods is based on the median of individual ABL's determined over the entire monitoring period.

The results of the long-term unattended noise monitoring are displayed in Table 4-2. Daily noise logger graphs have been included in Attachment 3.

Table 4-2: Unattended Noise Monitoring Results at Logger Location, dB(A)

Date	Average L_1			Average L_{10}			ABL (L_{90})			L_{eq}		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
17/03/2020	65	62	57	57	55	48	45	43	40	55	53	47
18/03/2020	65	62	61	57	56	52	42	45	39	55	53	52
19/03/2020	65	63	61	58	56	53	41	44	40	55	53	52
20/03/2020	-	-	61	-	-	55	-	-	43	-	-	53
21/03/2020	65	59	59	57	52	51	41	40	39	54	50	50
22/03/2020	63	61	56	55	53	47	40	40	40	53	51	46
23/03/2020	65	60	60	57	53	51	41	41	39	55	50	53
24/03/2020	65	60	60	58	53	51	41	39	37	55	50	51
25/03/2020	-	-	59	-	-	50	-	-	38	-	-	50
26/03/2020	63	61	60	56	54	51	40	41	39	53	52	51
27/03/2020	65	61	-	57	54	-	41	45	-	55	52	-
28/03/2020	64	-	57	56	-	47	41	**-**	**37**	54	**-**	**47**
29/03/2020	62	-	53	54	-	46	38	-	40	53	-	45
Average	**64**	**61**	**59**	**57**	**54**	**50**	*	*	*	*	*	*
Median (RBL)	*	*	*	*	*	*	**41**	**41**	**39**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**54**	**52**	**51**

Note: - indicates values that has not been considered due to adverse weather conditions.
* Indicates values that are not relevant to that noise descriptor.
Value in bold indicates relevant noise descriptor.

4.3.2 Short-Term Attended Noise Monitoring Results

Given that the results of the unattended noise monitoring are affected by all ambient noise sources such as local fauna, road traffic and industrial sources, it is not possible to determine with precision the exact existing industrial noise contribution based on unattended monitoring alone. Therefore, the attended noise monitoring allows for a more detailed understanding of the existing ambient noise characteristics and a more meaningful final analysis to be undertaken. The results of the short-term attended noise monitoring are displayed in Table 4-3.

Table 4-3: Attended Noise Monitoring Results, dB(A)

Location / Time	Noise Descriptor				Comments
	L_{Aeq}	L_{A90}	L_{A10}	L_{A1}	
344 Park Road, Wallacia 3.16pm	54	45	57	65	*Passing trucks <69 dB(A)* *Plane <62 dB(A)* *Birds <57 dB(A)* *Passing cars <60 dB(A)* *Barking dog <50 dB(A)* *Wind <53 dB(A)* *Insects <45 dB(A)* *Motorised pesticide sprayer <44 dB(A)* *Noise dominated by frequent traffic on Park Road, insect noise and bird noise. Dog barks consistently and constant distant traffic. A few small planes overhead.*

5. METEOROLOGICAL CONDITIONS

Wind and temperature inversions may affect the noise emissions from the site and are to be incorporated in the assessment when considered to be a feature of the area.

In this section, an analysis of the 2019 weather data has been conducted to establish whether significant winds are characteristic of the area.

5.1 WIND EFFECTS

Wind is considered to be a feature where source-to-receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30% or more of the time in any assessment period in any season.

5.1.1 Wind Rose Plots

Wind rose plots show the direction that the wind is coming from, with triangles known as "petals". The petals of the plots in the figures summarise wind direction data into 8 compass directions i.e. north, north-east, east, south-east, etc. The length of the triangles, or "petals", indicates the frequency that the wind blows from that direction. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes.

Thus, the segments of a petal show what proportion of wind for a given direction falls into each class. The proportion of time for which wind speed is less than 0.5 m/s, when speed is negligible, is referred to as calm hours or "calms". Calms are not shown on a wind rose as they have no direction, but the proportion of time consisting of the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axis, which denote frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are similar in size. The frequencies denoted on the axes are indicated beneath each wind rose.

5.1.2 Local Wind Trends

Seasonal wind rose plots for this site utilising Badgerys Creek AWS data have been included in Figure 5-1, Figure 5-2 and Figure 5-3 for day, evening and night periods respectively.

Figure 5-1: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Day time

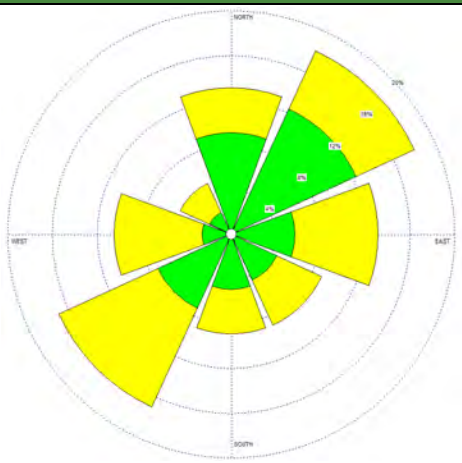
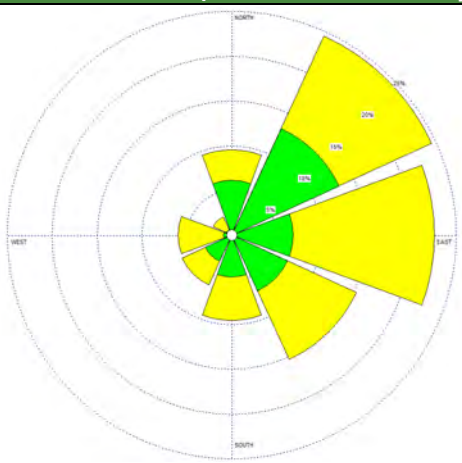
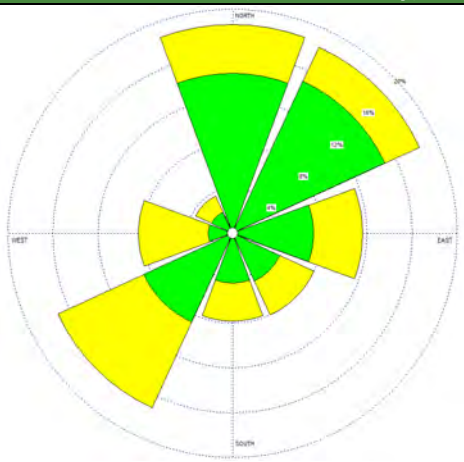
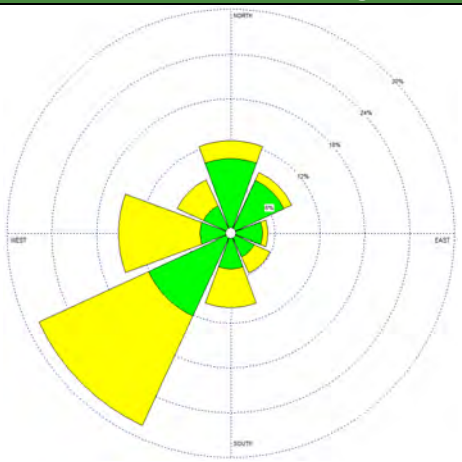
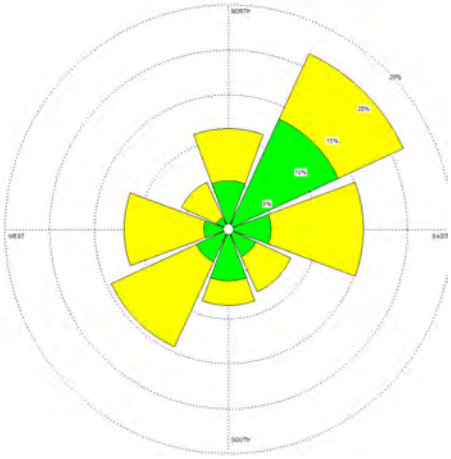
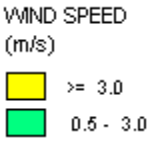
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 3.15 m/s Calms Frequencies: 5.47% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 3.27 m/s Calms Frequencies: 4.09% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.62 m/s Calms Frequencies: 6.62% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 3.05 m/s Calms Frequencies: 6.72% Axis Frequencies: 6%, 12%, 18%, 24%, 30%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 3.70 m/s Calms Frequencies: 4.20% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Figure 5-2: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Evening time

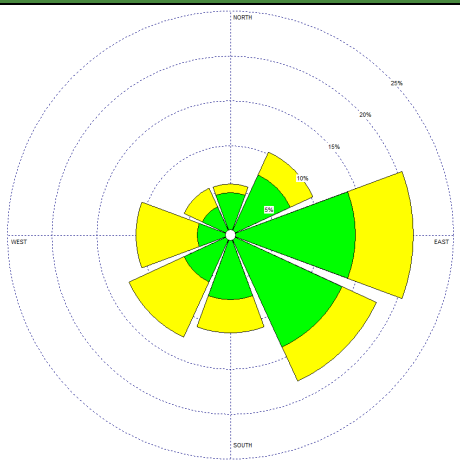
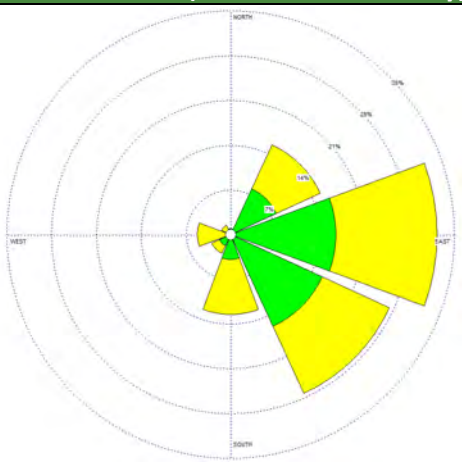
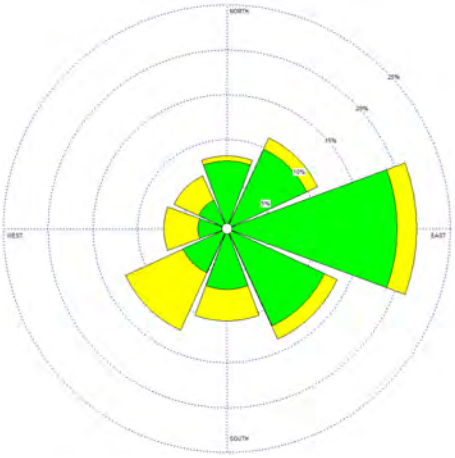
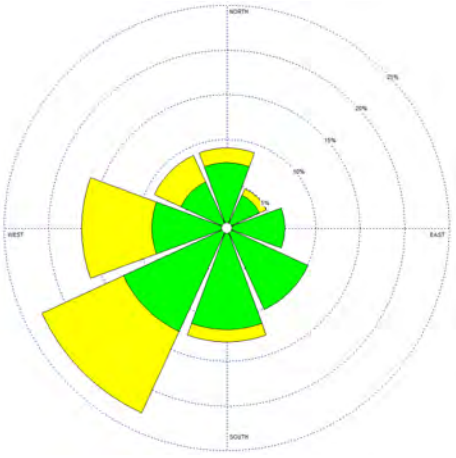
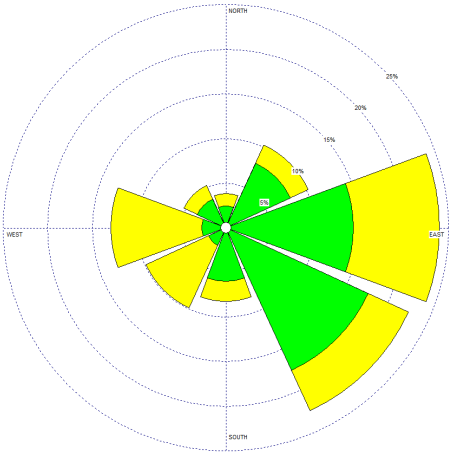
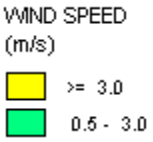
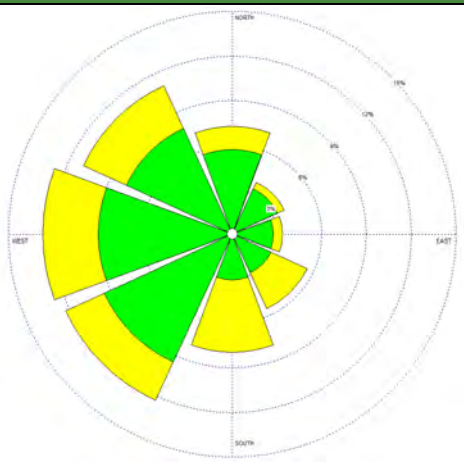
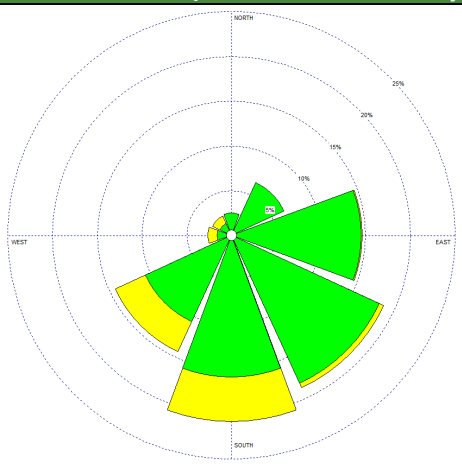
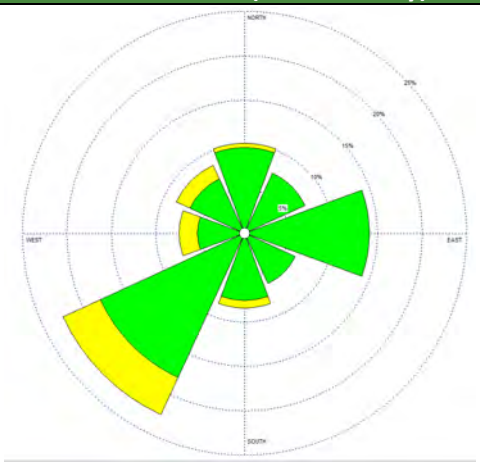
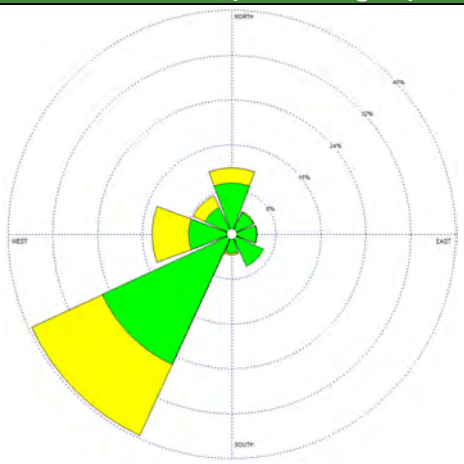
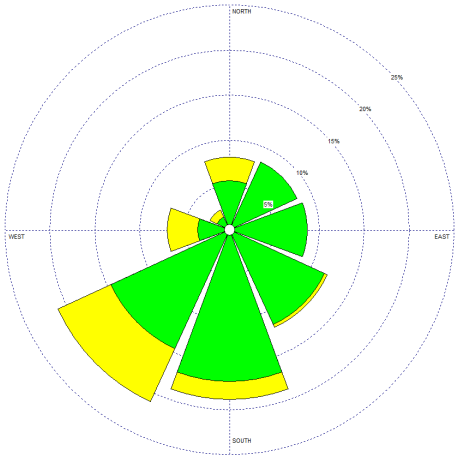
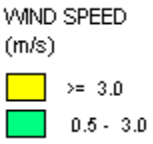
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.63 m/s Calms Frequencies: 5.91% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 4.47 m/s Calms Frequencies: 1.32% Axis Frequencies: 7%, 14%, 21%, 28%, 35%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.13 m/s Calms Frequencies: 9.51% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 2.32 m/s Calms Frequencies: 8.70% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.96 m/s Calms Frequencies: 3.30% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Figure 5-3: Wind Rose Plots – BOM Badgerys Creek AWS ID 067108 – 2019 – Night time

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 1.76 m/s Calms Frequencies: 13.48% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 1.47 m/s Calms Frequencies: 17.55% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 1.49 m/s Calms Frequencies: 15.34% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 2.26 m/s Calms Frequencies: 7.97% Axis Frequencies: 8%, 16%, 24%, 32%, 40%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 1.74 m/s Calms Frequencies: 13.80% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

Appendix D2 of the Noise Policy for Industry (EPA, 2017), refers to utilising the Noise Enhancing Wind Analysis (NEWA) program on the NSW EPA website to determine the significance of source-to-receiver winds.

Table 5-1 below contains the noise wind component analysis from the NEWA software. Wind speeds are taken up to 3 m/s and wind direction is taken from source-to-receiver, plus and minus 45 degrees, as per appendix D2 of the Noise Policy for Industry.

It can be seen from Table 5-1 that there are two instances where during a period/season, more than 30% of wind speeds are less than 3 m/s in the plus and minus 45 degree arc from source to receiver.

Therefore, based on the information presented from the weather data, source-to receiver wind speeds of 3 m/s or are present for more than 30% of the time during the winter night time period. Therefore, wind effects have been included in the assessment.

Table 5-1: Noise Wind Component Analysis 2019 Badgerys Creek

Receiver	Day				Evening				Night			
	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring
R1	14.3	13.8	7.2	9.0	27.0	22.0	9.8	25.5	17.7	3.4	0.5	7.9
R2	14.6	13.6	7.1	8.8	26.3	22.3	11.4	26.1	19.3	4.6	0.5	8.2
R3	10.9	11.2	5.6	8.0	19.9	21.5	11.1	20.3	20.0	8.4	0.7	10.6
R4	7.3	8.5	4.0	6.0	14.6	18.5	7.9	17.3	16.0	8.3	0.7	9.5
R5	10.4	13.6	10.9	9.5	13.4	26.4	22.6	19.5	29.5	35.3	24.2	30.9
R6	7.3	12.4	15.7	7.7	5.1	17.1	27.2	9.9	21.0	29.8	31.5	26.4
R7	6.9	12.9	16.7	7.6	4.8	16.0	27.2	7.1	20.0	28.2	32.4	26.3
R8	9.7	16.2	23.4	11.3	2.3	6.8	23.9	2.7	2.9	9.8	23.8	8.3
R9	14.0	20.7	25.9	17.1	2.0	9.0	23.9	2.5	3.4	10.6	25.5	9.0
R10	23.9	20.0	19.0	20.7	7.8	8.4	13.6	9.3	6.6	5.8	15.7	7.6
R11	23.5	19.6	16.4	22.5	13.1	8.4	9.2	12.6	8.2	4.9	12.0	7.7
R12	19.5	12.9	6.9	13.5	24.7	12.0	4.6	19.2	9.4	0.1	0.6	5.1
R13	11.8	18.5	26.1	14.9	1.8	9.0	23.4	2.2	3.3	10.4	25.8	9.0
R14	16.9	12.5	6.2	11.0	28.0	15.5	6.8	21.7	11.1	0.4	0.4	5.5
R15	6.1	14.2	21.4	8.9	2.8	9.5	26.9	3.0	5.1	11.3	24.4	10.3

Noise enhancing meteorological conditions occur for 30% or more of the period and season

5.2 TEMPERATURE INVERSIONS

Temperature inversions are considered a feature where they occur more than 30% of the total night time during winter (June, July and August) between 6:00pm and 7:00am. This is different from the night noise assessment period over which inversions are to be assessed, which is from 10:00pm to 7:00am.

This involves determining the percentage occurrence of moderate (Class F) and strong (Class G) inversions. Weak inversions (Class E) should not be included in the analysis.

The analysis conducted on the 2019 weather data highlighted that during winter 27.51%of the nights presented temperature inversion conditions, therefore these effects have not been included in the noise impact assessment.

5.2.1 Weather Conditions Considered in the Assessment

The following conditions were considered as the facility will only operate during the day time period:

Condition A: neutral weather conditions
The meteorological condition considered in the noise model has been displayed in detail in Table 5-2.

Table 5-2: Meteorological Conditions Assessed in Noise Propagation Modelling

Condition	Classification	Ambient Temp.	Ambient Humidity	Wind Speed	Wind Direction (blowing from)	Temperature Inversion	Affected Receptors	Applicability
A	Neutral	10°C	70%	–	–	No	All	All periods

6. CURRENT LEGISLATION AND GUIDELINES

6.1 NSW EPA NOISE POLICY FOR INDUSTRY

6.1.1 Introduction

The NSW Noise Policy for Industry was developed by the NSW EPA primarily for the assessment of noise emissions from industrial sites regulated by the NSW EPA.

The policy sets out two components that are used to assess potential site-related noise impacts. The intrusiveness noise level aims at controlling intrusive noise impacts in the short-term for residences. The amenity noise level aims at maintaining a suitable amenity for particular land uses including residences in the long-term. The more stringent of the intrusiveness or amenity level becomes the project noise trigger levels for the project.

6.1.2 Project Intrusiveness Noise Level

The project intrusiveness noise level is determined as follows:

$L_{Aeq,\ 15\ minute}$ = rating background noise level + 5 dB

Where the $L_{Aeq,(15minute)}$ is the predicted or measured L_{Aeq} from noise generated within the project site over a fifteen minute interval at the receptor.

This is to be assessed at the most affected point on or within the residential property boundary or if that is more than 30 m from the residence, at the most affected point within 30 m of the residential dwelling.

6.1.3 Amenity Noise Level

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW Noise Policy for Industry 2017. The relevant recommended noise levels applicable from the Noise Policy for Industry are reproduced in Table 6-1. The suburban category has been selected for the residential noise amenity criteria to match the characteristics of the area.

Table 6-1: Amenity noise levels.

Receiver	Noise Amenity Area	Time of Day	L_{Aeq} dB(A) Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
School Classroom	All	Noisiest 1-hour period when in use	Internal: 40[1]
			External: 50[2]
Industrial premises	All	When in use	70

Note: 1) In the case where existing schools are affected by noise from existing sources, the acceptable L_{Aeq} noise level may be increased to L_{Aeq} 1 hour.
2) Where internal amenity noise levels are specified, they refer to the noise level at the centre of the habitable room that is most exposed to the noise and apply with windows opened sufficiently to provide adequate ventilation, except where alternative means of ventilation complying with the Building Code of Australia are provided. In cases where gaining internal access for monitoring is difficult, then external noise levels 10 dB(A) above the internal levels apply.

Source: Table 2.2 and Section 2.6, NSW Noise Policy for Industry

The project amenity noise level for industrial developments = recommended amenity noise level minus 5 dB(A)

The following exceptions to the above method to derive the project amenity noise levels apply:

1. *In areas with high traffic noise levels*
2. *In proposed developments in major industrial clusters*
3. *Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.*
4. *Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for development.*

This development is not considered to be captured by the above exceptions.

6.1.4 Sleep Disturbance Criteria

In accordance with the NSW EPA Noise Policy for Industry, the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night-time noise levels at a residential location exceed:

- **$L_{Aeq,\ 15\ minute}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or**
- **L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,**

a detailed maximum noise level assessment should be undertaken.

6.1.5 Project Noise Trigger Levels

The project noise trigger levels for the site have been established in accordance with the principles and methodologies of the NSW Noise Policy for Industry (EPA, 2017).

The table below presents the rating background level, project intrusive noise level, recommended amenity noise level, and project amenity noise level. The project noise trigger level is the lowest value of intrusiveness or project amenity noise level after conversion to $L_{Aeq\ 15\ minute}$, dB(A) equivalent level. Sleep disturbance trigger levels associated with operational activities are presented in Table 6-2.

Different time periods apply for the noise criteria as the intrusive criterion considers a 15 minute assessment period while the amenity criterion requires assessment over the total length of time that a site is operational within each day, evening or night period. In order to ensure compliance under all circumstances, a 15 minute period assessment has been considered for all receptors.

Table 6-2: Project Noise Trigger Levels (PNTL) for Operational Activities, dB(A)

Receiver	Type of Receptor	Time of day	Rating background noise level	Project intrusiveness noise level $L_{eq\ 15\ minute}$	Recommended amenity noise level $L_{Aeq\ period}$	Project amenity noise level $L_{Aeq\ 15\ minute}$[1]	PNTL $L_{Aeq\ 15\ minute}$	Sleep Disturbance L_{Amax}
R1-R12	Residential – Rural	Day	41	**46**	50	48	**46**	-
		Evening	41	46	45	**43**	**43**	-
		Night	39	44	40	**38**	**38**	**52**
R13	School	When in use	-	-	$L_{Aeq\ 1hr}$ = 50 (external)	50[2]	**50**	-
R14-15	Industrial Premises	When in use	-	-	70	68	**68**	-

Notes:
1) These levels have been converted to $L_{Aeq\ 15\ minute}$ using the following: $L_{Aeq\ 15\ minute} = L_{Aeq\ period} + 3$ dB (NSW Noise Policy for Industry Section 2.
2) This value has been conservatively assumed that $L_{Aeq\ 15\ minute}$ is equivalent to $L_{Aeq\ 1hr}$.

6.2 NSW Road Noise Policy

The NSW Road Noise Policy (RNP) has been adopted to establish the noise criteria for the potential noise impact associated with additional traffic generated by the proposed development. The RNP was developed by the NSW EPA primarily to identify the strategies that address the issue of road traffic noise from:

- Existing roads;
- New road projects;
- Road redevelopment projects; and
- New traffic-generating developments.

6.2.1 Road Category

The subject site is accessed via Park Road. Based on the RNP road classification description, Park Road is classified as a 'local road'. The closest resident is 380 Park Road, Luddenham 30 m from the road.

6.2.2 Noise Assessment Criteria

Section 2.3 of the RNP outlines the criteria for assessing road traffic noise. The relevant sections of Table 3 of the RNP are shown in Table 6-3.

Table 6-3: Road Traffic Noise Assessment Criteria For Residential Land Uses, dB(A)

Road Category	Type of Project/Land Use	Assessment Criteria, dB(A)*	
		Day (7am-10pm)	Night (10pm-7am)
Local roads	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq\ (1\ hour)}$ 55 dB	$L_{Aeq\ (1\ hour)}$ 50 dB

* Measured at 1 m from a building façade.

6.2.3 Relative Increase Criteria

In addition to the assessment criteria outlined above, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development, must be considered. Residences experiencing increases in total traffic noise levels above the relative criteria should also be considered for mitigation as described in Section 3.4 of the RNP. For road projects where the main subject road is a local road, the relative increase criterion does not apply.

As the site is located on a local road, the relative increase criteria does not apply.

6.2.4 Exceedance of Criteria

If the criteria shown in Table 6-3 cannot be achieved, justification should be provided that all feasible and reasonable mitigation measures have been applied.

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.

6.2.5 Assessment Locations for Existing Land Uses

Table 6-4: Assessment Locations for Existing Land Uses

Assessment Type	Assessment Location
External noise levels at residences	The noise level should be assessed at 1 metre from the façade and at a height of 1.5 metres from the floor. Separate noise criteria should be set and assessment carried out for each façade of a residence, except in straightforward situations where the residential façade most affected by road traffic noise can be readily identified. The residential noise level criterion includes an allowance for noise reflected from the façade ('façade correction'). Therefore, when taking a measurement in the free field where reflection during measurement is unlikely (as, for instance, when measuring open land before a residence is built), an appropriate correction – generally 2.5 dB – should be added to the measured value. The 'façade correction' should not be added to measurements taken 1 metre from the façade of an existing building. Free measurements should be taken at least 15 metres from any wall, building or other reflecting pavement surface on the opposite side of the roadway, and at least 3.5 metres from any wall, building or other pavement surface, behind or at the sides of the measurement point which would reflect the sound.
Noise levels at multi-level residential buildings	The external points of reference for measurement are the two floors of the building that are most exposed to traffic noise. On other floors, the internal noise level should be at least 10 dB less than the relevant external noise level on the basis of openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Internal noise levels	Internal noise levels refer to the noise level at the centre of the habitable room that is most exposed to the traffic noise with openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Open space – passive or active use	The noise level is to be assessed at the time(s) and location(s) regularly attended by people using the space. In this regard, 'regular' attendance at a location means at least once a week.
Commercial or industrial premises	The noise level is to be assessed at the reasonably most affected point or within the property boundary. This requirement should not be read to infer that the noise level only applies at the 'reasonably worst-affected location'.

6.2.6 Road Traffic Project Specific Noise Levels

The selected project specific noise levels associated with road traffic noise are presented in Table 6-5.

Table 6-5: Project Specific Noise Levels Associated with Road Traffic, dB(A)

Receptor along	Period	Assessment Criteria
Park Road (Local Road)	Day	55 $L_{Aeq,\ 15\ hour}$
	Night	50 $L_{Aeq,\ 9\ hour}$

6.3 CONSTRUCTION NOISE CRITERIA

Criteria for construction and demolition noise has been obtained from the NSW Interim Construction Noise Guideline (DECC, 2009). Guidance for construction vibration has been taken from British Standard BS7385-Part 2: 1993 '*Evaluation and measurement for vibration in buildings*' and other standards.

6.3.1 NSW Interim Construction Noise Guideline

Residential Criteria

Table 2 of the Interim Construction Noise Guideline (DECC, 2009), sets out construction noise management levels for noise at residences and how they are to be applied. The management noise levels are reproduced in Table 6-6 below. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected' noise management level.

Table 6-6: Management Levels at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq(15\ minute)}$	How to Apply
Recommended standard hours: Monday to Friday 7am – 6pm Saturday 8am – 1pm No work on Sundays or Public Holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15\ minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level. • The proponent should also inform all potentially affected residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school, or mid-morning or mid-afternoon for works near residents. 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see Section 7.2.2 (RNP)

Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m from the residence.

Other Land Uses

Table 6-7 sets out management levels for construction noise at other land uses applicable to the surrounding area.

Table 6-7: Management Levels at Other Land Uses

Land use	Management Level $L_{Aeq(15\ minute)}$ (applies when properties are being used)
Industrial Premises	External Noise Level 75 dB(A)
Schools	Internal Noise Level 45 dB(A) External Noise Level 55 dB(A)

There are no other sensitive land uses in the area surrounding the site.

Noise Criterion

The noise criterion for construction noise is presented in Table 6-8.

Table 6-8: Construction Noise Criterion dB(A)

Receiver	Land Use	Period	RBL L_{A90}	Management Level $L_{Aeq(15\ minute)}$
R1-R12	Residential	Standard Hours	41	51
R13	School	When in use	-	55
R14-R15	Industrial	When in use	-	75

6.3.2 Vibration Criteria

Vibration criteria from construction works are outlined in this section, including guidelines to avoid cosmetic damage, structural damage or human discomfort. There is no specific vibration standard in NSW to assess cosmetic or structural damage to buildings. Usually the British Standard BS 7385–Part 2: 1993 '*Evaluation and measurement for vibration in buildings*' or the German standard DIN4150–Part 3: 1999 '*Structural Vibration Part 3 – effects of vibration on structures*' is referenced. The *Assessing Vibration – A Technical Guideline* (DEC, 2006) provides guidance on preferred levels for human exposure.

6.3.3 BS 7385-2:1993

The British Standard BS 7385–Part 2:1993 '*Evaluation and measurement for vibration in buildings*' provides vibration limits to avoid cosmetic damage on surrounding structures. Limits are set at the lowest limits where cosmetic damage has previously been shown.

Table 6-9: Vibration criteria for cosmetic damage (BS 7385:2 1993)

Type of building	Peak component particle velocity in frequency range of predominant pulse		
	4 Hz to 15 Hz	15 Hz to 40 Hz	40 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above		
Unreinforced or light framed structures. Residential or light commercial type buildings	15 to 20 mm/s	20 to 50 mm/s	50 mm/s

6.3.4 DIN4150-3:1999

The German standard DIN4150-Part 3:1999 'Structural Vibration Part 3 – effects of vibration on structures' has also been considered. The German standard is considered more onerous than the British standard, and specifically includes more stringent limits to avoid structural damage to surrounding heritage buildings.

Table 6-10: Structural damage criteria heritage structures (DIN4150-3 1999)

Type of building	Peak component particle velocity (PPV) mm/s			
	Vibration at the foundation at a frequency of:			Vibration of horizontal plane of highest floor at all frequencies
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	
Buildings used for commercial purposes, industrial buildings or buildings of similar design	20	20 to 40	40 to 50	40
Residential dwellings and similar	5	5 to 15	15 to 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified as the two categories above, and are of intrinsic value (for example heritage listed buildings).	3	3 to 8	8 to 10	8

6.3.5 Human Exposure

The guideline *Assessing Vibration – A Technical Guideline* (DEC, 2006) describes preferred criteria for human exposure. The limits describe values where occupants of buildings would be impacted by construction work.

Table 6-11: Preferred and maximum weighted rms z-axis values, 1-80 Hz

Location	Daytime		Night time	
	Preferred	Maximum	Preferred	Maximum
Continuous Vibration (weighted root mean square (rms) vibration levels for continuous acceleration (m/s^2) in the vertical direction)				
Residences	0.01	0.02	0.007	0.014
Offices, schools, educational institutions and places of worship	0.02	0.04	0.02	0.04
Workshops	0.04	0.08	0.04	0.08
Impulsive Vibration (weighted root mean square (rms) vibration levels for impulsive acceleration (m/s^2) in the vertical direction)				
Residences	0.3	0.6	0.1	0.2
Offices, schools, educational institutions and places of worship	0.64	1.28	0.64	1.28
Workshops	0.64	1.28	0.64	1.28
Intermittent Vibration (m/s)				
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

7. OPERATIONAL NOISE IMPACT ASSESSMENT

An outline of the predictive noise modelling methodology and operational noise modelling scenarios has been provided in this section of the report.

7.1 MODELLING METHODOLOGY

Noise propagation modelling was carried out using the ISO 9613-2:1996 algorithm within SoundPLAN. This model has been extensively utilised by Benbow Environmental for assessing noise emissions for existing and proposed developments and is recognised by regulatory authorities throughout Australia. The model allows for the prediction of noise from a site at the specified receptor, by calculating the contribution of each noise source. Other model inputs included the noise sources, topographical features of the subject area, surrounding buildings, noise walls and receiver locations.

The modelling scenario has been carried out using the L_{Aeq} descriptor. Using the model, noise levels were predicted at the potentially most affected receivers to determine the noise impact against the project specific noise levels and other relevant noise criteria in accordance with the NSW Noise Policy for Industry (EPA, 2017).

7.1.1 Noise Sources

The sound power levels for the identified noise sources associated with the operational activities have been taken from Benbow Environmental's database.

A-weighted third octave band centre frequency sound power levels have been used and are presented in Table 7-1 below. The noise sources utilised as part of this assessment comprise of the primary noise generating activities associated with the effective operation of the proposed development.

Table 7-1: A-weighted Sound Power Levels Associated with Operational Activities, dB(A)

Noise Source	Height	Max	Overall	Third Octave Band Centre Frequency (Hz)									
				25	31	40	50	63	80	100	125	160	200
				250	315	400	500	630	800	1000	1250	1600	2000
				2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Shredder	1 m	-	108	41	43	46	52	55	65	72	78	85	88
				89	91	95	98	98	100	97	99	97	97
				95	94	94	93	89	85	80	75	69	61
Mobile Crusher	2 m	-	108	41	43	46	52	55	65	72	78	85	88
				89	91	95	98	98	100	97	99	97	97
				95	94	94	93	89	85	80	75	69	61
Baler	1 m	-	93	-	-	-	-	58	-	-	76	-	-
				84	-	-	83	-	-	91	-	-	83
				-	-	81	-	-	75	-	-	-	-
Waste Screen (Trommel screen)	1 m	-	104	42	44	59	64	75	76	75	81	82	83
				83	84	90	93	90	92	94	95	95	95
				94	93	91	89	86	82	77	73	67	59
Air separator	1 m	-	102	40	42	57	62	73	74	73	79	80	81
				81	82	88	91	88	90	92	93	93	93
				92	91	89	87	84	80	75	71	65	57
Bounce separator (Trommel screen)	1 m	-	105	43	45	60	65	76	77	76	82	83	84
				84	85	91	94	91	93	95	96	96	96
				95	94	92	90	87	83	78	74	68	60
Vibrating Screen	1 m		104	82	80	89	90	97	94	89	92	90	90
				87	86	90	92	88	89	89	90	90	89
				88	87	86	84	82	79	76	73	69	64
20T Excavator	2 m	-	102	-	-	-	-	82	-	-	85	-	-
				91	-	-	97	-	-	96	-	-	95
				-	-	92	-	-	85	-	-	-	-
30T Excavator	2 m	-	103	-	-	-	-	96	-	-	94	-	-
				93	-	-	94	-	-	95	-	-	95
				-	-	90	-	-	83	-	-	-	-
Front End Loader (<111 kW at 2000 rpm)	2 m	-	102	44	51	59	65	64	77	77	78	80	85
				89	85	85	88	88	90	93	94	93	92
				91	90	88	87	84	81	77	73	66	60
Aggregate Transfer	2 m	110	106	-	12	-	-	33	-	-	48	-	-
				63	-	-	75	-	-	82	-	-	86
				-	-	88	-	-	88	-	-	76	-
Conveyor	1 m	-	80	29	31	29	35	38	49	45	49	53	57
				57	65	68	70	68	71	70	72	71	70
				63	63	59	56	52	49	44	42	36	29
LPG Forklift	1 m	-	92	36	59	61	51	65	66	77	68	60	62
				66	69	74	81	78	78	81	85	84	84
				81	75	71	71	65	63	56	51	45	42
Truck Engine	1.5 m	106	103	44	48	57	65	70	73	78	78	80	82
				83	85	94	98	94	96	89	88	82	87
				85	84	82	83	83	82	78	-	-	-

Table 7-1: A-weighted Sound Power Levels Associated with Operational Activities, dB(A)

Noise Source	Height	Max	Overall	Third Octave Band Centre Frequency (Hz)									
				25	31	40	50	63	80	100	125	160	200
				250	315	400	500	630	800	1000	1250	1600	2000
				2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Truck Exhaust	3 m	104	101	42	46	55	63	68	71	76	76	78	80
				81	83	92	96	92	94	87	86	80	85
				83	82	80	81	81	80	76	-	-	-
Sweeper	1 m	-	83	-	-	-	-	80	-	-	75	-	-
				69	-	-	75	-	-	71	-	-	67
				-	-	61	-	-	58	-	-	-	-

7.1.2 Modelling Scenario

One day scenario was modelled for operational noise emissions. Scenario 1 covers the day period with neutral weather conditions and outdoor and indoor noise sources. Figure 7-1 shows the location of the noise sources for the operational scenario.

Table 7-2: Modelled Noise Sources

Scenario	Description
Scenario 1: Day Operations Neutral weather conditions	This scenario includes the following: Outdoor noise sources • Truck movements (8 per 1 hour period) Indoor noise sources • Truck movements through loading area (8 per 1 hour period) • Use of 20T excavator x 1; • Use of 30T excavator x 1; • Use of front end loader x 2; • Use of shredder; • Use of mobile crusher; • Use of waste trommel screen; • Use of air separator; • Use of bounce separator; • Use of vibrating screen x 3; • Use of line conveyors; • Use of baler; • Use of sweeper; and • Use of LPG forklift.

Figure 7-1: Day operations – broad view

Figure 7-2: Day operation sources

Figure 7-3: Evening operation sources

Figure 7-4: Night operation sources

7.1.3 Modelling Assumptions

The relevant assessment period for operational noise emissions is 15 minutes when assessing noise levels against the Intrusive Criterion; therefore noise source durations detailed throughout the following assumptions section should be considered per 15 minute period in view of potential noise impacts under worst-case scenarios. Each assessment-specific assumption has been detailed below:

- Topographical information has been obtained from Google Earth and implemented in SoundPLAN.
- All ground areas surrounding the subject site and the nearest nominated occupancies have been modelled considering different ground factors ranging from 0 to 1. The site and surrounding industrial areas have been modelled with a ground absorption factor of 0 (hard) and the surrounding rural area 0.9 (soft).
- Surrounding buildings have been included in the noise model.
- Aggregate transfer from the conveyors inside to the stockpiles in the bays have been modelled at 2 m above the ground.
- Indoor sources are all assumed to be point sources and are assumed to operate 100% of the time as a worst case scenario.
- All residential receivers were modelled at 1.5 m above ground level at the most noise-affected point on the property within 30 m of the dwelling.
- The main building has been modelled with sheet-steel 1 mm double corregated steel facades (R_w 36 dB) and sheet-steel corregated steel with miwo roof, 120 mm thick in total (R_w 32 dB).

Day Scenario

- 2 truck movement looping around the warehouse is assumed to enter and leave the site every 15 minutes in a worst case scenario. Trucks have been assumed to travel on the site at 25 km/h. Trucks are modelled in sound plan as line sources, utilising moving point source definition.
- Roller shutter doors 1-6 and 10-11 have been modelled in the open position (R_w 0 dB) for 5 minutes every 15 minute period.
- Roller shutter doors 7-9 have been modelled in the closed position 100% of the time as trimdek 0.48 R_w 22 dB.
- Pedestrian access doors have been modelled in the open position (R_w 0 dB) for 3 minutes every 15 minute period.
- The front end loader has been modelled as a point source outdoors and is assumed to operate 100% of the time as a worst case scenario.

Figure 7-5: Building diagram view from the east

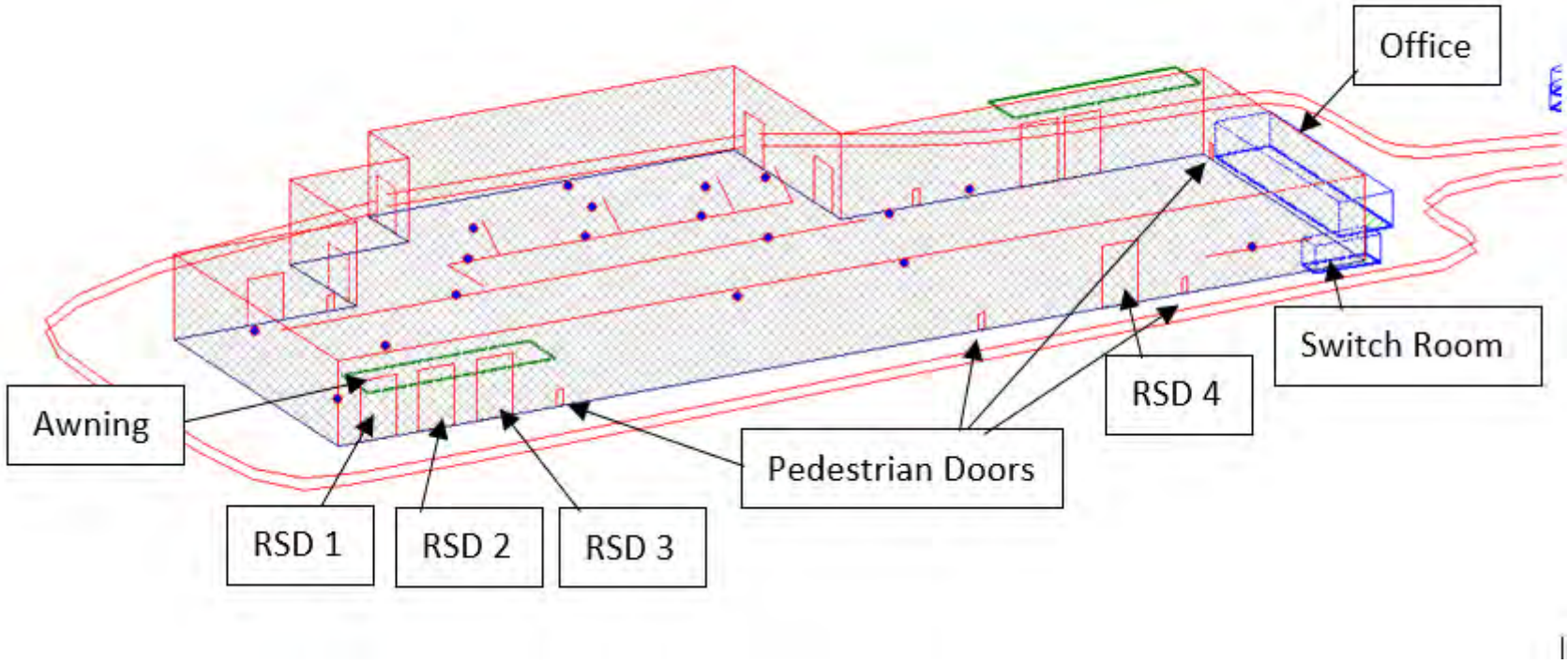
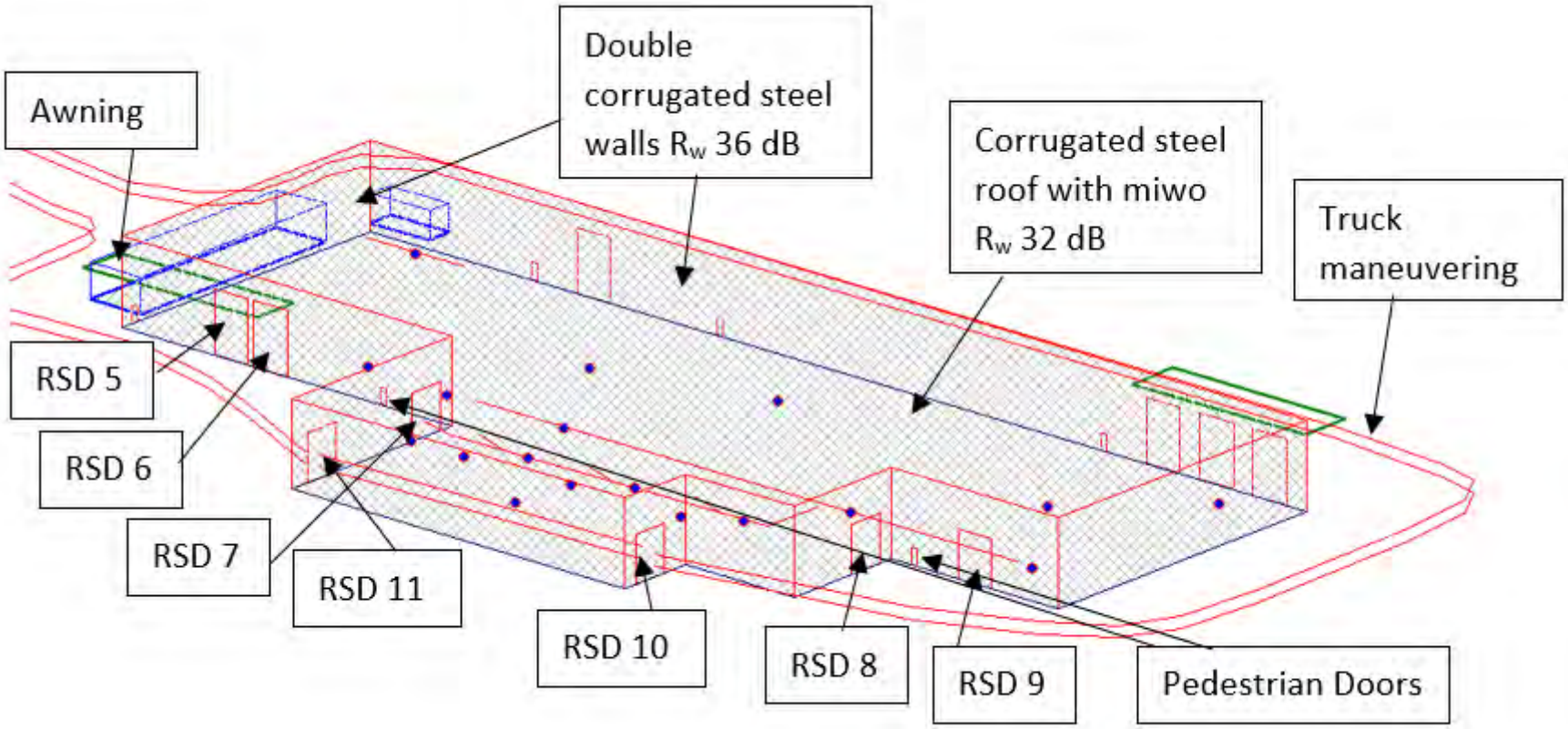


Figure 7-6: Building diagram from the west



7.2 Predicted Noise Levels – Operational

Noise levels at the nearest receptors have been calculated and results of the predictive noise modelling considering operational activities are shown in Table 7-3.

The modelled scenario is predicted to comply with the $L_{eq(15\ minute)}$ project specific criteria at all sensitive receptors.

Proactive noise management practices and controls are outlined in Section 7.3.

Table 7-3: Predicted Noise Levels – Operational Activities dB(A) Day

Receptor	Project Criteria $L_{eq(15\ minute)}$	Scenario 1
	Day	Predicted $L_{eq(15\ minute)}$
R1	46	46 ✓
R2	46	40 ✓
R3	46	39 ✓
R4	46	39 ✓
R5	46	38 ✓
R6	46	41 ✓
R7	46	45 ✓
R8	46	44 ✓
R9	46	42 ✓
R10	46	35 ✓
R11	46	31 ✓
R12	46	36 ✓
R13	50	31 ✓
R14	68	34 ✓
R15	68	44 ✓

✓Complies ✗ Non-compliance

7.3 Recommended Mitigation Measures

The noise assessment in Section 7 predicted that if the assumptions listed in 7.1.3 are carried out, noise levels would be met at all surrounding receivers.

Controls important to note are the following:

- All front-end loaders operated on site are to be no greater than 111 kW in power, and produce no higher sound power level than 102 dB(A) as shown in Table 7-1.
- The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A).
- The walls must have an R_w of at least 36 dB, double corrugated steel has been modelled;
- The roof must have an R_w of at least 32 dB, corrugated steel with miwo, 120 mm thick in total has been modelled;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended; and
- Pedestrian doors should also be kept close when not in use.

The following noise control measures are recommended in order to proactively further reduce noise levels at surrounding receivers:

- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site;
- Enforcement of low on-site speed limits;
- Regular maintenance of plant; and
- Signs to encourage quiet operations during the night period.

8. ROAD TRAFFIC NOISE IMPACT ASSESSMENT

A description of the calculation methodology and the noise predictions associated with road traffic has been provided below. The most likely route to the site travels along Park Road, on towards the A9.

Calculation of road traffic noise contribution has been undertaken using SoundPLAN. Fifty-five trucks per day time period are predicted, therefore, a worst case scenario of two trucks per 15 minutes, 8 per hour has been considered during the day time period. The trucks are assumed to travel along Park Road at the posted speed of 80 km/h adjacent to the closest receptor. Trucks have been modelled considering two moving point sources at heights of 1.5 m and 3 m above ground level in order to account for the engine (1.5 m) and the exhaust outlet (3.0 m).

The $L_{Aeq,\ 1\ hour\text{-}day}$ noise descriptor has been calculated at the most affected residential receptor located nearby along Park Road. The receiver has been selected as it is the closest residential receiver along the road route to the site. The predicted noise levels are displayed in Table 8-1. The highest noise levels would be predicted at this location therefore 380 Park Road is the only location considered.

Table 8-1: Predicted Levels for Road Traffic Noise

Receptor	Criteria	Predicted noise level
	Day $L_{Aeq,\ 1\ hour}$	Day $L_{Aeq,\ 1hour}$
380 Park Road	55	43 ✓

✓Complies × Non-compliance

For the residential dwelling that is adjacent to Park Road, site contribution noise levels associated with the delivery trucks would be below the daytime criteria of $L_{Aeq\ (1\ hour)}$ 55 dB and night-time criteria of $L_{Aeq\ (1\ hour)}$ 50 dB for local roads. Therefore, the site has a negligible contribution on the 380 Park Road receiver.

From Table 8-1, the predicted daytime $L_{Aeq,1\ hour}$ and night-time $L_{Aeq,1\ hour}$ road traffic noise levels comply with the noise criteria, as established in the NSW EPA Road Noise Policy. Therefore, no additional road noise mitigation strategies are recommended.

9. CONSTRUCTION NOISE IMPACT ASSESSMENT

9.1 CONSTRUCTION ACTIVITIES

Construction activities are proposed to include the following:

- Site establishment;
- Civil works to level the property to proposed heights;
- Concreting works of the building base, hardstand areas and driveways; and
- Structure works for the proposed building.

The current residential dwelling and associated sheds are proposed to be kept, therefore no demolition works are proposed.

9.2 MODELLED NOISE GENERATING SCENARIOS

Considering the construction activities outlined in Section 9.1, the four construction stages listed in Table 9-1 are modelled for:

- Site establishment;
- Civil works;
- Concreting works; and
- Structure works.

The noise generating stages consider a worst case scenario in which all equipment is running for 100% of the time over the 15 minute assessment period.

The equipment list for the stages is detailed in Table 9-1, with an equipment location diagrams in Figure 9-1 to Figure 9-4. Equipment is primarily located near the entrance to the site, as equipment such as trucks will have greatest access and are most likely to be positioned at this spot.

All construction works are proposed to be undertaken during standard construction hours mentioned in Table 6-6, that is

- Monday to Friday, 7am to 6pm;
- Saturday 8am to 1pm ; and
- No work on Sundays or public holidays.

Table 9-1: Modelled Noise Stages for Proposed Construction Works

Scenario	Time of the day	Noise Sources for Worst 15-minute Period
1. Site establishment	Standard hours	• Generator • Hand tools • Truck
2. Civil works	Standard hours	• 5T excavator • Backhoe • Dozer • Hand tools • Truck
3. Concreting works	Standard hours	• Concrete mixer truck • Concrete pump • Hand tools
4. Structure works	Standard hours	• Truck • Crane • Hand Tools

Note 1: As per Section 4.5 of the Interim Construction Noise Guideline (DECC, 2009), a number of activities have proven to be particularly annoying to residents and have therefore had 5 dB added to their predicted levels.

Figure 9-1: Construction Stage 1 – Site Establishment

Figure 9-2: Construction Stage 2 – Civil Works

Figure 9-3: Construction Stage 3 – Concreting Works

Figure 9-4: Construction Stage 4 – Structure Works

9.3 MODELLING METHODOLOGY

9.3.1 Noise Model

Noise propagation modelling for the construction activities was carried out using the ISO 9613-2:1996 algorithm within SoundPLAN. The construction stages were modelled using the $L_{Aeq,\ 15\ minutes}$ descriptor.

Assumptions made in the noise modelling of the construction noise stages are as follows:

- The relevant assessment period for operational noise emissions has been considered to be 15 minutes. Construction stages assume all equipment is running 100% of the time during the 15 minute assessment period, to provide a worst case scenario;
- Topographical information for off-site areas was obtained from Google Earth;
- Topographical information for on-site areas was obtained from the site survey;

- All receptors were modelled at 1.5 m above ground level;
- All ground areas have been modelled considering different ground factors ranging from 0 to 1 (Soft to Hard ground). The subject site has been modelled with a ground absorption factor of 0 (hard) and the surrounding rural area, 1 (soft).
- All noise sources associated with the construction works have been modelled as point sources.

9.3.2 Noise Sources

A-weighted octave band centre frequency sound power levels are presented shown in Table 9-2 below. The sound power levels for the relevant noise sources have been calculated from measurements of sound pressure levels undertaken by an acoustic engineer from Benbow Environmental at similar sites and sourced from Benbow Environmental's noise source database, as well as taken from AS 2436-2010 and the UK Department for Environmental Food and Rural Affairs (DEFRA) database, *Update of noise database for prediction of noise on construction and open sites*.

Table 9-2: A-weighted Sound Power Levels Associated with Construction Activities, dB(A)

Noise Source	Overall	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Generator	**93**	79	84	83	85	87	86	83	69
Truck	**106**	77	84	89	104	95	93	88	88
Jackhammer	**114**	82	92	99	112	109	105	102	95
Dozer	**105**	75	89	94	100	100	98	92	82
Backhoe	**96**	76	78	83	89	91	89	88	77
Hand tools	**100**	71	81	91	96	94	90	87	81
Concrete mixer truck	**103**	70	84	92	96	97	98	92	85
Concrete pump truck	**105**	77	92	97	99	100	95	95	89
Crane	**103**	84	84	87	94	98	97	95	85
Excavator	**100**	80	83	89	95	94	93	90	83

9.4 Construction Predicted Noise Levels

Results of the predictive noise modelling of the construction activities are shown in Table 9-3. Compliance with the noise criteria is predicted at all receptors, during all construction scenarios. Noise levels are also predicted to be well below the highly noise affected criteria of 75 dB(A).

Table 9-3: Noise Modelling Results Associated with Construction Activities for L_{eq}, dB(A)

Receiver	Criteria: PSNL ($L_{eq,15\ minute}$ dB(A))	Predicted Levels: Scenario (Standard Hours) (L_{eq}, dB(A))			
	Standard Hours	1	2	3	4
R1	51	45 ✓	48 ✓	45 ✓	47 ✓
R2	51	40 ✓	42 ✓	40 ✓	41 ✓
R3	51	39 ✓	41 ✓	38 ✓	40 ✓
R4	51	38 ✓	40 ✓	38 ✓	39 ✓
R5	51	40 ✓	40 ✓	39 ✓	40 ✓
R6	51	41 ✓	44 ✓	42 ✓	42 ✓
R7	51	45 ✓	47 ✓	45 ✓	46 ✓
R8	51	43 ✓	47 ✓	46 ✓	45 ✓
R9	51	41 ✓	45 ✓	43 ✓	43 ✓
R10	51	34 ✓	38 ✓	36 ✓	35 ✓
R11	51	31 ✓	36 ✓	32 ✓	32 ✓
R12	51	35 ✓	37 ✓	34 ✓	35 ✓
R13	55	31 ✓	33 ✓	31 ✓	32 ✓
R14	75	37 ✓	39 ✓	37 ✓	38 ✓
R15	75	47 ✓	48 ✓	45 ✓	48 ✓

9.5 Construction Noise Mitigation Measures

Construction activities should only take place during standard **construction** hours as follows:

Monday to Friday:	7am to 6pm
Saturday:	8am to 1pm
Sunday and Public Holidays:	No works permitted

10. STATEMENT OF POTENTIAL NOISE IMPACT

Benbow Environmental has been engaged by Greenfields Resource Recovery Facility to prepare a noise impact assessment for a resource recovery facility at Lot 5, DP 655046 (344 Park Road, Wallacia). The site will have a processing capacity of 95,000 tonnes per year.

The principal noise sources associated with the site include noise from a shredder and mobile crusher, screening equipment, conveyors and aggregate transfer as well as mobile plant including truck movements, excavators and front end loaders.

The noise impact assessment was undertaken in accordance with the following guidelines:

- NSW Noise Policy for Industry (EPA, 2017);
- Interim Construction Noise Guideline (DECC, 2009); and
- NSW Road Noise Policy (RNP) (DECCW, 2011).

Assessment criteria for noise emissions from the subject site were used to determine whether the potential noise impacts from the site were within the derived limits or in exceedance of the guidelines.

The nearest receivers and noise criteria were identified. The site operations were modelled using the predictive noise software, Sound Plan V7.3.

The activities proposed by the proponent were found to be within the framework of the NSW EPA Noise Policy for Industry.

The operational noise levels were predicted to comply with the $L_{Aeq(15\ minute)}$ project specific criteria at all receptors.

The noise assessment in Section 7 predicted that if the assumptions listed in 7.1.3 are carried out, noise levels would be met at all surrounding receivers.

Controls important to note are the following:

- All front-end loaders operated on site are to be no greater than 111kW in power, and produce no higher sound power level than 102 dB(A) as shown in Table 7-1.
- The activity of aggregate transfer is to create a sound power level of no greater than 106 dB(A).
- The walls must have an R_w of at least 36 dB, double corrugated steel has been modelled;
- The roof must have an R_w of at least 32 dB, corrugated steel with miwo, 120mm thick in total has been modelled;
- Roller shutter doors must be kept closed when not in use for deliveries, automatic closing roller shutter doors are recommended; and
- Pedestrian doors should also be kept close when not in use.

Further proactive noise management practices are described in Section 7.3.

Compliance with the guidelines set out in the NSW Road Noise Policy was predicted at all considered receptors.

Construction noise is predicted to comply with the Interim Construction Guidelines at all surrounding receivers.

This concludes the report.

Victoria Hale
Senior Environmental Scientist

R T Benbow
Principal Consultant

11. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Greenfields Resource Recovery Facility, as per our agreement for providing environmental services. Only Greenfields Resource Recovery Facility is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Greenfields Resource Recovery Facility for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Noise Terminology

'A' FREQUENCY WEIGHTING

The 'A' frequency weighting roughly approximates to the Fletcher-Munson 40 phon equal loudness contour. The human loudness perception at various frequencies and sound pressure levels is equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). Humans are most sensitive to midrange frequency sounds, such as a child's scream. Sound level meters have inbuilt frequency weighting networks that very roughly approximates the human loudness response at low sound levels. It should be noted that the human loudness response is not the same as the human annoyance response to sound. Here low frequency sounds can be more annoying than midrange frequency sounds even at very low loudness levels. The 'A' weighting is the most commonly used frequency weighting for occupational and environmental noise assessments. However, for environmental noise assessments, adjustments for the character of the sound will often be required.

AMBIENT NOISE

The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. Usually assessed as an energy average over a set time period 'T' (L_{Aeq},T).

AUDIBLE

Audible refers to a sound that can be heard. There are a range of audibility grades, varying from "barely audible", "just audible" to "clearly audible" and "prominent".

BACKGROUND NOISE LEVEL

Total silence does not exist in the natural or built-environments, only varying degrees of noise. The Background Noise Level is the minimum repeatable level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc.. It is quantified by the noise level that is exceeded for 90 % of the measurement period 'T' (L_{A90}, T). Background Noise Levels are often determined for the day, evening and night time periods where relevant. This is done by statistically analysing the range of time period (typically 15 minute) measurements over multiple days (often 7 days). For a 15 minute measurement period the Background Noise Level is set at the quietest level that occurs at 1.5 minutes.

'C' FREQUENCY WEIGHTING

The 'C' frequency weighting approximates the 100 phon equal loudness contour. The human ear frequency response is more linear at high sound levels and the 100 phon equal loudness contour attempts to represent this at various frequencies at sound levels of approximately 100 dB.

DECIBEL

The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. The decibel is ten times the logarithm of the ratio of any two quantities that relate to the flow of energy (i.e. power). When used in acoustics it is the ratio of square of the sound pressure level to a reference sound pressure level, the ratio of the sound power level to a reference sound power level, or the ratio of the sound intensity level to a reference sound intensity level. See also Sound Pressure Level and Sound Power Level. Noise levels in decibels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dB, and another similar machine is placed beside it, the level will increase to 53 dB (from $10 \log_{10} (10^{(50/10)} + 10^{(50/10)})$ and not 100 dB. In theory, ten similar machines placed side by side will increase the sound level by 10 dB, and one hundred machines increase the sound level by 20 dB. The human ear has a vast sound-sensitivity range of over a thousand billion to one so the logarithmic decibel scale is useful for acoustical assessments.

dBA – See 'A' frequency weighting

dBC – See 'C' frequency weighting

EQUIVALENT CONTINUOUS SOUND LEVEL, LAeq

Many sounds, such as road traffic noise or construction noise, vary repeatedly in level over a period of time. More sophisticated sound level meters have an integrating/averaging electronic device inbuilt, which will display the energy time-average (equivalent continuous sound level - L_{Aeq}) of the 'A' frequency weighted sound pressure level. Because the decibel scale is a logarithmic ratio, the higher noise levels have far more sound energy, and therefore the LAeq level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.

'F'(FAST) TIME WEIGHTING

Sound level meter design-goal time constant which is 0.125 seconds.

FLETCHER–MUNSON EQUAL LOUDNESS CONTOUR CURVES

The Fletcher–Munson curves are one of many sets of equal loudness contours for the human ear, determined experimentally by Harvey Fletcher and Wilden A. Munson, and reported in a 1933 paper entitled "Loudness, its definition, measurement and calculation" in the Journal of the Acoustic Society of America.

FREE FIELD

In acoustics a free field is a measurement area not subject to significant reflection of acoustical energy. A free field measurement is typically not closer than 3.5 metres to any large flat object (other than the ground) such as a fence or wall or inside an anechoic chamber.

FREQUENCY

The number of oscillations or cycles of a wave motion per unit time, the SI unit is the hertz (Hz). 1 Hz is equivalent to one cycle per second. 1000 Hz is 1 kHz.

IMPACT ISOLATION CLASS (IIC)

The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation. Not commonly used in Australia.

'I' (IMPULSE) TIME WEIGHTING

Sound level meter time constant now not in general use. The 'I' (impulse) time weighting is not suitable for rating impulsive sounds with respect to their loudness. It is also not suitable for assessing the risk of hearing impairment or for determining the 'impulsiveness' of a sound.

IMPACT SOUND INSULATION ($L_{nT,w}$)

Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured 1/3 octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE

An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

LOUDNESS

The volume to which a sound is audible to a listener is a subjective term referred to as loudness. Humans generally perceive an approximate doubling of loudness when the sound level increases by about 10 dB and an approximate halving of loudness when the sound level decreases by about 10 dB.

MAXIMUM NOISE LEVEL, LAFmax

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'F' (Fast) time weighting. Often used for noise assessments other than aircraft.

MAXIMUM NOISE LEVEL, LASmax

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'S' (Slow) time weighting. Often used for aircraft noise assessments.

NOISE RATING NUMBERS

A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the 'A' frequency weighted dB level minus five.

NOISE

Noise is unwanted, harmful or inharmonious (discordant) sound. Sound is wave motion within matter, be it gaseous, liquid or solid. Noise usually includes vibration as well as sound.

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient"

OFFENSIVE NOISE

Reference: Dictionary of the NSW Protection of the Environment Operations Act (1997). "Offensive Noise means noise:
(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:
(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or
(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or
(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE

Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T60

The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α

Sound is absorbed in porous materials by the viscous conversion of sound energy to a small amount of heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2 kHz is termed the Noise Reduction Coefficient (NRC).

'S' (SLOW) TIME WEIGHTING

Sound level meter design-goal time constant which is 1 second.

SOUND ATTENUATION

A reduction of sound due to distance, enclosure or some other devise. If an enclosure is placed around a machine, or an attenuator (muffler or silencer) is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 20 dB reduces the sound energy by one hundred times.

SOUND EXPOSURE LEVEL (LAE)

Integration (summation) rather than an average of the sound energy over a set time period. Use to assess single noise events such as truck or train pass by or aircraft flyovers. The sound exposure level is related to the energy average (L_{Aeq}, T) by the formula L_{Aeq}, T = L_{AE} – 10 $\log_{10}$ T. The abbreviation (SEL) is sometimes inconsistently used in place of the symbol (L_{AE}).

SOUND PRESSURE

The rms sound pressure measured in pascals (Pa). A pascal is a unit equivalent to a newton per square metre (N/m^2).

SOUND PRESSURE LEVEL, Lp

The level of sound measured on a sound level meter and expressed in decibels (dB). Where L_P = 10 $\log_{10}$ $(Pa/Po)^2$ dB (or 20 log10 (Pa/ Po) dB) where Pa is the rms sound pressure in Pascal and Po is a reference sound pressure conventionally chosen is 20 µPa (20 x 10^{-6} Pa) for airborne sound. L_p varies with distance from a noise source.

SOUND POWER

The rms sound power measured in watts (W). The watt is a unit defined as one joule per second. A measures the rate of energy flow, conversion or transfer.

SOUND POWER LEVEL, Lw

The sound power level of a noise source is the inherent noise of the device. Therefore sound power level does not vary with distance from the noise source or with a different acoustic environment. Lw = Lp + 10 $\log_{10}$ 'a' dB, re: 1pW, (10^{-12} watts) where 'a' is the measurement noise-emission area (m^2) in a free field.

SOUND TRANSMISSION CLASS (STC)

An internationally standardised method of rating the sound transmission loss of partition walls to indicate the sound reduction from one side of a partition to the other in the frequency range of 125 Hz to 4000 kHz. (Refer: Australian Standard AS 1276 – 1979). Now not in general use in Australia see: weighted sound reduction index.

SOUND TRANSMISSION LOSS

The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS 1191 - 2002.

STATISTICAL NOISE LEVELS, Ln.

Noise which varies in level over a specific period of time 'T' (standard measurement times are 15 minute periods) may be quantified in terms of various statistical descriptors for example:-

- The noise level, in decibels, exceeded for 1% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF1}, T. This may be used for describing short-term noise levels such as could cause sleep arousal during the night.
- The noise level, in decibels, exceeded for 10% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF10}, T. In most countries the LAF10, T is measured over periods of 15 minutes, and is used to describe the average maximum noise level.
- The noise level, in decibels, exceeded for 90% of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as L_{AF90}, T. In most countries the LAF90, T is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

STEADY NOISE

Noise, which varies in level by 6 dB or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997).

WEIGHTED SOUND REDUCTION INDEX, Rw

This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 Hz to 3.150 kHz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999). Internal partition wall Rw + C ratings are frequency weighted to simulate insulation from human voice noise. The R_w + C is similar in value to the STC rating value. External walls, doors and windows may be R_w + C_{tr} rated to simulate insulation from road traffic noise. The spectrum adaptation term Ctr adjustment factor takes account of low frequency noise. The weighted sound reduction index is normally similar or slightly lower number than the STC rating value.

WHITE NOISE

White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.

'Z' FREQUENCY WEIGHTING

The 'Z' (Zero) frequency weighting is 0 dB within the nominal 1/3 octave band frequency range centred on 10 Hz to 20 kHz. This is within the tolerance limits given in AS IEC 61672.1–2004: 'Electroacoustics - Sound level meters – Specifications'.

Attachment 2: Calibration Certificates

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: **SLM 24948 & FILT 5245**

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	15335
Microphone Type:	7052H	**Serial No:**	40814
Preamplifier Type:	SV12L	**Serial No:**	18742
Filter Type:	1/3 Octave	**Serial No:**	15335
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Benbow Environmental 25-27 Sherwood Street Northmead, NSW 2152		
Ambient Pressure:	1004 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	39% ±5%
Date of Calibration:	14/06/2019	**Issue Date:**	17/06/2019
Acu-Vib Test Procedure:	AVP10 (SLM) & AVP06 (Filters)		

CHECKED BY: NKB **AUTHORISED SIGNATURE:** Jack Kiett

Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION

ACU-VIB
ELECTRONICS
HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
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web site: www.acu-vib.com.au

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 24945

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: B & K
Type No: 4230 **Serial No:** 565912
Owner: Benbow Environmental
25-27 Sherwood Street
Northmead, NSW 2152

Tests Performed: Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	94.03	987.01	0.45
Level 2:	NA	N	NA	NA	NA
Uncertainty:			±0.11 dB	±0.05%	±0.20 %
Uncertainty (at 95% c.l.) k=2					

CONDITION OF TEST:
Ambient Pressure: 1001 hPa ±1.5 hPa **Relative Humidity:** 48% ±5%
Temperature: 23 °C ±2° C
Date of Calibration: 14/06/2019 **Issue Date:** 17/06/2019
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017
CHECKED BY: .. **AUTHORISED SIGNATURE:** .....
Jack Kielt

.Accredited for compliance with ISO/IEC 17025 - Calibration
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.
The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Lab. 9262
Acoustic and Vibration Measurements

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Unit 36/14 Loyalty Rd
North Rocks NSW AUSTRALIA 2151
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C19409

Client Details Benbow Environmental
25-27 Sherwood Street
NORTHMEAD NSW 2152

Equipment Tested/ Model Number : ARL EL-215
Instrument Serial Number : 194702
Microphone Serial Number : N/A
Pre-amplifier Serial Number : N/A

Atmospheric Conditions
Ambient Temperature : 22.9°C
Relative Humidity : 37.2%
Barometric Pressure : 100.71kPa

Calibration Technician : Lucky Jaiswal
Secondary Check: Sandra Minto
Calibration Date : 22 Jul 2019
Report Issue Date : 25 Jul 2019

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	*Pass*	10.3.4: Inherent system noise level	*Pass*
10.2.3: Frequency weighting	*Pass*	10.4.2: Time weighting characteristic F and S	*Pass*
10.3.2: Overload indications	*Pass*	10.4.3: Time weighting characteristic I	*Pass*
10.3.3: Accuracy of level range control	*Pass*	10.4.5: R.M.S performance	*Pass*
8.9: Detector-indicator linearity	*Pass*	9.3.2: Time averaging	*Pass*
8.10: Differential level linearity	*Pass*	9.3.5: Overload indication	*Pass*

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.15dB*	*Temperature*	*±0.2°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±2.4%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.015kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.11dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

The sound level meter under test has been shown to conform to the type 2 requirements for periodic testing as described in AS 1259.1:1990 and AS 1259.2:1990 for the tests stated above.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025 - calibration.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Attachment 3: QA/QC Procedures

Calibration of Sound Level Meters

A sound level meter requires regular calibration to ensure its measurement performance remains within specification. Benbow Environmental sound level meters are calibrated by a National Association of Testing Authority (NATA) registered laboratory or a laboratory approved by the NSW Environment Protection Authority (EPA) every two years and after each major repair, in accordance with AS 1259–1990.

The calibration of the sound level meter was checked immediately before and after each series of measurements using an acoustic calibrator. The acoustic calibrator provides a known sound pressure level, which the meter indicates when the calibrator is activated while positioned on the meter microphone.

The sound level meters also incorporate an internal calibrator for use in setting up. This provides a check of the electrical calibration of the meter, but does not check the performance of the microphone. Acoustical calibration checks the entire instrument including the microphone. Calibration certificates for the instrument sets used have been included as Attachment 1.

Care and Maintenance of Sound Level Meters

Noise measuring equipment contains delicate components and therefore must be handled accordingly. The equipment is manufactured to comply with international and national standards and is checked periodically for compliance. The technical specifications for sound level meters used in Australia are defined in Australian Standard AS 1259–1990 "*Sound Level Meters"*.

The sound level meters and associated accessories are protected during storage, measurement and transportation against dirt, corrosion, rapid changes of temperature, humidity, rain, wind, vibration, electric and magnetic fields. Microphone cables and adaptors are always connected and disconnected with the power turned off. Batteries are removed (with the instrument turned off) if the instrument is not to be used for some time.

Investigation Procedures

All investigative procedures were conducted in accordance with AS 1055.1–1997 *Acoustics – Description and Measurement of Environmental Noise* Part 1: *General Procedures*.

The following information was recorded and kept for reference purposes:

- type of instrumentation used and measurement procedure conducted;
- description of the time aspect of the measurements, ie. measurement time intervals; and
- positions of measurements and the time and date were noted.

As per AS 1055.1–1997, all measurements were carried out at least 3.5 m from any reflecting structure other than the ground. The preferred measurement height of 1.2 m above the ground was utilised. A sketch of the area was made identifying positions of measurement and the approximate location of the noise source and distances in meters (approx.).

Unattended Noise Monitoring

NOISE MONITORING EQUIPMENT

ARL noise loggers type Ngara and EL-215 were used to conduct the long-term unattended noise monitoring. This equipment complies with Australian Standard 1259.2–1990 *Acoustics – Sound Level Meters* and is designated as a Type 1 and Type 2 instrument suitable for field use.

The measured data is processed statistically and stored in memory every 15 minutes. The equipment was calibrated prior and subsequent to the measurement period using a Rion NC-73 sound level calibrator. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations. Instrument calibration certificates have also been included in Attachment 1.

METEOROLOGICAL CONSIDERATION DURING MONITORING

For the long-term attended monitoring, meteorological data for the relevant period were provided by the Bureau of Meteorology, which was considered representative of the site for throughout the monitoring period.

DESCRIPTORS & FILTERS USED FOR MONITORING

Noise levels are commonly measured using A-weighted filters and are usually described as dB(A). The "A-weighting" refers to standardised amplitude versus frequency curve used to "weight" sound measurements to represent the response of the human ear. The human ear is less sensitive to low frequency sound than it is to high frequency sound. Overall A-weighted measurements quantify sound with a single number to represent how people subjectively hear different frequencies at different levels.

Noise environments can be described using various descriptors depending on characteristics of noise or purpose of assessments. For this survey the L_{A90} was used to analyse the monitoring results. The statistical descriptors L_{A90} measures the noise level exceeded for 90% of the sample measurement time, and is used to describe the “Background noise”. Background noise is the underlying level of noise present in the ambient noise, excluding extraneous noise or the noise source under investigation.

Measurement sample periods were fifteen minutes. The Noise -vs- Time graphs representing measured noise levels at the noise monitoring location are presented in Attachment 3.

ATTENDED NOISE MONITORING

NOISE MONITORING EQUIPMENT

The attended short-term noise monitoring was carried out using a SVANTEK SVAN957 Class 1 Precision Sound Level Meter. The instrument was calibrated by a NATA accredited laboratory within two years of the measurement period. The instrument sets comply with AS 1259 and was set on A-weighted, fast response.

The microphone was positioned at 1.5 metres above ground level and was fitted with a windsock. The instrument was calibrated using a Rion NC-73 sound level calibrator prior and subsequent to the measurement period to ensure the reliability and accuracy of the instrument sets. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations. Instrument calibration certificates have also been included in Attachment 1.

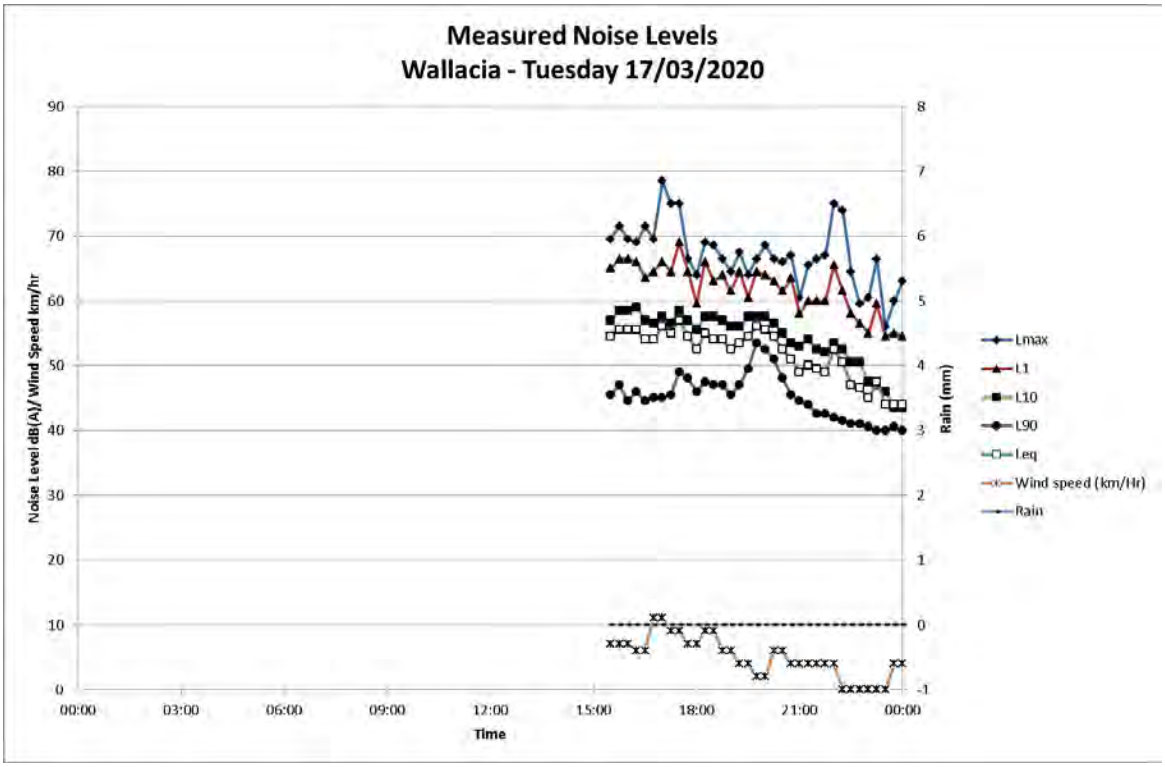
WEATHER CONDITIONS

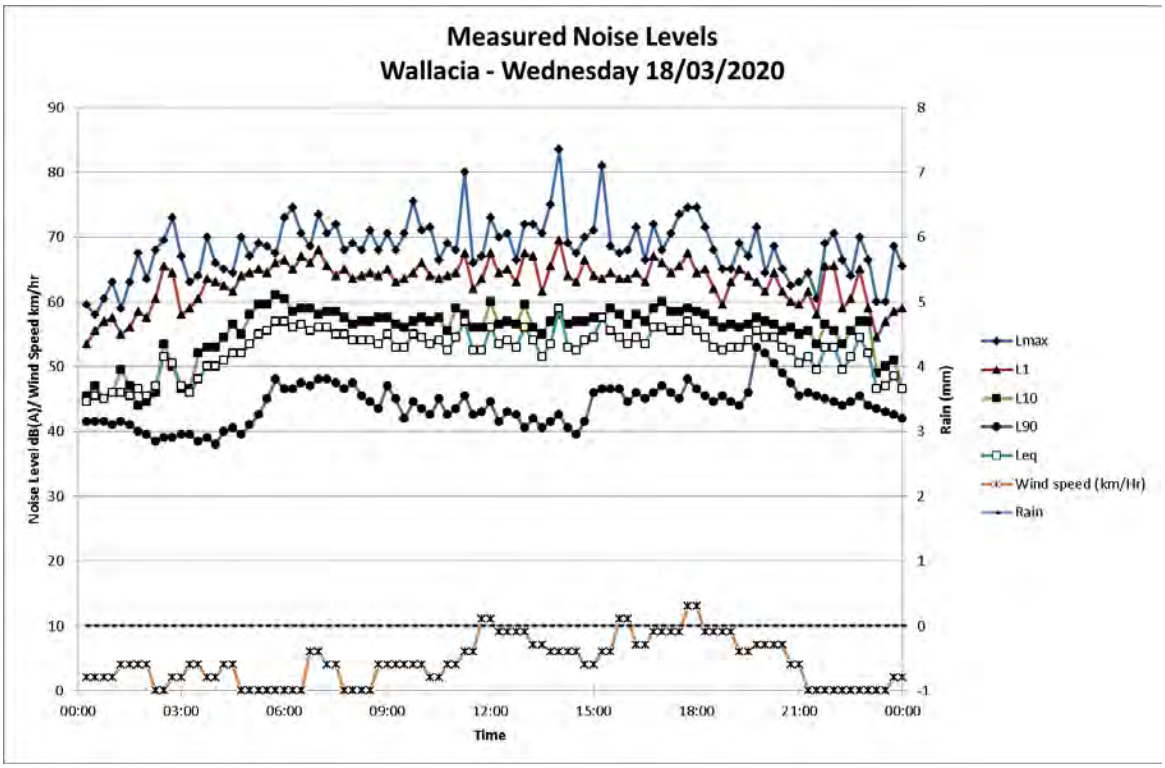
It was partially cloudy, fine without significant breeze.

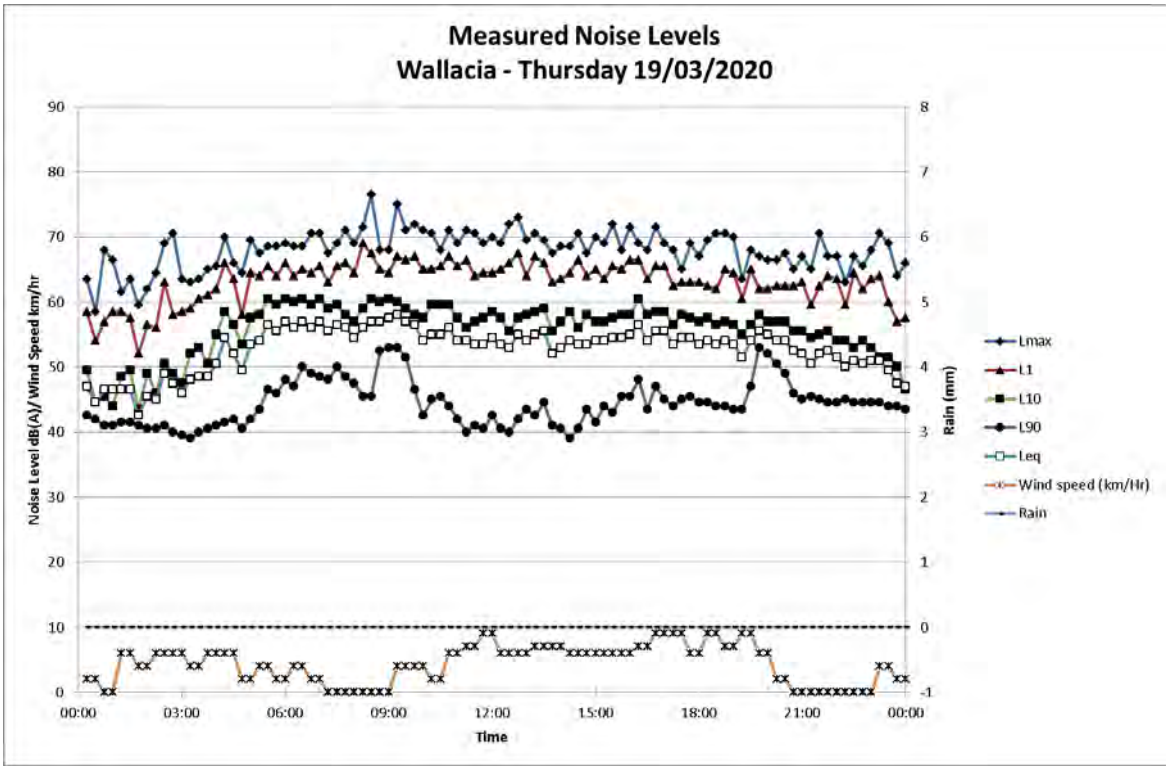
METHODOLOGY

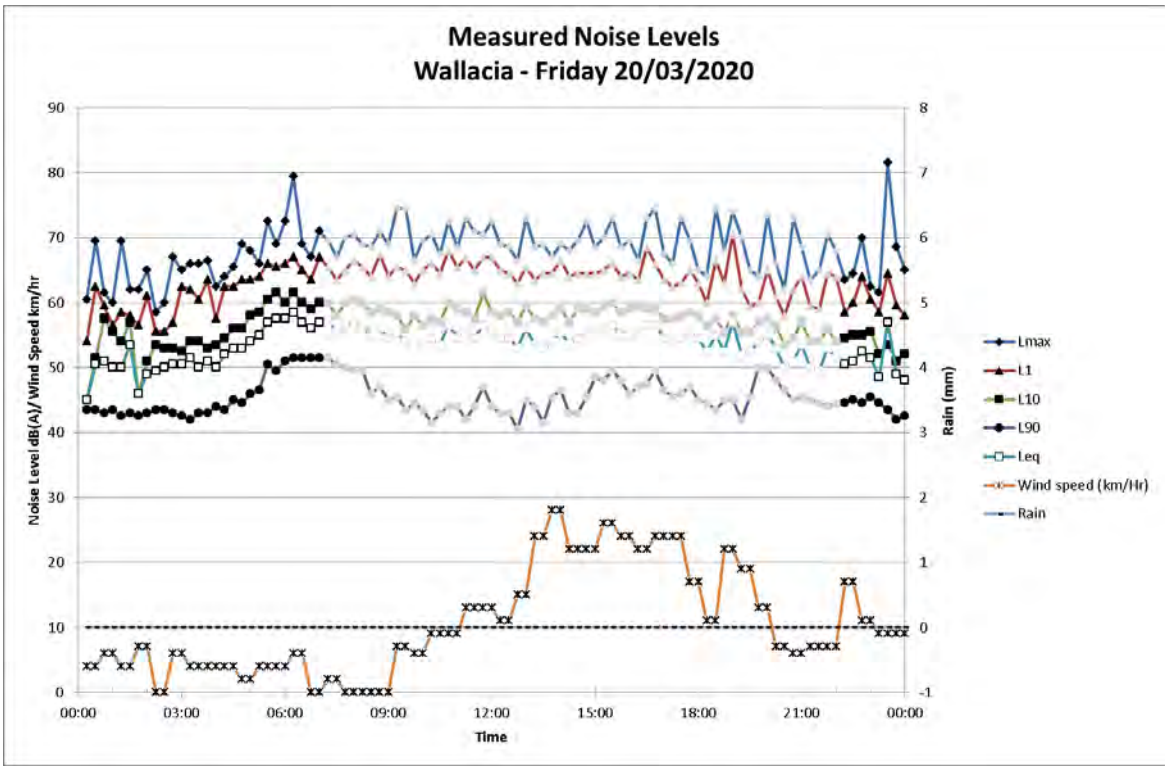
The attended noise measurements were carried out generally in accordance with Australian Standard AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise".

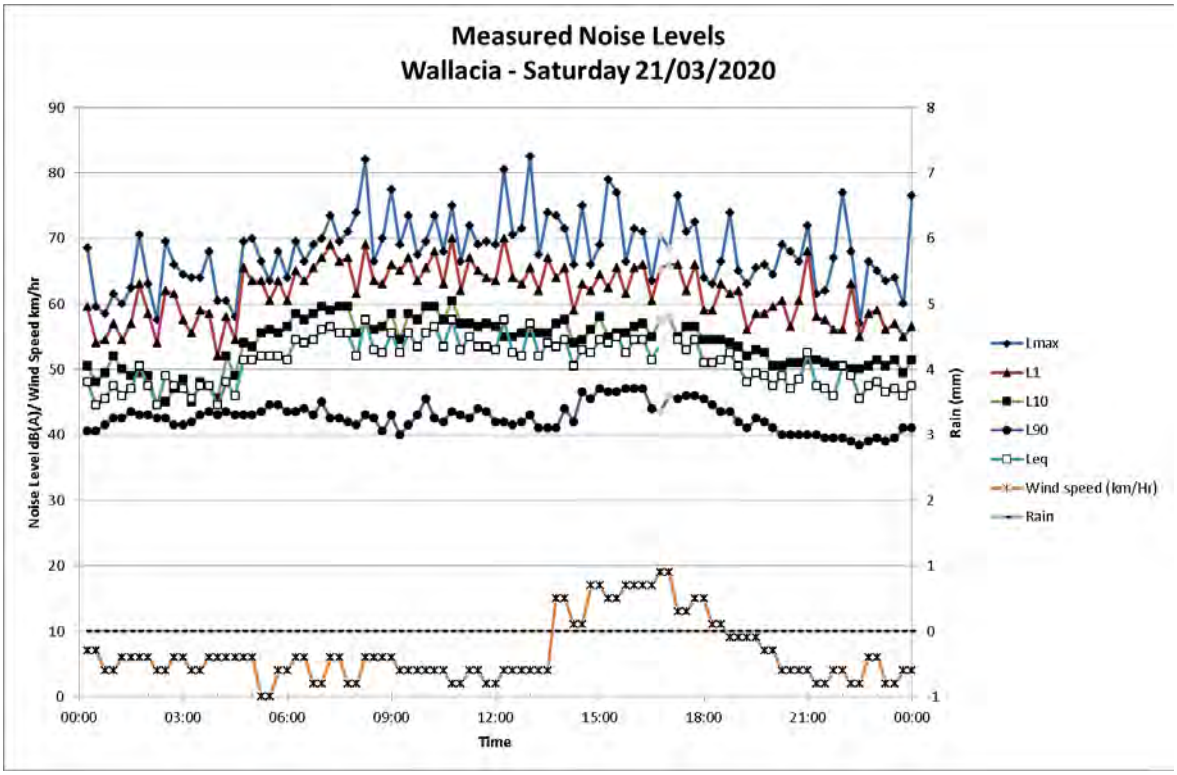
Attachment 4: Daily Noise Logger Charts

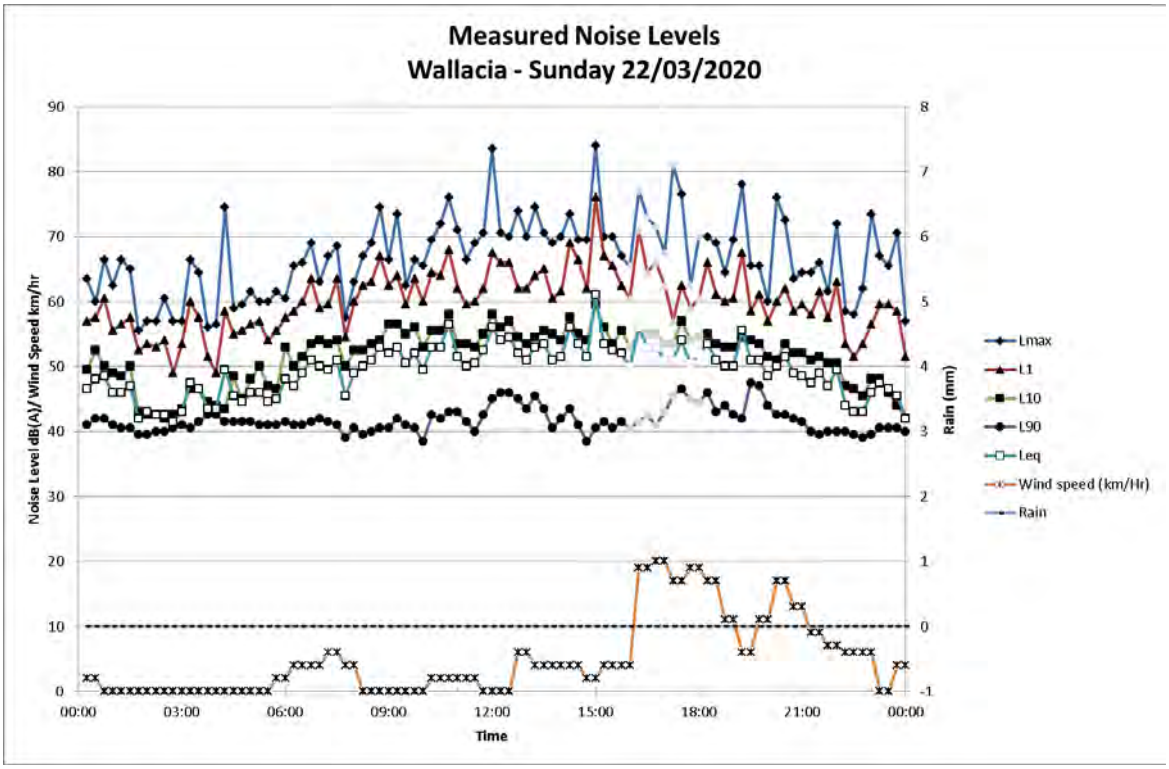


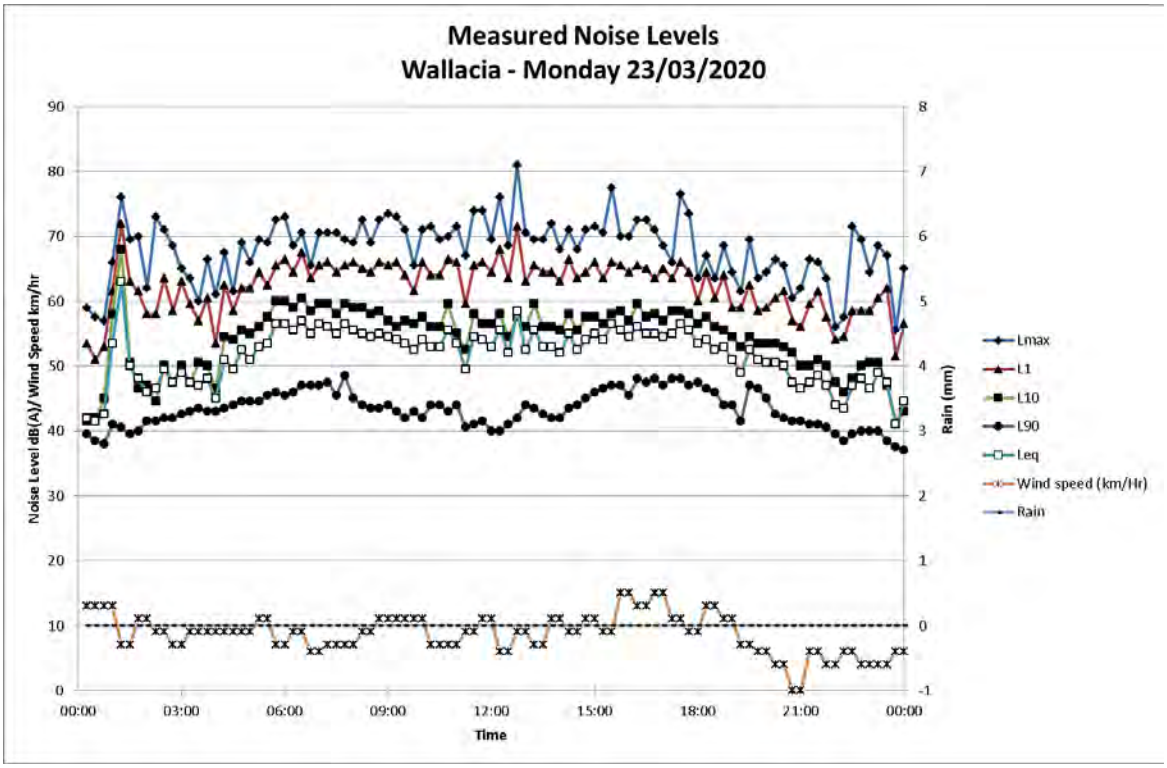


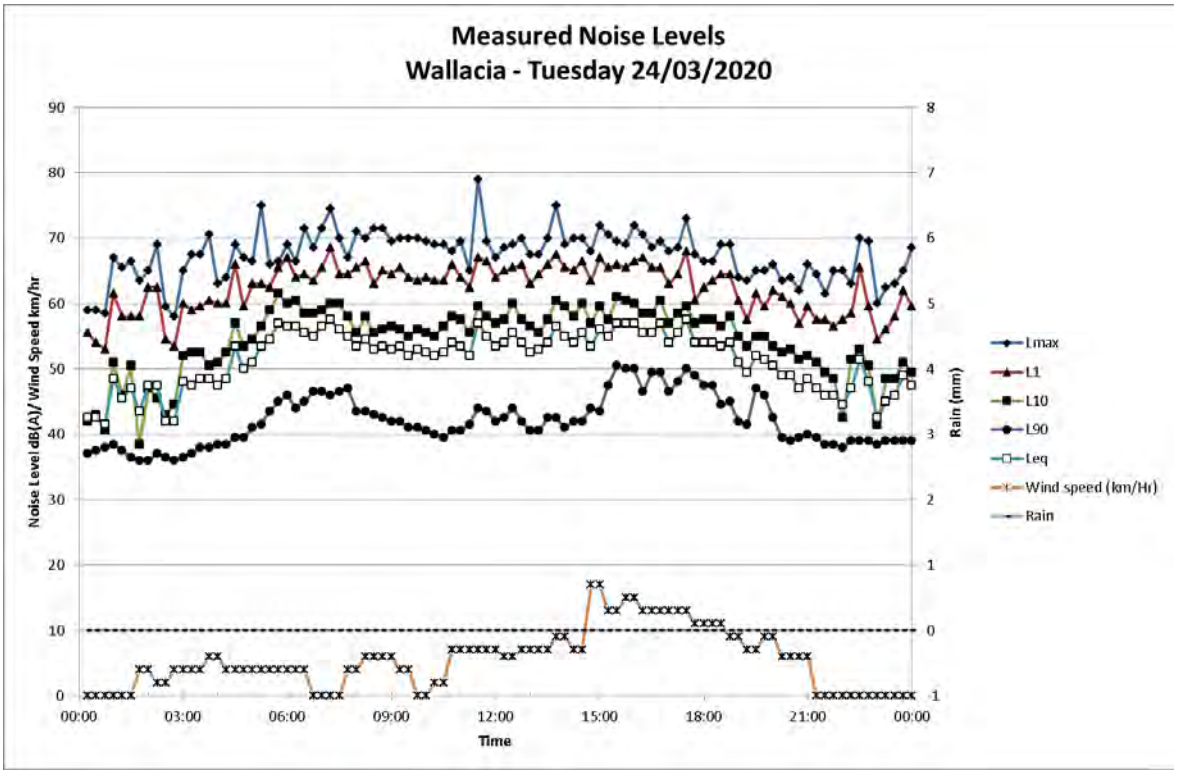


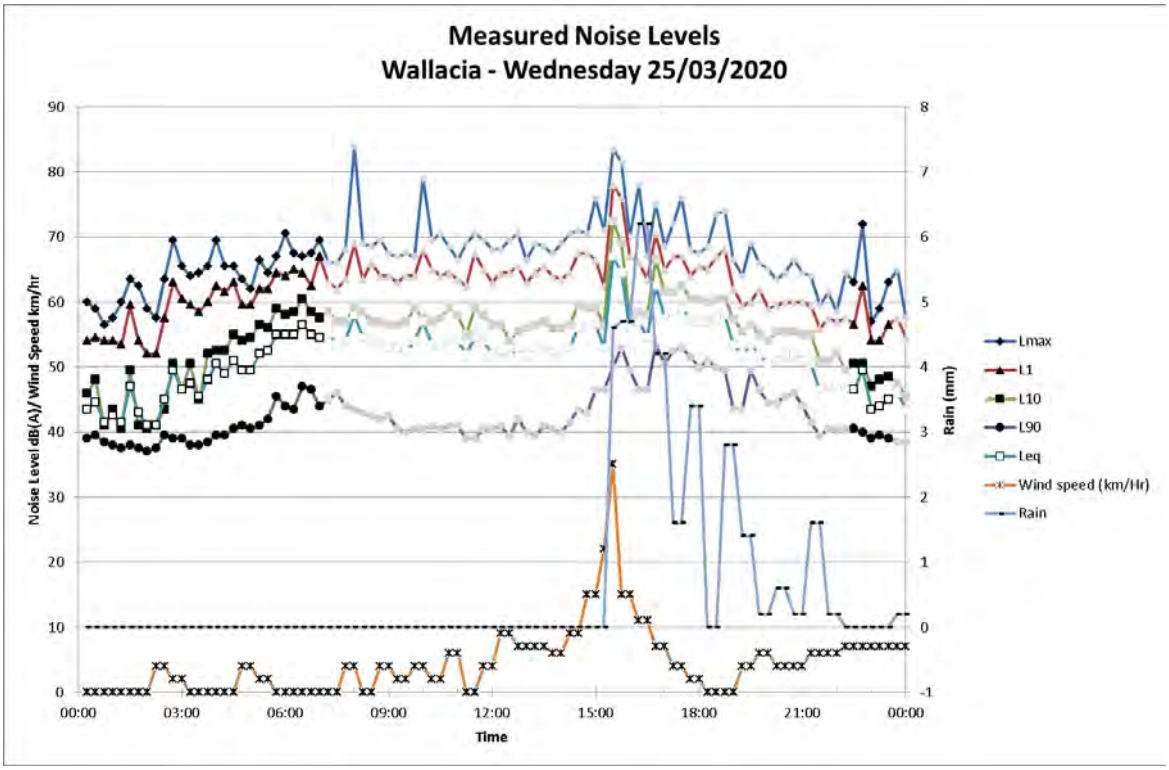


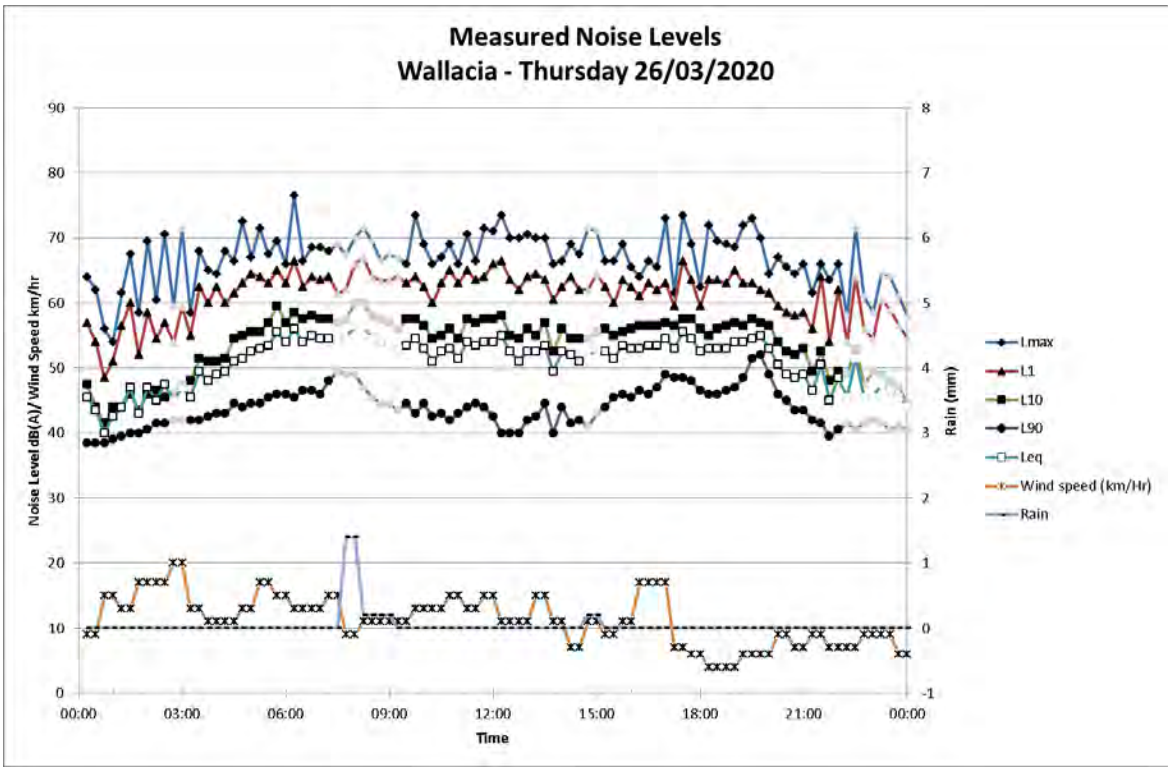


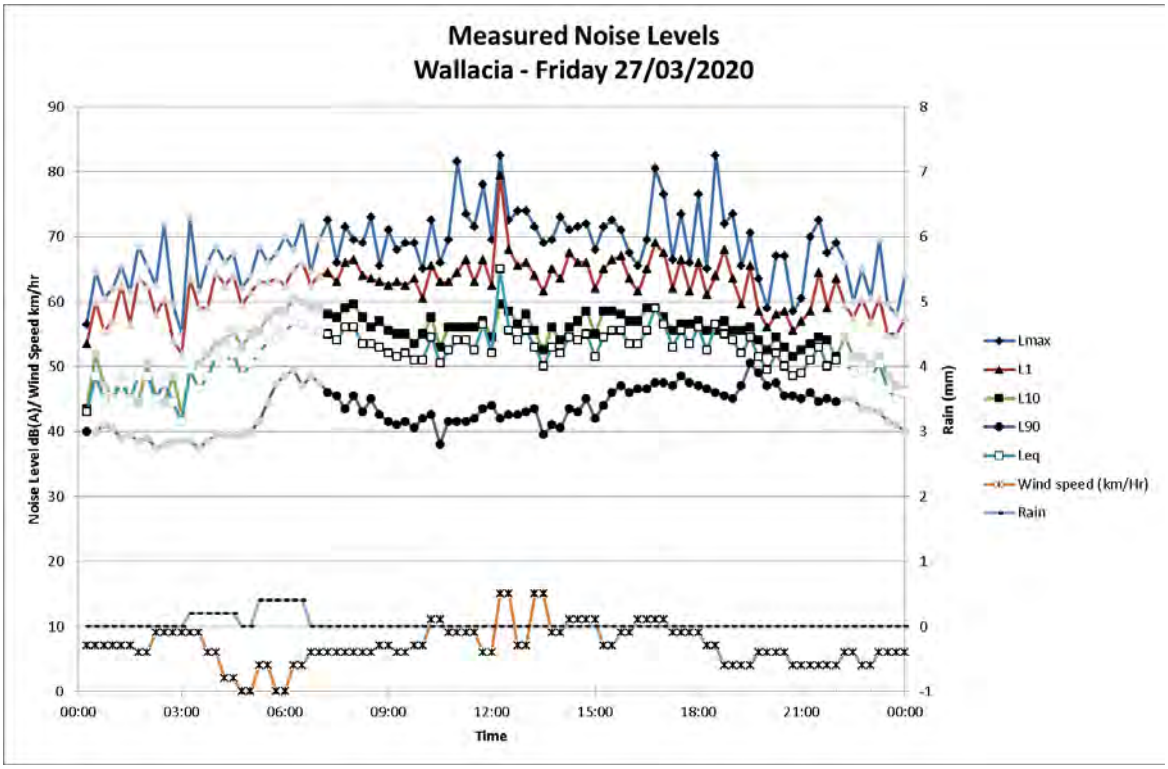


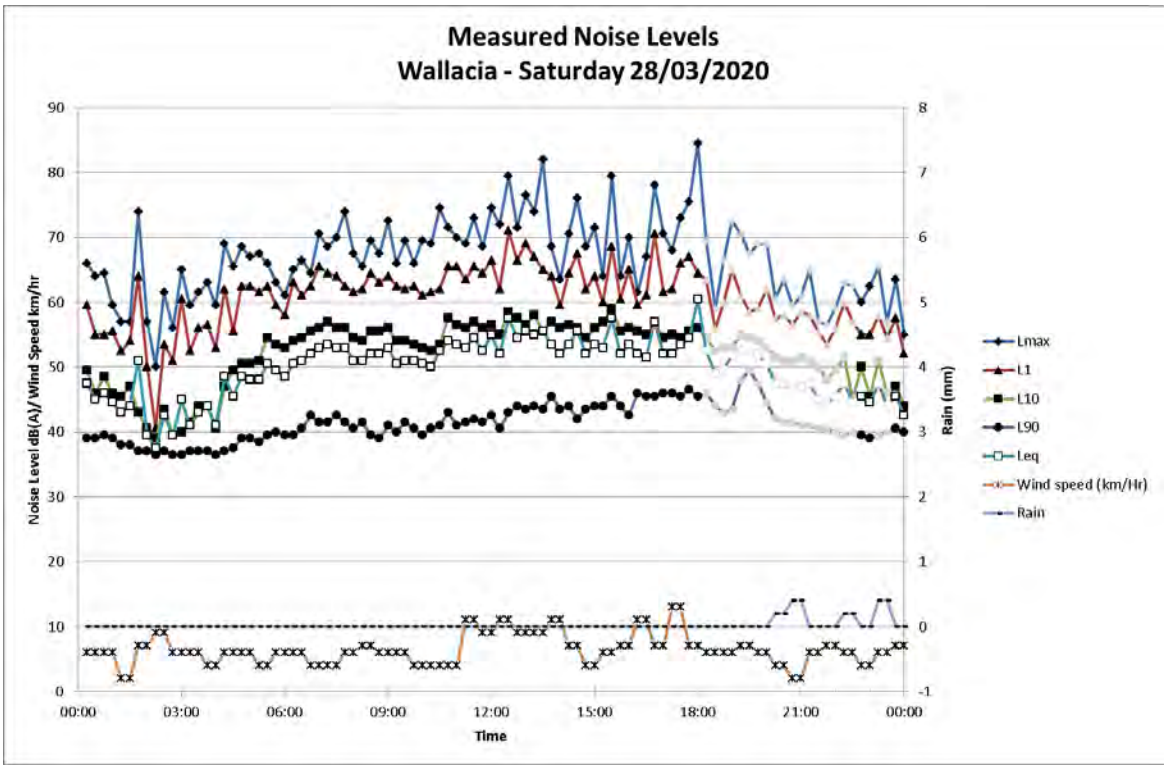


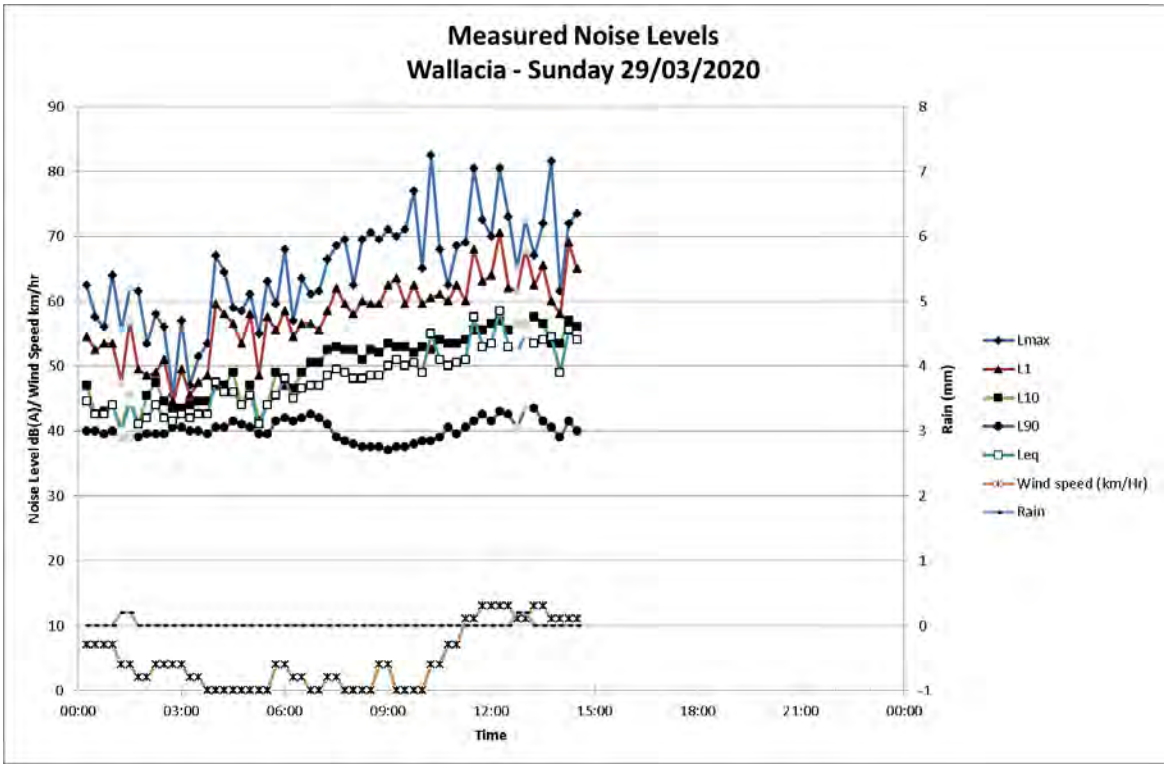












EIS Appendix 7: Bushfire Report

BUSHFIRE CONSULTING SERVICES PTY LTD
Designing Bushfire Protection Measures

Reference: 20/0119
PO Box 1020
Penrith NSW 2750
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www.bfcs.com.au
Date of Issue: 20 April 2020

Bush Fire Assessment Report

in relation to the proposed

waste recycling facility at:

Lot 5 DP 655046

344 Park Road Wallacia

(subject site)

Document Tracking

Item	Detail
Project Name	Bush Fire Assessment Report, proposed waste recycling facility
Project Address	Lot 5 DP 655046, 344 Park Road Wallacia
Client Name	Benbow Environmental
Project Number	20/0119
Plan Reference	Plans by Carlo Ranieri & Associates, numbered 0320, revision A, dated 19/02/2020
Prepared by	Warwick Fear
Approved by	Catherine Gorrie

Bushfire Consulting Services Pty Ltd Contact Details	
Catherine Gorrie	Managing Director
Office Number	02 4744 5800
Mobile Number	0425 833 893
Email	info@bfcs.com.au

Document Control

Version	Primary Author	Description	Date Completed
1	Warwick Fear	Draft	17/04/2020
2	Catherine Gorrie	Final for client review	20/04/2020

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Disclaimer

Any recommendation or advice expressed in this report is made in good faith and in accordance with the relevant legislation for bushfire prone development in New South Wales. Bushfire Consulting Services Pty Ltd has endeavoured to ensure that the information in this document is correct. However, many factors outside our current knowledge or control affect the recipient's needs and project plans. Bushfire Consulting Services Pty Ltd does not warrant or represent that the document is free from error or omissions and does not accept liability for any errors or omissions. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. To the fullest extent possible Bushfire Consulting Services Pty Ltd excludes any express or implied warranty as to condition, fitness, merchantability or suitability of this document and limits its liability for direct or consequential loss at Bushfire Consulting Services Pty Ltd option to re-supplying the document or the cost of correcting the document. In no event shall Bushfire Consulting Services Pty Ltd responses to questions or any other information in this document be deemed to be incorporated into any legally binding agreement without the express written consent of an officer of Bushfire Consulting Services Pty Ltd.

It should be borne in mind that the measures recommended in this report cannot guarantee that a building will survive a bushfire event on every occasion. This is due to the degree of vegetation management, the unpredictable behaviour of bushfires and extreme weather conditions. As such, the author is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to the person taking action or not taking action based on the recommendations of this report.

NOTE: This bush fire assessment shall remain valid for 12 months from the date of issue.

Executive Summary

Bushfire Consulting Services was commissioned by Benbow Environmental to provide a bush fire assessment for a waste recycling facility at Lot 5 DP 655046, 344 Park Road Wallacia. The subject site is mapped as designated bush fire prone land by Penrith Council and is located within 100 metres of bush fire prone (hazardous) vegetation.

The proposal is a form of "other non-residential" development and, as such, this report makes recommendations in accordance with the aim and objectives of Chapter 1 and 8 of the NSW RFS document '*Planning for Bush Fire Protection*' (PBP) (NSWRFS 2019). The recommendations address these objectives including:

- afford buildings and their occupants protection from exposure to a bush fire
- provide for a defendable space to be located around buildings
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available
- provide for ongoing management and maintenance of BPMs, and
- ensure that utility services are adequate to meet the needs of firefighters.
- Provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation
- Provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development
- Provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building
- Provide for the storage of hazardous materials away from the hazard wherever possible

Where all recommendations are implemented, the report concludes that the proposal can comply with the aim and objectives of PBP.

Compliance Summary

This Assessment has been Certified by: Catherine Gorrie BPAD-Level 3 Accredited Practitioner FPAA Cert No: BPAD20751	
Does this development comply with the relevant aim and objectives of PBP?	Yes
Is referral to the NSW Rural Fire Service (RFS) required?	No

List of Abbreviations

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018, *Construction of Buildings in Bushfire Prone Areas*
BAL	Bushfire Attack Level
BPAD	Bushfire Planning and Design (Accreditation Scheme)
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
Council	Penrith Council
DA	Development Application
DEM	Digital Elevation Model
EP&A Act	*Environmental Planning and Assessment Act – 1979*
FDI	Fire Danger Index
FPAA	Fire Protection Association of Australia
kW/m^2	Kilowatts per metre squared
LiDAR	Light Detection and Ranging
LPMA	Land & Property Management Authority
NCC	National Construction Code
PBP	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act – 1997*
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SIX	Spatial Information Exchange
SWS	Static Water Supply

Contents

1. Introduction

This report has been commissioned by Benbow Environmental to provide a bush fire assessment for a new waste recycling facility at Lot 5 DP 655046, 344 Park Road Wallacia.

The subject property is “bushfire prone land” as per the local Council bushfire prone land map as defined by section 10.3 (s10.3) of the *Environmental Planning & Assessment Act* (EP&A) 1979 and therefore the requirements stipulated by legislation apply to any new development on the site.

Planning for Bush Fire Protection 2019 (Chapter 8) describes this type of development as “other non-residential development” and therefore the aim and objectives of Chapter 1 and 8 of PBP are applicable.

The bush fire assessment and recommendations are derived from the Rural Fire Service document *Planning for Bush Fire Protection 2019*.

2. Purpose of this Report

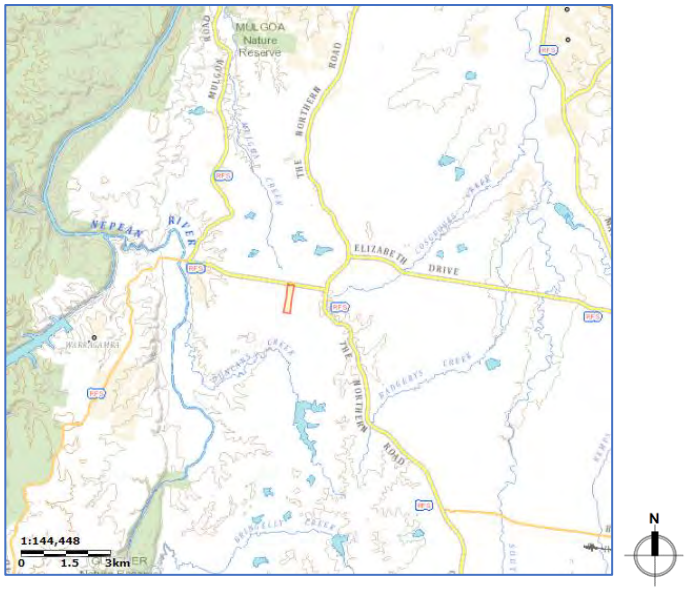
The purpose of this report is to provide the owners, the Consent Authority and the Certifier with a description of the proposed development as well as the vegetation type, slope and any other factors influencing the likely bushfire behaviour, sufficient to show that the development will be protected from the likely bushfire threat as outlined in current legislation.

This assessment includes an analysis of the hazard, threat and subsequent risk to the development and provides recommendations that satisfy the aim and objectives of Planning for Bush Fire Protection.

3. Location

The site is located and known as Lot 5 DP 655046, 344 Park Road Wallacia. The property is part of the Penrith local government area.

Figure 1. Location Map. Source: LPMA SIX Viewer (NSW Government 2019a)

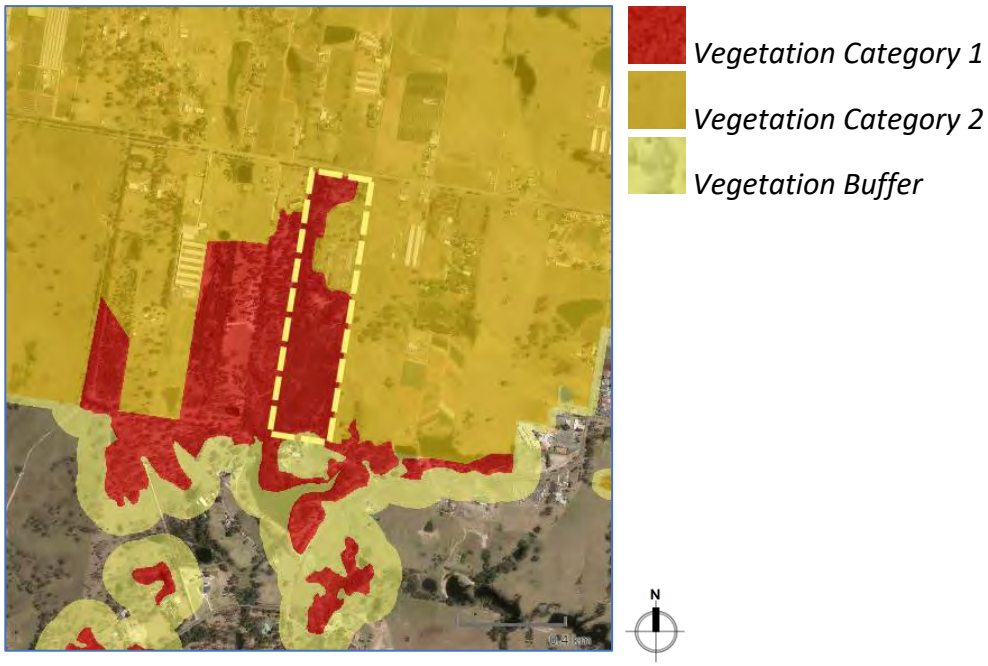


Site location outlined in red

Figure 2. Aerial Map. Source: LPMA SIX Viewer (NSW Government 2019a)

Site location outlined in red

Figure 3. Bushfire Prone Land Map. Source: NSW Government Planning Portal (NSW Government 2019b)



Site location outlined in yellow

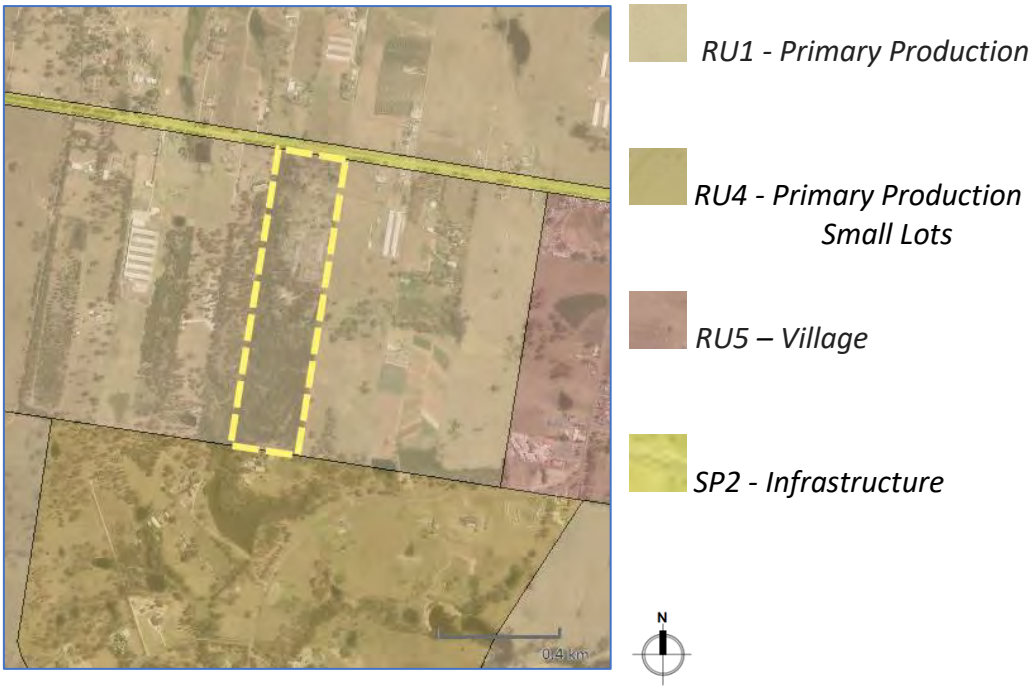
4. Property Description

The property is comprised of Lot 5 in DP 655046, 344 Park Road Wallacia covering approximately 19.66ha in area (Figure 2). It is bounded by Park Road to the approximate north and private allotments to the approximate east, south and west. It currently contains a dwelling and two sheds.

4.1 Zoning

The land is zoned RU1 - Primary Production under Penrith Local Environmental Plan 2010. Adjacent lands to the approximate east and west are similarly zoned. Adjacent lands to the approximate north are zoned SP2 – Infrastructure and adjacent lands to the approximate south are zoned RU4 - Primary Production Small Lots (Figure 4).

Figure 4. Zoning Map. Source: NSW Government Planning Viewer (NSW Government 2019b)



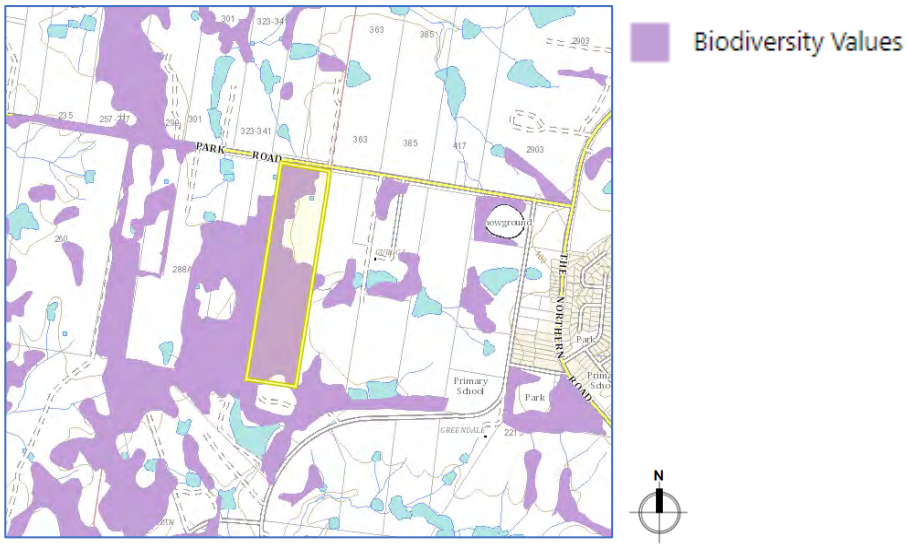
Site location outlined in yellow

4.2 Biodiversity Values

A search of the NSW Office of Environment and Heritage's Biodiversity Values Map has been carried out which indicates land with high biodiversity value within the site, as defined by the *Biodiversity Conservation Regulation 2017* (Figure 5). The development and access are wholly located outside the mapped area.

Figure 5: Biodiversity Values Map: NSW Office of Environment and Heritage

https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap



Site location outlined in yellow

Areas mapped in purple indicate land with high values

4.3 The Proposal

The proposal is for a new waste recycling facility, comprising a material recovery facility and attached office building, concrete storage bunkers with an awning over, rainwater tanks, an existing detached building to be converted to an office, a weighbridge, a parking area for cars, a parking area for small trucks, new internal access roads and hardstand areas. In terms of the NCC, the classification of the proposed material recovery facility building is Class 8, the proposed detached office is Class 5, the vehicle parking areas are Class 7a, the concrete storage bunkers are Class 10a and the weighbridge is Class 10b. The proposed office attached to the material facility recovery building may be considered as Class 8, as it is less than 10% of the floor area of the storey it is on.

5. Site Assessment

Bushfire Consulting Services Pty Ltd attended the site on 11 March 2020. The assessment relates to the new development shown in the site plans (reference Appendix 1 below). The NSW Spatial Services mapping website has also been used as a reference (NSW Government 2019a), and '*Ocean Shores to Desert Dunes*' by David Keith (Keith 2004), in determining the vegetation type.

6. Bush Fire Attack Assessment

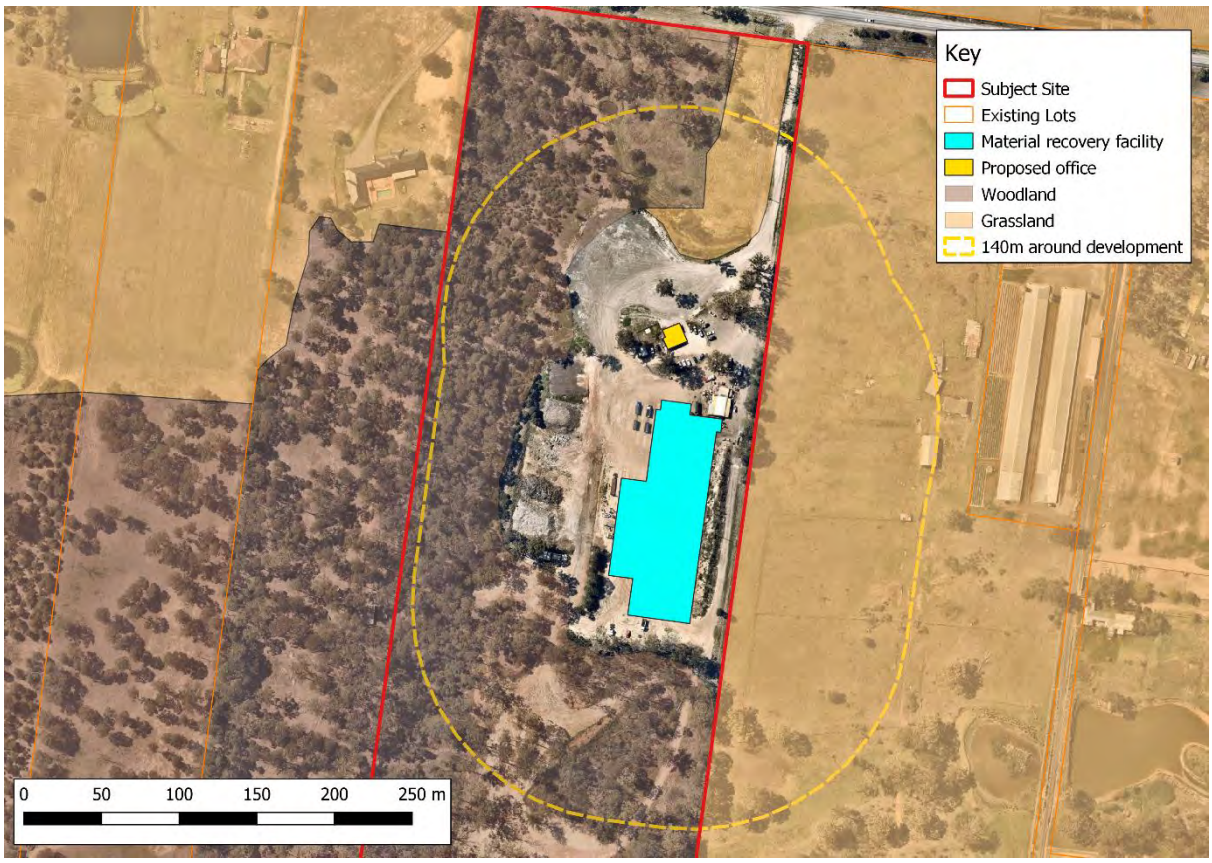
6.1 Determine Vegetation Formations

The hazardous vegetation formations for each aspect of the development within 140m of the asset have been identified according to Keith (2004). The bushfire threat emanates from bushland located to the north, east, south and west of the subject buildings. This includes vegetation both within and external to the subject site boundaries.

Where mixes of vegetation formations are located together, the vegetation formation providing the greater hazard is used for the purpose of this assessment. The combination of vegetation and slope that yields the worst-case scenario has been used.

Based on a site visit and determination of vegetation formation using the Keith (2004) Identification Key, the primary bushland vegetation having the potential to affect the subject buildings is classified as Shale Plain Woodland (Grassy and Semi-Arid Woodland) to the north, south and west and Grassland to the east (Figure 5).

Figure 6. Hazardous vegetation affecting the subject buildings. Source: NearMap (2019) with overlays by BFCS P/L. Aerial Photography date: 29/10/2019



Part subject site outlined in red. Vegetation was assessed to a distance of 140m from the proposed buildings

Table 1. Hazardous vegetation affecting the proposed office building

Direction	Vegetation Classification
North	Absence of Classified Vegetation for 43m then Woodland
East	Absence of Classified Vegetation for 51m then Grassland
South	Absence of Classified Vegetation for >140m
West	Absence of Classified Vegetation for 68m then Woodland

Table 2. Hazardous vegetation affecting the proposed waste recycling building

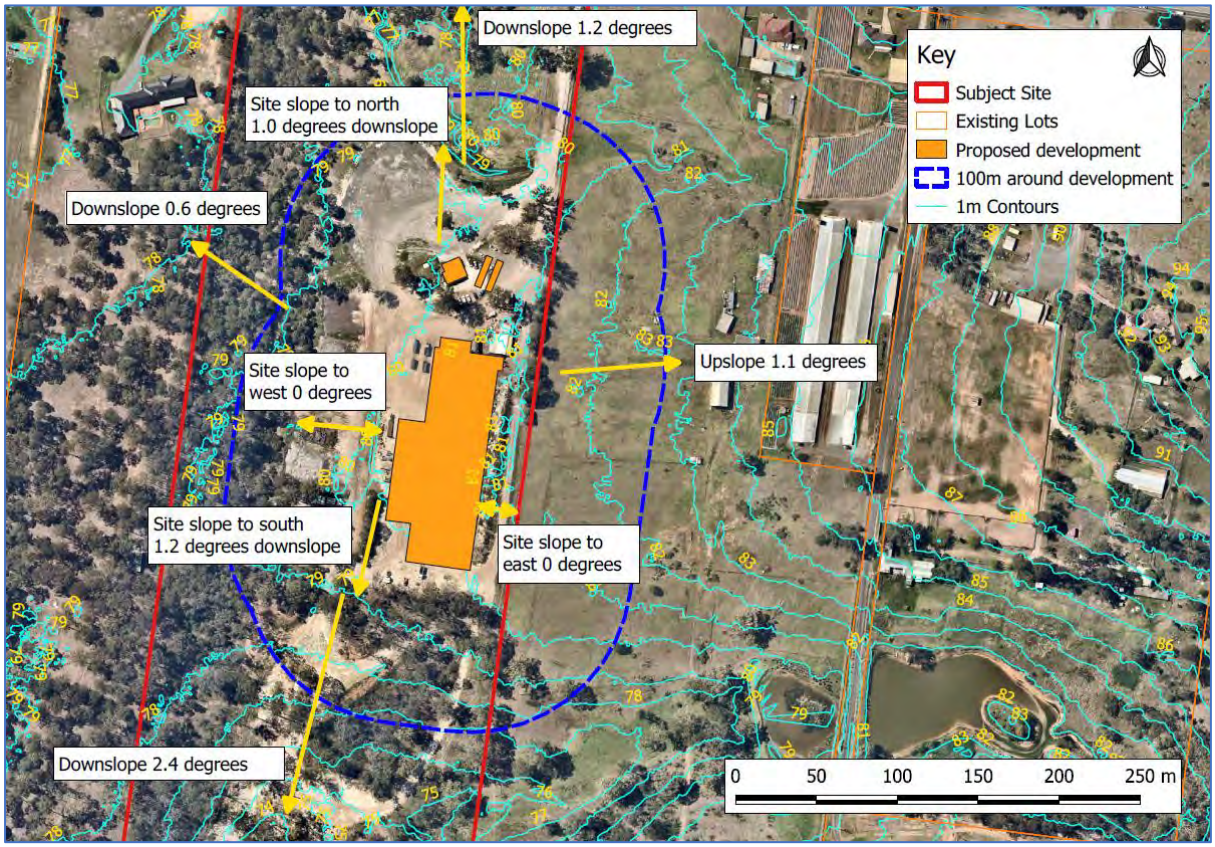
Direction	Vegetation Classification
North	Absence of Classified Vegetation for 93m then Woodland
East	Absence of Classified Vegetation for 25m then Grassland
South	Absence of Classified Vegetation for 21m then Woodland
West	Absence of Classified Vegetation for 49m then Woodland

6.2 The effective slope

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. The effective slope of the land under the hazard vegetation and the site slope between the proposed buildings and the hazard are derived from a site assessment combined with the most detailed contour data available. 1m DEM data is sourced from NSW Spatial Services which is captured using LiDAR and has a horizontal accuracy of 0.3m and vertical accuracy of 0.8m at 95%.

The effective slope and site slope have been estimated manually on site over a distance of 100m from the proposed development where accessible, under the classified vegetation community constituting the hazard. The slope was found to be consistent with the topographical information from NSW Spatial Services LiDAR data (Figure 6).

Figure 7. Slope Diagram. Source: NearMap (2019) and LiDAR (NSW Government 2019a) with overlays by BFCS P/L: Aerial Photography Date: 29/10/2019



Approximate site location outlined in red, 1m contours.

Slope to north: ((79 - 77)/97) x 1/tan = Downslope 1.2° downslope

Slope to east: ((83 - 81)/101) x 1/tan = Upslope 1.1°

Slope to south: ((79 - 74)/117) x 1/tan = Downslope 2.4°

Slope to west: ((79 - 78)/98) x 1/tan = Downslope 0.6°

Site slope to north: ((80 - 79)/58) x 1/tan = 1.0° (downslope)

Site slope to east is ((81 – 81)/13) x 1/tan = 0°

Site slope to south is ((80 - 79)/49) x 1/tan = 1.2° (downslope)

Site slope to west is ((80 – 80)/55) x 1/tan = 0°

Table 3. Slope Analysis

Direction from Building Footprint	Slope Description
Vegetation to north	Downslope 1.2°
Vegetation to east	Upslope 1.1°
Vegetation to south	Downslope 2.4°
Vegetation to west	Downslope 0.6°

6.3 Fire Weather

The development is located in the Penrith Council area, a part of the Greater Sydney Region, which has a Fire Danger Index of 100.

7. Relevant objectives of PBP

The objectives for buildings of Class 5-8 are outlined in PBP Chapter 1 and 8.

PBP section 8.3.1 - Objectives for Class 5 – 8 Buildings

Objective	Comment
Provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation	Can Comply. The lot has direct access to Park Road, which is a public road. Internal access provides a minimum road width of approximately 4m, with hard surfaces around the development This is sufficient for fire trucks and other emergency vehicles to enter and egress the lot in a forwards direction and internal roads are designed to loop around buildings. Suitable access for fire-fighting vehicles and evacuation is planned to be available

Objective	Comment
Provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development	Can Comply. The need to formulate an emergency management and evacuation plan is suggested Information regarding formulation of an appropriate plan is available from NSW RFS at: https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/what-you-need-to-know/decision-tree-pages/goal-13https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/what-you-need-to-know/decision-tree-pages/goal-13 The NSW RFS provide a template to create a bush fire emergency management and evacuation plan at: https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0003/29271/DPP1079-Emergency-management-and-evacuation-plan-FORM.pdf
Provide adequate services of water for the protection of buildings during and after the passage of bush fire	Can Comply. The development includes provision of 5 x 34KL and 1 x 27KL rainwater storage tanks. Fire hydrant spacing, design and sizing is to comply with the relevant clauses of Australian Standard AS 2419.1:2005 and hydrants are not located within any road carriageway. Fire hydrant flows and pressures are to comply with the relevant clauses of AS 2419.1:2005. all Above-ground water service pipes are metal, including and up to any tanks and tanks are to be concrete or metal

Objective	Comment
Locate electricity so as not to contribute to the risk of fire to a building	Where practical, electrical transmission lines are provided underground
Locate gas so as not to contribute to the risk of fire to a building	If applicable, reticulated or bottled gas is installed and maintained in accordance with *AS/NZS 1596:2014 - The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used, all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side, connections to and from gas cylinders are metal, polymer-sheathed flexible gas supply lines are not used, and above-ground gas service pipes are metal, including and up to any outlets
Provide for the storage of hazardous materials away from the hazard wherever possible	Can comply. Wherever possible, hazardous materials will be stored away from the bushfire hazard

PBP section 1.1 – General Aim and Objectives

Objective	Comment
Afford buildings and their occupants protection from exposure to a bush fire	The proposed non-habitable structures are separated from the bushfire hazard by distances sufficient to reduce radiant heat levels to <29kW/m^2 and provide buildings and occupants protection from exposure to a bush fire (see below)

Objective	Comment
Provide for a defendable space to be located around buildings	A defendable space of at least 10m width is proposed around the subject buildings, which meets the requirements of PBP
Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings	The subject buildings are separated from the bushfire hazard by at least 24m to the north, 10m to the east, and 29m to the south and west. The relevant FFDI (100), vegetation formations and effective slopes have been matched using Table A1.12.2 of PBP, and the available separation distances between the buildings and the hazard meet or exceed the minimum distances required to achieve radiant heat levels of <29kW/m^2. This indicates that direct flame contact on the buildings is not anticipated
Ensure that appropriate operational access and egress for emergency service personnel and occupants is available	Can comply as; • road widths are to be a minimum 4m • a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches • a suitable turning area is to be provided • curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress • the minimum distance between inner and outer curves is 6m • maximum grades for sealed roads do not exceed 15 degrees

Objective	Comment
Provide for ongoing management and maintenance of BPMs, and ensure that utility services are adequate to meet the needs of firefighters	Normal property maintenance will ensure that BPMs are maintained. Utility services will meet the needs of firefighters (see requirements of PBP section 8.3.1 above)

To ensure that flame contact is not anticipated, the relevant FFDI, vegetation formation and effective slope are matched using Table A1.12.2 of PBP.

Table A1.12.2 of PBP - Minimum distances to ensure direct flame contact not anticipated (APZs) – FFDI 100 areas (≤ 29kW/m^2, 1090K) as it applies to the entire development

Aspect	Distance from hazard	Vegetation Classification	Slope Under Classified Vegetation	Distance to ensure direct flame contact not anticipated
North	43m	Woodland	Downslope >0-5°	16m
East	25m	Grassland	Downslope >0-5°	12m
South	21m	Woodland	Downslope >0-5°	16m
West	49m	Woodland	Downslope >0-5°	16m

8. Identify Construction Requirements

The NCC does not provide for any bush fire specific performance requirements for these particular classes of buildings. The general fire safety construction provisions of

the NCC are taken as acceptable solutions, and AS 3959 and the NASH Standard are not considered as a set of Deemed to Satisfy provisions for this non-residential proposal.

9. Recommendations

The following recommendations are made for the bushfire measures for the proposed development of a waste recycling facility at Lot 5 DP 655046, 344 Park Road Wallacia, and are based upon the relevant provisions of the NSW Rural Fire Service Guideline entitled *Planning for Bush Fire Protection 2019*.

1. Water Supply

A 20,000 litre static water supply is to be available for fire fighting purposes and suitable fittings sufficient to enable fire fighting. The tank is to be concrete or metal and all exposed water pipes external to the building are metal, including any fittings. Fire hydrant spacing, design and sizing is to comply with the relevant clauses of Australian Standard AS 2419.1:2005 and hydrants are not located within any road carriageway. Fire hydrant flows and pressures are to comply with the relevant clauses of AS 2419.1:2005.

2. Access

To ensure that appropriate operational access and egress for emergency service personnel and occupants is available, access is to meet the following requirements;

i) road widths are to be a minimum 4m
ii) a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches
iii) a suitable turning area is to be provided n accordance with PBP Appendix 3
iv) curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress

v) the minimum distance between inner and outer curves is 6m

vi) maximum grades for sealed roads does not exceed 15 degrees

3. Electricity and Gas Services

Where practicable, electrical transmission lines are underground.

Where applicable, reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used.

All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side, connections to and from gas cylinders are metal. Polymer-sheathed flexible gas supply lines are not used, and above-ground gas service pipes are metal, including and up to any outlets.

4. Storage of Hazardous Materials

Wherever possible, the storage of hazardous materials will be away from the hazard.

5. Emergency and Evacuation Planning

The need to formulate an emergency management and evacuation plan is suggested. The NSW RFS Website provides a 'Guide for Developing a Bush Fire Emergency management and Evacuation Plan' at:

https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0003/29271/DPP1079-Emergency-management-and-evacuation-plan-FORM.pdf

10. Summary

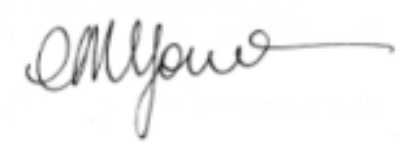
This report consists of a bush fire assessment for the proposed development of a waste recycling facility at Lot 5 DP 655046, 344 Park Road Wallacia. The report concludes

that the proposed development is on designated bushfire prone land and the legislative requirements for development in bushfire prone areas are applicable.

This report has considered all the elements of bushfire attack and finds that the development satisfies the aim and objectives of 'Planning for Bush Fire Protection' 2019, subject to implementation of the recommendations made by this report.

Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains and although the standard is designed to improve the performance of such buildings, there can be no guarantee because of the variable nature of bushfires that any one building will withstand bushfire attack on every occasion.

This report is a bush fire assessment that provides the required information to assist local Council and the Rural Fire Service in determining compliance in accordance with Planning for Bush Fire Protection. The local Council is the final consenting authority and the construction of the building must comply with the recommendations included in the Council's conditions of consent.



Catherine Gorrie

(a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment)

Accredited Bushfire Planning and Design Practitioner

Fire Protection Association Australia BPAD-Level 3 (BPAD 20751)

Grad Dip Bushfire Protection (UWS 2010)

Diploma Environmental Health & Building Surveying (TAFE 2005)

Corporate Bronze Member Fire Protection Association Australia

Bushfire Consulting Services Pty Ltd

Mob: 0425 833 893

11. References

Keith D 2004, *Ocean Shores to Desert Dunes, the Native Vegetation of NSW and the ACT,* Department of Environment and Conservation, Sydney

NearMap 2019, *NearMap Photomap Aerial Imagery*, NearMap Australia, Barrangaroo, NSW

NSW Government 2019a, *NSW Spatial Services*, NSW Department of Finance, Services and Innovation.

NSW Government 2019b, *NSW Planning Portal*, NSW Department of Planning and Environment.

NSW Government 2019c, *Biodiversity Values Map*, NSW Department of Environment and Heritage.

NSW RFS 2019, *Planning for Bush Fire Protection*, NSW Rural Fire Service, Sydney.

Standards Australia 2018, *Australian Standard AS 3959-2018 'Construction of Buildings in Bushfire Prone Areas'*, SAI Global, Australia.

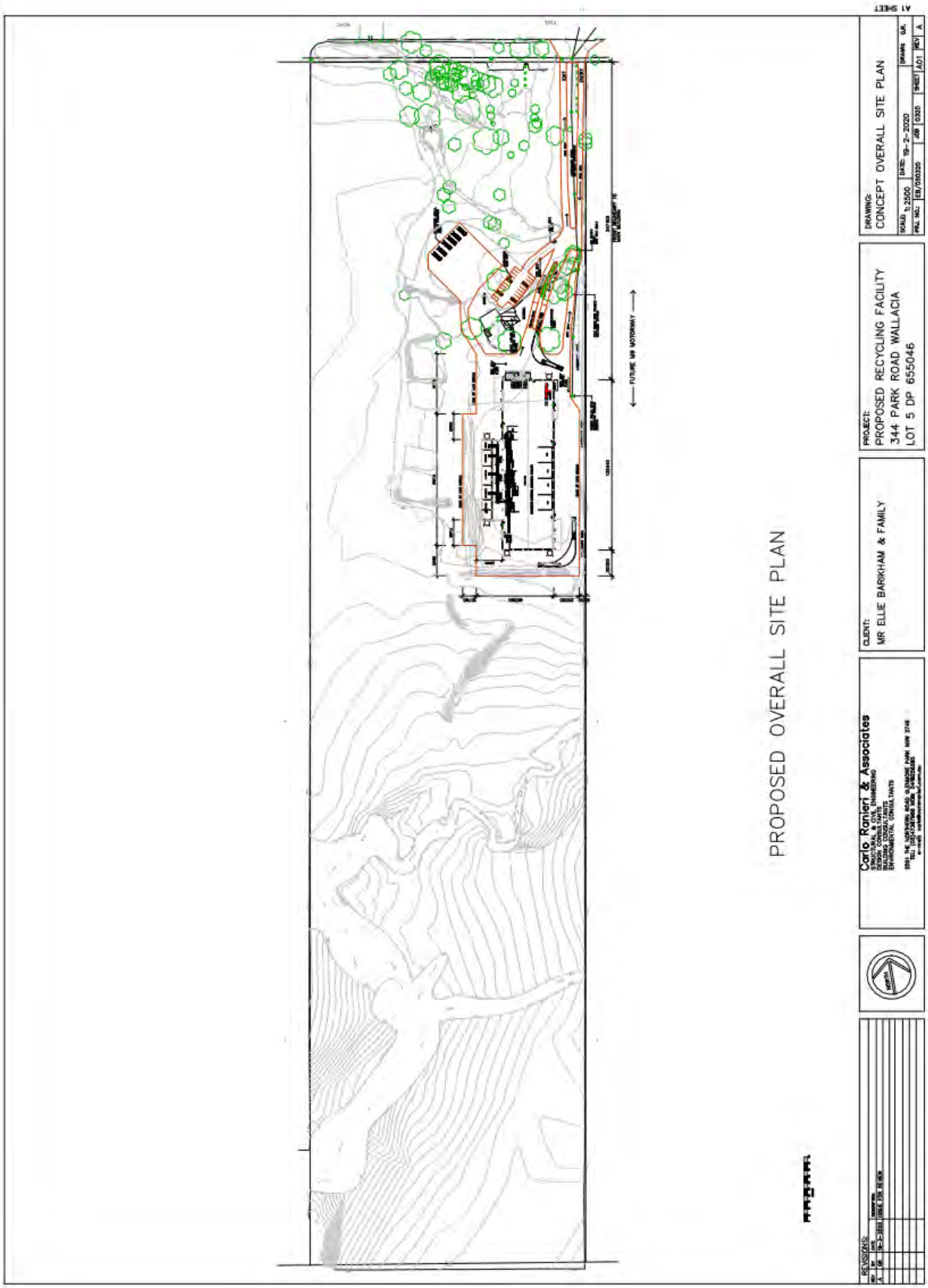
12. Legislation

Environmental Planning & Assessment Act 1979

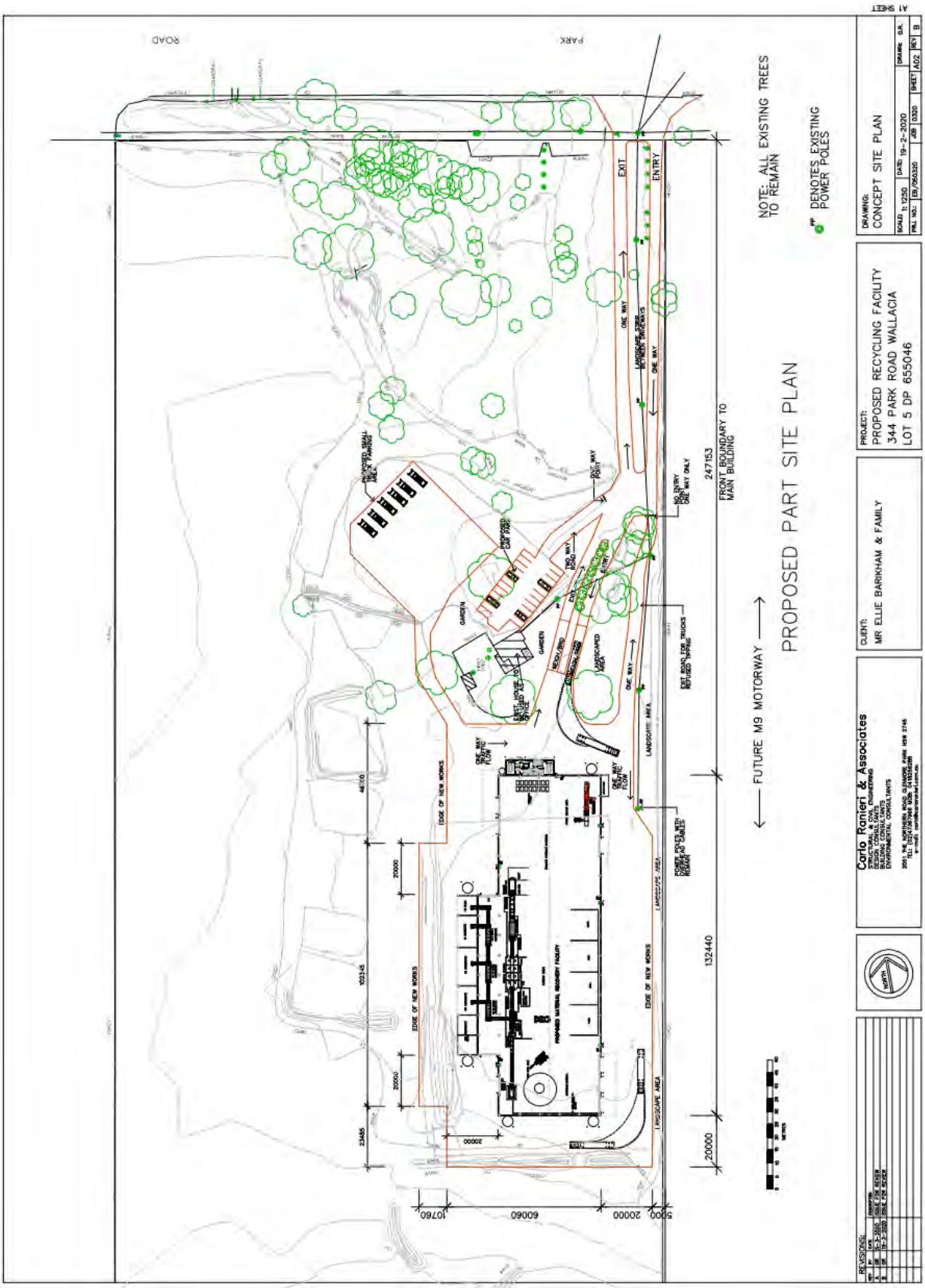
Rural Fires Act 1997

Rural Fires Regulation 2013

Appendix 1 – Overall Site Plan



Part Site Plan



Appendix 2 – Photos of Site and Surrounds

Source: BFCS P/L 11/03/2020

View to approximately southwest from Park Road showing the subject site

View to approximately southwest showing an existing building on the subject site to be converted into an office

View to approximately north from the existing cleared area on the subject site

View to approximately east from the existing cleared area on the subject site showing the approximate position of the proposed waste recycling building

View to approximately south from the existing cleared area on the subject site showing typical vegetation to the south of the proposed waste recycling building

View to approximately west from the existing cleared area on the subject site showing typical vegetation to the west of the proposed waste recycling building

View to approximately southwest showing predominantly onsite vegetation to the west of the proposed office building

View to approximately north showing typical onsite vegetation to the north of the proposed office building

View across the subject site east boundary showing typical vegetation to the east of the subject site on the adjoining property

Typical onsite vegetation to the south of the proposed waste recycling building

View to approximately north along the east boundary of the subject site showing the existing driveway access and approximate position of proposed access to the development

Appendix 3 – Bushfire Risk Assessment Certificate

This form is completed by a recognized consultant in bushfire risk assessment in accordance with section s4.14 of the *Environmental Planning and Assessment Act 1979 No 203*

PROPERTY ADDRESS:	Lot 5 DP 655046 344 Park Road Wallacia
DESCRIPTION OF PROPOSAL:	A waste recycling facility
PLAN REFERENCE: (relied upon in report preparation)	Plans by Carlo Ranieri & Associates, numbered 0320, revision A, dated 19/03/2020
DOES THE PROPOSAL RELY ON ALTERNATE SOLUTIONS:	YES NO (Circle the relevant response) (If YES the application is to be referred to NSW RFS for assessment.)

I, Catherine Gorrie, of Bushfire Consulting Services Pty Ltd, have carried out a bushfire risk assessment on the above mentioned proposal and property. A detailed Bushfire Assessment Report is attached which includes the submission requirements set out in Appendix 2 of Planning for Bushfire Protection 2019 together with recommendations as to how the relevant aim and objectives are to be achieved.

REPORT REFERENCE:	20/0119
REPORT DATE:	20/04/2020
CERTIFICATION NO/ACCREDITED SCHEME:	BPAD-Level 3 Accredited Practitioner FPAA Cert No: BPAD20751

Note: this certificate must be completed and signed by a person recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment in accordance with s4.14 of the *EP&A Act 1979* No 203.

****

I hereby certify, in accordance with Section 4.14 of the Environmental Planning and Assessment Act 1979 No 203:

That I am a person recognised by the NSW Rural Fire Service as a qualified consultant in bushfire risk assessment; and

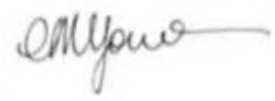
That subject to the recommendations contained in the attached Bushfire Risk Assessment Report the proposed development conforms to the relevant specifications and requirements*.

* The relevant specifications and requirements being; specifications and requirements of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service in co-operation with the Department of Planning and any other document as prescribed by Section s4.14 of the Environmental Planning and Assessment Act 1979 No 203.

I am aware that the bush fire assessment report, prepared for the above mentioned site is to be submitted in support of a development application for this site and will be relied upon by Council as the basis for ensuring that the bushfire risk management aspects of the proposed development have been addressed in accordance with Planning for Bush Fire Protection 2019.

Attachments:

- Bush Fire Risk Assessment Certificate
- Recommendations



SIGNATURE:

DATE: 20/04/2020

EIS Appendix 8: Geotechnical Investigation

envirotech
Consulting Group

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GEOTECHNICAL INVESTIGATION - SUBSURFACE SOIL PROFILE CLASSIFICATION

For

344 PARK ROAD, WALLACIA NSW 2745

PREPARED FOR:	National Integrated Creative Solutions
REFERENCE:	REF-19-7557-A
DATE:	4th April 2019

DISTRIBUTION & REVISION REGISTER

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1 Original	Daniel Mathew	Envirotech Pty. Ltd (Filed)
2 Soft Copy (PDF, emailed)	National Integrated Creative Solutions	20nicolas15@gmail.com

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DOCUMENT HISTORY		
Document No.	Revision No.	Issue Date
REF-19-7557	A	04/04/2019

AUTHOR	TECHNICAL REVIEWER
	
Ben Hamilton Geotechnical Engineer BSc (Geo.), GradCertEngSci, AGS	Simon Doberer Environmental Scientist/Operations Manager BSc (Env.)

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APPENDICES

A: Site and Borehole Location
B: Soil landscape
C: Geotechnical Explanatory Notes
D: Borehole Logs

1. INTRODUCTION

Envirotech Pty Ltd was commissioned by Mr. Nicolas Israel from National Integrated Creative Solutions to undertake a soil profile classification for 344 Park road, Wallacia NSW 2745.

1.1 Overview

The objectives of the investigation were to investigate the underlying soils, providing evidence on the depth of soil strata, depth of fill, extent of fill to the natural soil profile and any groundwater present. The results of the investigation will assist in surveying the natural ground profile and quantifying the amount of fill present within the area of investigation.

1.2 Scope of Works

The scope of works comprised the following;

- Application for "Dial before you dig" plans;
- Review of available reports and geological maps held within our files;
- Walkover observations of the site;
- Assessment of the existing site conditions and local geology;
- Drilling of ten (10) boreholes employing a 4WD vehicle mounted drill rig utilising 60 mm solid flight augers to depths up to 3.0 m at locations nominated by Envirotech;
- Engineering logs; and
- Groundwater level determination, if encountered.

1.3 Legislative Requirements

This assessment has been prepared in general accordance with the following guidelines and standards;

- Australian Standard 1726 (2017) Geotechnical site investigations;
- Australian Standard 2870 (2011) Residential slabs and footings;
- Australian Standard 3798 (2007) Guidelines on earthworks for commercial and residential developments;

1.4 Context of Report

This report is to be read in its entirety and individual sections should not be reviewed to provide any level of information independently. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments. Particular attention is drawn to the limitations of inherent site investigation and the importance of verifying the subsurface conditions inferred herein.

2. METHODOLOGY

2.1 Fieldwork

A site visit was made on the Wednesday 13th March 2019 by a geotechnical engineer from Envirotech. A preliminary walkover of the site was conducted during the site visit. The fieldwork consisted of a visual site assessment and drilling of ten (10) boreholes by a 4WD vehicle mounted solid flight auger at locations nominated by Envirotech, within the footprint of the mark up plans provided by the client.

No sampling was undertaken. Appendix A displays the location of boreholes.

2.2 Laboratory

No external laboratory testing was undertaken for the purpose of this report.

3. SITE DESCRIPTION

The site was located at 344 Park road, Wallacia NSW 2745. The area of the subject site was approximately 20,210 m^2 (20.21 Ha). The area of the investigation was approximately 9,346 m^2 (9.346 Ha). At the time of the site inspection the investigation area displayed large open cleared areas of land fill. Some areas of the remaining forest vegetation were also cleared for access and future development located toward the rear of the investigation area. Figure 1 below displays an overall aerial view of the property. Figure 2 displays the marked-up areas of investigation.

3.1 Soil landscape

Gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 m, slopes are usually <5%. Broad rounded crests and ridges with gently inclined slopes. Cleared eucalypt woodland and tall open-forest (wet sclerophyll forests).

Figure 1 Overall aerial view of the property and surrounding region

Figure 2 Area of investigation

3.2 Geology

Wianamatta Group; Ashfield Shale consisting of laminite and dark grey siltstone and Bringelly Shale which consists of shale, with occasional calcareous claystone, laminite and coal.
This unit is occasionally underlain by claystone and laminite lenses within the Hawkesbury Sandstone such as at Duffys Forest.

3.3 Subsurface Conditions

A summary of the subsurface strata is presented in the following table;

Table 1 A summary of geological units

UNIT	SOIL TYPE
UNIT A	TOPSOIL; Admix silt and sand, brown, organics (roots), some gravels, slightly moist
UNIT B	FILL: Sandy GRAVEL: poorly sorted, pale yellow, white and grey, fine to coarse sands and sandstone gravels, dry, very dense
UNIT C	FILL: Gravelly SAND/CLAY: dark brown grey, orange-brown, fine to coarse sands and gravels, slightly moist to moist, very dense
UNIT D	NATURAL: SILT: orange-brown to grey, trace fine to coarse rounded to sub-rounded gravels, slightly moist, loose
UNIT E	NATURAL: Silty CLAY: medium plasticity, red brown, indurate ironstone, slightly moist, firm to stiff
UNIT F	RESIDUAL: Sandy CLAY: low plasticity, orange brown, fine to medium sands, slightly moist to moist, very stiff
UNIT G	SANDSTONE: Clayey Sandstone: DW-MW, pale yellow to brown, fine to medium sands, ELS to LS, moist, very dense to hard

Note: DW - Distinctly weathered, MW - Moderately weathered, VLS - Very low strength, LS - Low strength

A summary of the subsurface strata depths is presented in the following table;

Table 2 Depth of geological units

Borehole	UNIT A	UNIT B	UNIT C	UNIT D	UNIT E	UNIT F	UNIT G
BH01	0-0.2m	-	-	-	0.2-0.6m	0.6-1.0m	1.0-2.0m
BH02	0-0.2m	-	-	0.2-1.1m	-	1.1-3.0m	
BH03	-	0-0.1m	-	-	0.1-1.0m	1.0-1.8m	1.8-2.0m
BH04	-	0-0.05m	0.05-0.2m	-	0.2-0.6m	0.6-3.0m	-
BH05	-	0-0.15m	0.15-0.7m	-	0.7-1.7m	1.7-3.0m	-
BH06	-	0-0.15m	0.15-0.6m	0.6-0.9m	-	0.9-1.10m	1.0-1.5m
BH07	-	0-0.2m	0.2-0.3m	-	0.3-2.3m	2.3-3.0m	-
BH08	-	-	0-0.6m	-	0.6-1.0m	1.0-3.0m	-
BH09	-	-	0-0.8m	0.8-1.3m	-	1.3-3.0m	-
BH10	0-0.25m	-	-	-	0.25-1.8m	1.8-3.0m	-

Appendix D displays results of detailed logs.

4. GROUNDWATER

No groundwater was observed within the drilled boreholes. With reference to WaterNSW there are no boreholes located within ~500 m of 344 park Road, Wallacia NSW.

5. COMMENTARY

5.1 Site Classification

The classification of a site involves several geotechnical factors such as depth of bedrock, the nature and extent of subsurface soils and any specific problems (slope stability, soft soils, filling, reactivity, etc.).

During the site investigation subsurface conditions presented uncontrolled gravelly SAND/CLAY filling and natural SILT to depths up to 1.30 m overlying natural silty sandy CLAYS. In accordance with AS2870-2011 the subject site be classified as **Class P.** Reclassification of the site may be given if removal of all unsuitable fill (silt and uncontrolled sandy clay filling) is achieved and assessed in accordance with engineering principles. Replacement of all unsuitable materials with controlled fill (if required) may also be reclassified in accordance with AS 2870 *'Residential slabs and footings'* and general engineering principles.

5.2 Filling

Uncontrolled fill was present predominantly within the cleared areas of the site towards the centre of the investigation area (see Appendix A). Filling consisted of Sandy GRAVELS and Gravelly SAND/CLAY. Fill appeared to be well compacted and slightly moist to moist. The maximum depth of fill observed was 0.80 m at BH09. The minimum depth of fill observed was 0.10 m at BH03. Figure 3 below displays the approximate area of fill observed from the subsurface investigation.

Figure 3 Approximate area of fill

5.3 Site Preparation

All spoil on site should be properly controlled by erosion control measures to prevent transportation of sediments off-site. Appropriate soil erosion control methods should be adopted in accordance with local council requirements. Erosion and sediment control may be aided by minimizing the disturbance footprint.

Any material removed from the site will need to be managed in accordance with the provision of current legislation and may include material type classification in accordance with NSW EPA (2014) Waste Classification Guideline and disposal at facilities appropriately licensed to receive the materials.

5.3.1 Stripping

Particular attention should be made to areas of construction where cut and fill activities occur in preparation of suitable foundations. Preparation of the construction footprints shall be stripped of all unsuitable materials including vegetation, organics, soft soils and clays, silts, deleterious materials or uncontrolled filling.

Geotechnical assessment of the depth and quality of the existing soils and/or fill may obviate the need for such stripping in some circumstances.

All stripped materials should be deposited in stockpiles in locations available for re-use if required, and away from construction areas where the possibility of the material being unintentionally being incorporated could occur.

5.4 Site Suitability

The subsurface geotechnical investigation indicated that the area of investigation comprised localised zones of uncontrolled shallow fill, silts and natural clays overlying sandstone bedrock/shale and laminite lenses. Uncontrolled fill areas were predominantly within the centre of the investigation area where current activities are occurring. Toward the front of the property (BH01&BH10) displayed natural silty clays but no filling. No groundwater was observed within the excavated boreholes.

The suitability of the site relies on a number of factors which may influence the investigation, design, planning and construction of future developments. Reference to Australian Standard 3798 (2007) *'Guidelines on earthworks for commercial and residential developments'* and a suitably qualified geotechnical professional should be sought on guidance on the site suitability for future proposals.

6. LIMITATIONS

EnviroTech Pty. Ltd. Pty. Ltd. has undertaken the following report in accordance with the scope of works set out between EnviroTech Pty. Ltd. and the client. EnviroTech Pty. Ltd. derived the data in this report primarily from the site and soil assessment conducted on the date of site inspection. The impacts of future events may require future investigation of the site and subsequent data analysis, together with a re-evaluation of the conclusions and recommendations of this report.

In preparing this report, EnviroTech Pty. Ltd has relied upon, and assumed accurate, certain site information provided by the client and other persons. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. EnviroTech Pty. Ltd. accepts no liability or responsibility whatsoever for or in respect to any use or reliance upon this report by any third party.

The information contained within this report have been prepared exclusively for the client. Envirotech have prepared the report to address the risk associated with scale of the works. The report has been prepared with a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia. No other warranty, expressed or implied, is made or intended. This report is to be read in its entirety including attachments and appendices and should not read in individual sections.

A third party should not rely upon the information prior to making an assessment that the scope of work conducted meets their specific needs. Envirotech cannot be held liable for third party reliance on this document.

Envirotech's professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and/or opinions. Envirotech Pty Ltd has limited its investigation to the scope agreed upon with its client.

7. REFERENCES

- AS 3798 (2007) 'Guidelines on earthworks for commercial and residential developments'
- AS 2870 (2011) 'Residential slabs and footings'
- AS 1726 (2017) 'Geotechnical site investigations'
- Council policies, guidelines and requirements
- NSW Spatial Information Exchange (http://maps.six.nsw.gov.au/)
- NSW Espade (http://www.environment.nsw.gov.au/eSpadeWebapp/)
- WaterNSW (https://realtimedata.waternsw.com.au/water.stm)

Appendix A – Site and Borehole Locations

Site Location

Borehole Location

Appendix B – Soil Landscape

bt	BLACKTOWN	Residual

Source: Soil Landscapes of the Penrith 1:100,000 Sheet *report*

Landscape— gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 m, slopes are usually <5%. Broad rounded crests and ridges with gently inclined slopes. Cleared eucalypt woodland and tall open-forest (wet sclerophyll forests).

Soils— shallow to moderately deep (<100 cm) *Red and Brown Podzolic Soils (Dr3.21, Dr3.11, Db2.11)* on crests, upper slopes and well-drained areas; deep (150-300 cm) *Yellow Podzolic Soils* and *Soloths (Dy2.11, Dy3.11)* on lower slopes and in areas of poor drainage.

Limitations— moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.

LOCATION

Occurs extensively on the Cumberland Lowlands between the Georges and Parramatta Rivers in the south-west. Examples include Strathfield, Auburn and Belmore. Isolated examples are found north of Parramatta River on the Hornsby Plateau at Chatswood, Crows Nest, Duffys Forest, Dundas, Naremburn, Neutral Bay, St. Ives and St. Leonards.

LANDSCAPE

Geology

Wianamatta Group— Ashfield Shale consisting of laminite and dark grey siltstone and Bringelly Shale which consists of shale, with occasional calcareous claystone, laminite and coal.

This unit is occasionally underlain by claystone and laminite lenses within the Hawkesbury Sandstone such as at Duffys Forest.

Topography

Gently undulating rises on Wianamatta Shale with local relief 10-30 m and slopes generally <5%, but up to 10%. Crests and ridges are broad (200-600 m) and rounded with convex upper slopes grading into concave lower slopes. Rock outcrop is absent.

Vegetation

Almost completely cleared tall open-forest (wet sclerophyll forest) and open-woodland (dry sclerophyll forest). Remaining traces of the original wet sclerophyll forest containing Sydney blue gum *Eucalyptus saligna* and blackbutt *E. pilularis* are located at Ashfield Park. The original woodland and open-forest in drier areas to the west were dominated by forest red gum *E. tereticornis*, narrow-leaved ironbark *E. crebra* and grey box *E. moluccana*. This has been almost completely cleared. At Duffys Forest there is an open-forest dominated by ash *E. sieberi* with a dry sclerophyll shrub understorey.

Land use

The dominant land uses are intensive residential and light and heavy industry. Examples of residential areas include Newtown, Petersham, Strathfield and Belmore. Examples of industrial areas include Enfield, Lidcombe and Clyde.

Existing Erosion

No appreciable erosion occurs on this unit as most of the surface is covered by tiles, concrete, bitumen or turf.

Associated Soil Landscapes

Birrong (**bg**) soil landscape occurs along drainage depressions.

SOILS

Dominant Soil Materials

bt1— Friable brownish-black loam. This is a friable brownish-black loam to clay loam with moderately pedal sub-angular blocky structure and rough-faced porous ped fabric. This material occurs as topsoil (A1 horizon). Peds are well defined sub-angular blocky and range in size from 2mm to 20 mm. Surface condition is friable. Colour is commonly brownish-black (10YR 2/2), but can range from dark reddish-brown (5YR 3/2) to dark yellowish-brown (10YR 3/4). The pH ranges from slightly acid (pH 5.5) to neutral (pH 7.0). Rounded iron indurated fine gravel-sized shale fragments and charcoal fragments are sometimes present. Roots are common.

bt2— Hardsetting brown clay loam. This is a hardsetting brown clay loam to silty clay loam with apedal massive to weakly pedal structure and slowly porous earthy fabric. It commonly occurs as an A2 horizon. Peds when present are weakly developed, sub-angular blocky and are rough faced and porous. They range in size between 20 mm and 50 mm. Colour is commonly dark brown (7.5YR 4/3), but can range from dark reddish-brown (2.5YR 3/3) to dark brown (10YR 3/3). The pH ranges from moderately acid (pH 5.0) to slightly acid (pH 6.5). Platy ironstone gravel-sized shale fragments are common. Charcoal fragments and roots are rarely present.

bt3— Strongly pedal, mottled brown light clay. This is a brown light to medium clay with strongly pedal polyhedral or subangular-blocky structure and smooth-faced dense ped fabric. This material usually occurs as subsoil (B horizon). Texture often increases with depth. Peds range in size from 5 mm to 20 mm. Colour is usually brown (7.5YR 4/6), but may range from reddish-brown (2.5YR 4/6) to brown (10YR 4/6). Red, yellow or grey mottles are commonly present and often become more numerous with depth. The pH ranges from strongly acid (pH 4.5) to slightly acid (pH 6.5). Fine to coarse gravel-sized shale fragments are common and widespread and often occur in stratified bands. Both roots and charcoal fragments are rare.

bt4— Light grey plastic mottled clay. This is plastic light grey silty clay to heavy clay with moderately pedal polyhedral to sub-angular blocky structure and smooth-faced dense ped fabric. This material usually occurs as deep subsoil above shale bedrock (B3 or C horizon). Peds range in size from 2 mm to 20 mm. Colour is usually light grey (10YR 7/1) or, less commonly, greyish yellow (2.5Y 6/2). Red, yellow or grey mottles are common. The pH ranges from strongly acid (pH 4.0) to moderately acid (pH 5.5). Strongly weathered ironstone concretions and rock fragments are common. Gravel-sized shale fragments and roots are occasionally present. Charcoal fragments are rare.

Occurrence and Relationships

Crests. On crests and ridges up to 30 cm of friable brownish-black loam (**bt1**) overlies 10-20 cm of hardsetting brown clay loam (**bt2**) and up to 100 cm of strongly pedal, brown mottled light clay (**bt3**) (Red Podzolic Soils (Dr 3.21, 3.11) and Brown Podzolic Soils (Db 2.11)). **bt1** material is occasionally absent. Boundaries between the soil materials are usually clear. Total soil depth is <100 cm.

Upper slopes and midslopes. Up to 30 cm of **bt1** overlies 10-20 cm of **bt2** and 20-50 cm of **bt3**. This in turn overlies up to 100 cm of light grey plastic mottled clay (**bt4**). Occasionally the **bt1** material is absent. The boundaries between the soil materials are usually clear. Total soil depth is <200 cm (Red Podzolic Soils (Dr 3.21), Brown Podzolic Soils (Db 2.21)).

Lower sideslopes. Up to 30 cm of **bt1** overlies 10-30 cm of **bt2** and 40-100 cm of **bt3**. Below **bt3** there is usually >100 cm of **bt4**. The boundaries between the soil materials are clear. Total soil depth is >200 cm (Yellow Podzolic Soils (Dy 2.11, Dy 3.11)).

LIMITATIONS TO DEVELOPMENT

Urban Capability

High capability for urban development with appropriate foundation design.

Rural Capability

Small portions of this soil landscape that have not been urbanised are capable of sustaining regular cultivation and grazing.

Landscape Limitations

Moderately reactive soil
Seasonal waterlogging

Soil Limitations

bt1 Low wet strength
High organic matter
Low fertility
Sodicity (localised)
Strongly acid

bt2 Low wet strength
Hardsetting
Low fertility
Sodicity (localised)
Strongly acid
High aluminium toxicity

bt3 High shrink-swell (localised)
Low wet strength
Low permeability
Low available water capacity
Salinity (localised)

Sodicity (localised)
Very low fertility
Strongly acid
Very high aluminium toxicity

bt4 High shrink-swell (localised)
Low wet strength
Stoniness
Low available water capacity
Low permeability
Salinity (localised)
Sodicity (localised)
Very low fertility
Strongly acid
Very high aluminium toxicity
High erodibility (localised)

Fertility

General fertility is low to very low. Soil materials have low to moderate available water capacity, low CEC values, hardsetting surfaces (**bt2**), very low phosphorus and low to very low nitrogen levels. The subsoils (**bt3**, **bt4**) may be locally sodic with low permeability. When **bt1** is present its higher organic matter content and moderate nitrogen levels result in higher general fertility.

Erodibility

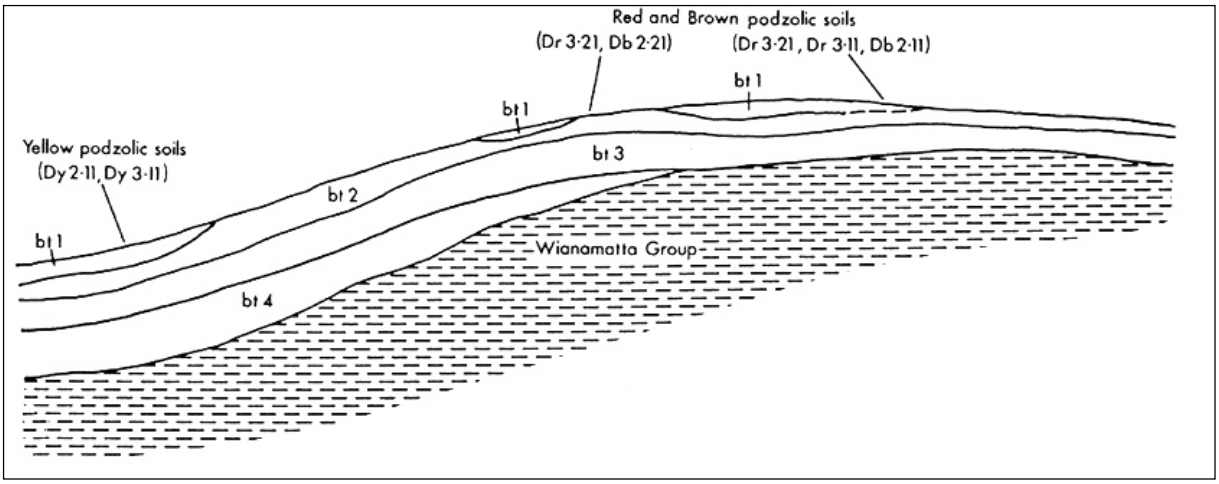
Blacktown soil materials have moderate erodibility. The topsoils (**bt1**, **bt2**) are often hardsetting and they have high fine sand and silt content, but they also have high to moderate organic matter content. The subsoils (**bt3**, **bt4**) are very low in organic matter. Where they are also highly dispersible and occasionally sodic the erodibility is high.

Erosion Hazard

The erosion hazard for non-concentrated flows is generally moderate, but ranges from low to very high. Calculated soil loss during the first twelve months of urban development ranges up to 73 t/ha for topsoil and 68 t/ha for exposed subsoil. Soil erosion hazard for concentrated flows is moderate to high.

Surface Movement Potential

The deep clay soils are moderately reactive. These are generally found on sideslopes and footslopes. Shallower soils on crests are slightly reactive.



Schematic cross-section of Blacktown soil landscape illustrating the occurrence and relationship of the dominant soil materials.

Appendix C – Geotechnical Explanatory Notes

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Explanatory Notes

Soil Description

In engineering terms soil includes every type of uncemented or partially cemented inorganic material found in the ground. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. The dominant feature is assessed from the Unified Soil Classification system and a soil symbol is used to define a soil layer as follows:

UNIFIED SOIL CLASSIFICATION

The appropriate symbols are selected on the result of visual examination, field tests and available laboratory tests, such as, sieve analysis, liquid limit and plasticity index.

USC Symbol	Description
GW	Well graded gravel
GP	Poorly graded gravel
GM	Silty gravel
GC	Clayey gravel
SW	Well graded sand
SP	Poorly graded sand
SM	Silty sand
SC	Clayey sand
ML	Silt of low plasticity
CL	Clay of low plasticity
OL	Organic soil of low plasticity
MH	Silt of high plasticity
CH	Clay of high plasticity
OH	Organic soil of high plasticity
Pt	Peaty Soil

MOISTURE CONDITION

Dry – Cohesive soils are friable or powdery
Cohesionless soil grains are free-running

Moist – Soil feels cool, darkened in colour
Cohesive soils can be moulded
Cohesionless soil grains tend to adhere

Wet – Cohesive soils usually weakened
Free water forms on hands when handling

For cohesive soils the following codes may also be used:

MC>PL Moisture Content greater than the Plastic Limit.
MC~PL Moisture Content near the Plastic Limit.
MC<PL Moisture Content less than the Plastic Limit.

PLASTICITY

The potential for soil to undergo change in volume with moisture change is assessed from its degree of plasticity. The classification of the degree of plasticity in terms of the Liquid Limit (LL) is as follows:

Description of Plasticity	LL (%)
Low	<35
Medium	35 to 50
High	>50

COHESIVE SOILS – CONSISTENCY

The consistency of a cohesive soil is defined by descriptive terminology such as very soft, soft, firm, stiff, very stiff and hard. These terms are assessed by the shear strength of the soil as observed visually, by the pocket penetrometer values and by resistance to deformation to hand moulding.

A Pocket Penetrometer may be used in the field or the laboratory to provide approximate assessment of unconfined compressive strength of cohesive soils. The values are recorded in kPa, as follows:

Strength	Symbol	Pocket Penetrometer Reading (kPa)
Very Soft	VS	< 25
Soft	S	20 to 50
Firm	F	50 to 100
Stiff	St	100 to 200
Very Stiff	VSt	200 to 400
Hard	H	> 400

COHESIONLESS SOILS – RELATIVE DENSITY

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Relative density terms such as very loose, loose, medium, dense and very dense are used to describe silty and sandy material, and these are usually based on resistance to drilling penetration or the Standard Penetration Test (SPT) 'N' values. Other condition terms, such as friable, powdery or crumbly may also be used.

The Standard Penetration Test (SPT) is carried out in accordance with AS 1289, 6.3.1. For completed tests the number of blows required to drive the split spoon sampler 300 mm are recorded as the N value. For incomplete tests the number of blows and the penetration beyond the seating depth of 150 mm are recorded. If the 150 mm seating penetration is not achieved the number of blows to achieve the measured penetration is recorded. SPT correlations may be subject to corrections for overburden pressure and equipment type.

Term	Symbol	Density Index	N Value (blows/0.3 m)
Very Loose	VL	0 to 15	0 to 4
Loose	L	15 to 35	4 to 10
Medium Dense	MD	35 to 65	10 to 30
Dense	D	65 to 85	30 to 50
Very Dense	VD	>85	>50

COHESIONLESS SOILS PARTICLE SIZE DESCRIPTIVE TERMS

Name	Subdivision	Size
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μm to 2.36 mm
	medium	200 μm to 600 μm
	fine	75 μm to 200 μm

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Rock Description

The rock is described with strength and weathering symbols as shown below. Other features such as bedding and dip angle are given.

ROCK QUALITY

The fracture spacing is shown where applicable and the Rock Quality Designation (RQD) or Total Core Recovery (TCR) is given where:

$$\text{RQD (\%)} = \frac{\text{Sum of Axial lengths of core > 100mm long}}{\text{total length considered}}$$

$$\text{TCR (\%)} = \frac{\text{length of core recovered}}{\text{length of core run}}$$

ROCK STRENGTH

Rock strength is described using AS1726 and ISRM – Commission on Standardisation of Laboratory and Field Tests, "Suggested method of determining the Uniaxial Compressive Strength of Rock materials and the Point Load Index", as follows:

Term	Symbol	Point Load Index $Is_{(50)}$ (MPa)
Extremely Low	EL	<0.03
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1
High	H	1 to 3
Very High	VH	3 to 10
Extremely High	EH	>10

ROCK MATERIAL WEATHERING

Rock weathering is described using the following abbreviation and definitions used in AS1726:

Abbreviation	Term
RS	Residual soil
XW	Extremely weathered
DW	Distinctly weathered
SW	Slightly weathered
FR	Fresh

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DEFECT SPACING/BEDDING THICKNESS

Measured at right angles to defects of same set or bedding.

Term	Defect Spacing	Bedding
Extremely closely spaced	<6 mm	Thinly Laminated
	6 to 20 mm	Laminated
Very closely spaced	20 to 60 mm	Very Thin
Closely spaced	0.06 to 0.2 m	Thin
Moderately widely spaced	0.2 to 0.6 m	Medium
Widely spaced	0.6 to 2 m	Thick
Very widely spaced	>2 m	Very Thick

DEFECT DESCRIPTION

Type:	Description
B	Bedding
F	Fault
C	Cleavage
J	Joint
S	Shear Zone
D	Drill break

Planarity/Roughness:

Class	Description
I	rough or irregular, stepped
II	smooth, stepped
III	slickensided, stepped
IV	rough or irregular, undulating
V	smooth, undulating
VI	slickensided, undulating
VII	rough or irregular, planar
VIII	smooth, planar
IX	slickensided, planar

The inclination if defects are measured from perpendicular to the core axis.

WATER


Water level at date shown


Partial water loss


Water inflow


Complete water loss

Groundwater not observed: The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.

Groundwater not encountered: The borehole/test pit was dry soon after excavation; however groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

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Graphic Symbols for Soils and Rocks

Typical symbols for soils and rocks are as follows. Combinations of these symbols may be used to indicated mixed materials such as clayey sand.

Soil Symbols

Main components


CLAY


SILT


SAND


GRAVEL


BOULDERS / COBBLES


TOPSOIL


PEAT

Minor Components


Clayey


Silty


Sandy


Gravelly

Other


FILL


BITUMEN


CONCRETE

Rock Symbols

Sedimentary Rocks


SANDSTONE


SILTSTONE


CLAYSTONE, MUDSTONE


SHALE


LAMINITE


COAL


LIMESTONE


CONGLOMERATE

Igneous Rocks


GRANITE


BASALT


UNDIFFERENTIATED IGNEOUS

Metamorphic Rocks


SLATE, PHYLLITE, SCHIST


GNEISS

QUARTZITE

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Engineering Classification of Shales and Sandstones in the Sydney Region – A Summary Guide

The Sydney Rock Class classification system is based on rock strength, defect spacing and allowable seams as set out below. All three factors must be satisfied.

CLASSIFICATION FOR SANDSTONE

Class	Uniaxial Compressive Strength (MPa)	Defect Spacing (mm)	Allowable Seams (%)
I	>24	>600	<1.5
II	>12	>600	<3
III	>7	>200	<5
IV	>2	>60	<10
V	>1	N.A.	N.A.

CLASSIFICATION FOR SHALE

Class	Uniaxial Compressive Strength (MPa)	Defect Spacing (mm)	Allowable Seams (%)
I	>16	>600	<2
II	>7	>200	<4
III	>2	>60	<8
IV	>1	>20	<25
V	>1	N.A.	N.A.

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UNIAXIAL COMPRESSIVE STRENGTH (UCS)

For expedience in field/construction situations the uniaxial (unconfined) compressive strength of the rock is often inferred, or assessed using the point load strength index (Is_{50}) test (AS 4133.4.1 – 1993). For Sydney Basin sedimentary rocks the uniaxial compressive strength is typically about 20 x (Is_{50}) but the multiplier may range from about 10 to 30 depending on the rock type and characteristics. In the absence of UCS tests, the assigned Sydney Rock Class classification may therefore include rock strengths outside the nominated UCS range.

DEFECT SPACING

The terms relate to spacing of natural fractures in NMLC, NQ and HQ diamond drill cores and have the following definitions:

Defect Spacing (mm)	Terms Used to Describe Defect Spacing[1]
>2000	Very widely spaced
600 – 2000	Widely spaced
200 – 600	Moderately spaced
60 – 200	Closely spaced
20 – 60	Very closely spaced
<20	Extremely closely spaced

[1]After ISO/CD14689 and ISRM.

ALLOWABLE SEAMS

Seams include clay, fragmented, highly weathered or similar zones, usually sub-parallel to the loaded surface. The limits suggested in the tables relate to a defined zone of influence. For pad footings, the zone of influence is defined as 1.5 times the least footing dimension. For socketed footings, the zone includes the length of the socket plus a further depth equal to the width of the footing. For tunnel or excavation assessment purposes the defects are assessed over a length of core of similar characteristics.

Source: Based on Pells et al (1978), as revised by Pells et al (1998).
Pells, P.J.N, Mostyn, G. and Walker, B.F. – Foundations on Sandstone and Shale in the Sydney Region. Australian Geomechanics Journal, No 33 Part 3, December 1998.

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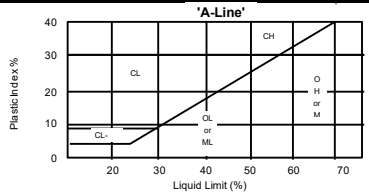
Summary of Soil Logging Procedures

Coarse Material: grain size - colour - particle shape - secondary components - minor constituents - moisture condition - relative density - origin - additional observations.

Fine Material: plasticity - colour - secondary components - minor constituents - moisture w.r.t. plasticity - consistency - origin - additional observations.

Guide to the Description, Identification and Classification of Soils

Major Divisions				SYMBOL	Typical Names
> 200mm		BOULDERS			
60 to 200mm		COBBLES			
COARSE GRAINED SOILS	More than 50% by dry mass less than 60mm is greater than 0.076mm	GRAVEL	More than 50% of coarse fraction > 2.36mm	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels.
		Gravelly Soils		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clayey gravels, gravel-sand-clay mixtures
		SANDS	More than 50% of coarse fraction < 2.36mm	SW	Well-graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands.
		Sandy Soils		SM	Silty sands, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	More than 50% by dry mass less than 60mm is less than 0.076mm	Liquid Limit < 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
				OL	Organic silts and organic silty clays of low plasticity.
		Liquid Limit > 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				Pt	Peat and other highly organic soils.



Grain sizes			
Gravel		Sand	
Coarse -	63 to 20mm	Coarse -	2.36 to 0.6mm
Medium -	20 to 6 mm	Medium -	0.6 to 0.2mm
Fine -	6 to 2.36mm	Fine -	0.2 to 0.075mm

GEOLOGICAL ORIGIN:-

Fill - artificial soils / deposits
Alluvial - soils deposited by the action of water
Aeolian - soils deposited by the action of wind
Topsoil - soils supporting plant life containing significant organic content
Residual - soils derived from insitu weathering of parent rock.
Colluvial - transported debris usually unsorted, loose and deposited

Field Identification of Fine Grained Soils - Silt or Clay?

Dry Strength - Allow the soil to dry completely and then test its strength by breaking and crumbling between the fingers.
High dry strength - Clays; Very slight dry strength - Silts.

Toughness Test - the soil is rolled by hand into a thread about 3mm in diameter. The thread is then folded and re-rolled repeatedly until it has dried sufficiently to break into lumps. In this condition inorganic clays are fairly stiff and tough while inorganic silts produce a weak and often soft thread which may be difficult to form and readily breaks and crumbles.

Dilatancy Test - Add sufficient water to the soil, held in the palm of the hand, to make it soft but not sticky. Shake horizontally, striking vigorously against the other hand several times. Dilatancy is indicated by the appearance of a shiny film on the surface of the soil. If the soil is then squeezed or pressed with the fingers, the surface becomes dull as the soil stiffens and eventually crumbles. These reactions are pronounced only for predominantly silt size material. Plastic clays give no reaction.

Descriptive Terms for Material Portions

COARSE GRAINED SOILS		FINE GRAINED SOILS	
% Fines	*Term/Modifier*	*% Coarse*	*Term/Modifier*
< 5	Omit, or use "trace"	< 15	Omit, or use "trace"
> 5, < 12	"with clay/silt" as applicable	> 15, < 30	"with sand/gravel" as applicable
> 12	Prefix soil as "silty/clayey"	> 30	Prefix as "sandy/gravelly"

Moisture Condition

for non-cohesive soils:

Dry -	runs freely through fingers.
Moist -	does not run freely but no free water visible on soil surface.
Wet -	free water visible on soil surface.

for cohesive soils:

MC > PL	Moisture content estimated to be greater than the plastic limit.
MC ~ PL	Moisture content estimated to be approximately equal to the plastic limit. The soil can be moulded
MC < PL	Moisture content estimated to be less than the plastic limit. The soil is hard and friable, or powdery.

The plastic limit (PL) is defined as the moisture content (percentage) at which the soil crumbles when rolled into threads of 3mm dia.

Consistency - For Clays & Silts

Description	*UCS(kPa)*	*Field guide to consistency*
Very soft	< 25	Exudes between the fingers when squeezed in hand
Soft	25 - 50	Can be moulded by light finger pressure
Firm	50 - 100	Can be moulded by strong finger pressure
Stiff	100 - 200	Cannot be moulded by fingers. Can be indented by thumb.
Very stiff	200 - 400	Can be indented by thumb nail
Hard	> 400	Can be indented with difficulty by thumb nail
Friable	-	Crumbles or powders when scraped by thumbnail

Relative Density for Gravels and Sands

Description	*SPT "N" Value*	*Density Index (ID) Range %*
Very loose	0 - 4	< 15
Loose	4 - 10	15 - 35
Medium dense	10 - 30	35 - 65
Dense	30 - 50	65 - 85
Very dense	> 50	> 85

Summary of Rock Logging Procedures

Description order: constituents - rock name - grain size - colour - weathering - strength - minor constituents - additional observations.
- minor constituents - moisture w.r.t. plasticity - consistency - origin - additional observations.

Definition - Sedimentary Rock	
Conglomerate	more than 50% of the rock consists of gravel (> 2mm) sized fragments
Sandstone	more than 50% of the rock consists of sand (0.06 to 2mm) sized grains
Siltstone	more than 50% of the rock consists of silt sized granular particles and the rock is not laminated
Claystone	more than 50% of the rock consists of clay or mica material and the rock is not laminated
Shale	more than 50% of the rock consists of clay or silt sized particles and the rock is laminated

Weathering		
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a change in volume but the soil has not significantly transported.
Extremely Weathered	EW	Rock is weathered to such an extent that it has 'soil' properties; ie. it either disintegrates or can be remoulded, in water
Distinctly Weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron-staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly Weathered	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh	FR	Rock shows no sign of decomposition or staining.

Stratification			
thinly laminated	< 6mm	medium bedded	0.2 - 0.6m
laminated	6 - 20mm	thickly bedded	0.6 - 2m
very thinly bedded	20 - 60mm	very thickly bedded	> 2m
thinly bedded	60mm - 0.2m		

Discontinuities

order of description: depth - type - orientation - spacing - roughness / planarity - thickness - coating

	Type	Class	Roughness/Planarity	Class	Roughness/Planarity
B	Bedding	I	rough or irregular, stepped	VI	slickensided, undulating
F	Fault	II	smooth, stepped	VII	rough or irregular, planar
C	Cleavage	III	slickensided, stepped	VIII	smooth, planar
J	Joint	IV	rough or irregular, undulating	IX	slickensided, planar
S	Shear Zone	V	smooth, undulating		
D	Drill break				

Rock Strength

Term		Is(50)	Field Guide
Extremely Low	EL		Easily remoulded by hand to a material with soil properties.
		0.03	
Very low	VL		May be crumbled in the hand. Sandstone is "sugary" and friable
		0.1	
Low	L		A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
		0.3	
Medium	M		A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.
		1	
High	H		A piece of core 150 mm long x 50 mm dia. core cannot be broken by unaided hands, can be slightly scratched or scored with knife.
		3	
Very High	VH		A piece of core 150 mm long x 50 mm dia. May be broken readily with hand held hammer. Cannot be scratched with pen knife.
		10	
Extremely High	EH		A piece of core 150 mm long x 50 mm dia. Is difficult to break with hand held hammer. Rings when struck with a hammer.

* - rock strength defined by point load strength (Is 50) in direction normal to bedding

Degree of fracturing

fragmented	The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter
highly fractured	Core lengths are generally less than 20mm - 40mm with occasional fragments.
fractured	Core lengths are mainly 30mm - 100mm with occasional shorter and longer lengths
slightly fractured	Core lengths are generally 300mm - 1000mm with occasional longer sections and shorter sections of 100mm – 300mm.
unbroken	The core does not contain any fracture.

- spacing of all types of natural fractures, but not artificial breaks, in cored bores.

The fracture spacing is shown where applicable and the Rock Quality Designation is given by:

$$RQD\ (\%) = \frac{\text{sum of unbroken core pieces 100 mm or longer}}{\text{total length considered}}$$

Appendix D – Borehole Logs

GEOTECHNICAL BOREHOLE / TESTPIT BH01

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 2.00 m

COORDINATES S: 33' 52.372" E:150' 40.702"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~80 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
			SM	TOPSOIL: Admix silt and sand, brown, trace fine to medium gravels, trace organics (roots), fine to medium sands	Slightly moist	Loose	
			CL	NATURAL: Silty CLAY: medium plasticity, red brown, indurate ironstone, moisture content < plastic limit	Slightly moist	Firm to stiff	
0.5	160						
			SC	RESIDUAL: Sandy CLAY: low plasticity, orange brown, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Very Stiff	Grey banding between 0.80 - 1.0 m
1			S.S	BEDROCK: SANDSTONE: DW - MW, pale yellow brown, fine to medium sands, ELS to LS	Moist	Very dense to hard	Weak sandstone
1.5							Low to medium strength sandstone
2				Termination Depth at:2.0 m. V-bit refusal on rock.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH02

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.414" E:150' 40.694"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~84 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			SM	TOPSOIL: Admix silt and sand, brown, trace fine to medium gravels, trace organics (roots), fine to medium sands	Slightly moist	Loose	
			ML	NATURAL: SILT: orange grey, trace fine to coarse rounded gravels	Slightly moist	Loose	
1			SC	RESIDUAL: Sandy CLAY: low plasticity, orange brown, fine to medium sands, moisture content < plastic limit	Slightly moist	Stiff to very stiff	
2.5					Very moist		Grey banding between 2.60 - 2.80 m
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH03

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 2.00 m

COORDINATES S: 33' 52.468" E:150' 40.679"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~84 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
			GP	FILL: Sandy GRAVEL: poorly sorted, imported blue metal, fine to coarse angular gravels, fine to coarse sands	Dry	Very dense	
			CL	NATURAL: Silty CLAY: low to medium plasticity, red brown, moisture content < plastic limit	Slightly moist	Stiff to very stiff	
0.5	600						
1			SC	RESIDUAL: Sandy CLAY: low plasticity, orange brown, fine to medium sands, moisture content < plastic limit	Slightly moist	Stiff to very stiff	
1.5			S.S	BEDROCK: SANDSTONE: pale yellow brown, DW, fine to medium sands, ELS	Slightly moist to moist	Very dense to hard	
2				Termination Depth at:2.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH04

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.539" E:150' 40.666"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~81 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			GP SW	FILL: Sandy GRAVEL: poorly sorted, pale yellow, white and grey, fine to coarse sands and sandstone gravels	Dry Slightly moist	Very dense	
			CL	FILL: Gravelly SAND: dark brown, fine to coarse sands and gravels	Slightly moist	Stiff to very stiff	
0.5				NATURAL: Silty CLAY: low to medium plasticity, red brown, moisture content < plastic limit			
			SC	RESIDUAL: Sandy CLAY: low plasticity, orange brown, fine to medium sands, moisture content < plastic limit	Slightly moist	Stiff to very stiff	
1							
1.5					Moist	Firm to stiff	Colour change to grey
2							
2.5							
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH05

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.571" E:150' 40.642"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~81 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			GP	FILL: Sandy GRAVEL: poorly sorted, pale yellow, white and grey, fine to coarse sands and sandstone gravels	Dry	Very dense	
			SW	FILL: Gravelly SAND: orange brown, fine to coarse sands and gravels	Slightly moist		
0.5			CL	NATURAL: Silty CLAY: low to medium plasticity, red brown, moisture content < plastic limit	Slightly moist	Stiff to very stiff	
1							
1.5			SC	RESIDUAL: Sandy CLAY: low plasticity, orange grey, fine to medium sands, moisture content < plastic limit	Slightly moist	Stiff to very stiff	Orange grey banding (1.7-3.0 m)
2							
2.5					Moist	Firm to stiff	
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH06

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 2.00 m

COORDINATES S: 33' 52.643" E:150' 40.607"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~78 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
			GP	FILL: Sandy GRAVEL: poorly sorted, pale yellow, white and grey, fine to coarse sands and sandstone gravels	Dry	Very dense	
			SC-SP	FILL: Clayey gravelly SAND: dark brown grey, fine to coarse sands and gravels	Moist		
0.5			ML	NATURAL: SILT: orange grey, trace fine to coarse gravels	Slightly moist	Loose	
			SC	RESIDUAL: Sandy CLAY: low plasticity, orange grey, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Stiff to very stiff	
1			S.S	BEDROCK: Clayey SANDSTONE: orange brown, CW - DW, fine to medium sands, ELS to VLS		Hard	
1.5				Termination Depth at:1.5 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH07

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.491" E:150' 40.645"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~82 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			GP	FILL: Sandy GRAVEL: poorly sorted, pale yellow, white and grey, fine to coarse sands and sandstone gravels	Dry	Very dense	
			SP	FILL: Gravelly SAND: grey black, fine to coarse sands and gravels	Slightly moist		
			CL	NATURAL: Silty CLAY: medium plasticity, orange brown, indurate ironstone, moisture content < plastic limit	Slightly moist	Stiff	
0.5	330						
1						Very stiff	Grey banding below 1.0 m
1.5							
	280						
2							
			SC	RESIDUAL: Sandy CLAY: low plasticity, orange grey, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Very stiff	
2.5							
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH08

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.443" E:150' 40.640"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~83 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			GM	FILL: Sandy gravelly CLAY: admix silt, sand, gravel and clay, brown, fine to coarse sands and gravels	Slightly moist to moist	Medium dense	
			GC	FILL: Silty CLAY with gravel and sand: grey brown, fine to coarse sands and gravels	Slightly moist to moist	Stiff	
0.5			CL	NATURAL: Silty CLAY: medium plasticity, red brown, indurate ironstone, moisture content < plastic limit	Slightly moist	Very stiff	
	510						
1			SC	RESIDUAL: Sandy CLAY: low plasticity, orange grey, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Firm to stiff	
1.5							
	310						
2						Very stiff	Increasing sand content below 2.0 m
2.5							
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH09

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.400" E:150' 40.648"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~85 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			GM	FILL: Sandy gravelly CLAY: admix silt, sand, gravel and clay, brown, fine to coarse sands and gravels	Slightly moist to moist	Firm to stiff	
0.5			ML	NATURAL: SILT: orange grey, some clay, trace fine to coarse rounded gravels	Slightly moist	Loose	
1	290		SC	RESIDUAL: Sandy CLAY: low plasticity, orange grey, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Very stiff	Orange grey banding
1.5							
2							
2.5							
3				Termination Depth at:3.0 m.			

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GEOTECHNICAL BOREHOLE / TESTPIT BH10

PROJECT NUMBER 19-7557
PROJECT NAME Geotechnical Investigation
CLIENT National Integrated Creative Solutions
ADDRESS 344 Park Rd Wallacia NSW

DRILLING DATE 13-03-2019
DRILLING COMPANY ASCT Drilling
DRILLER Andrew
DRILLING METHOD 60mm solid flight auger
TOTAL DEPTH 3.00 m

COORDINATES S: 33' 52.359" E:150' 40.656"
COORD SYS Degrees, Decimal Minutes
SURFACE ELEVATION ~85 m
LOGGED BY BH
CHECKED BY SD

COMMENTS

Depth (m)	Penetrometer (kPa)	Graphic Log	USCS	Material Description	Moisture	Consistency	Additional Observations
0			SM	TOPSOIL: Admix silt and sand, brown, trace fine to medium gravels, trace organics (roots), fine to medium sands	Slightly moist	Loose	
			CL	NATURAL: Silty CLAY: medium plasticity, orange brown, indurate ironstone, moisture content < plastic limit	Slightly moist	Firm to stiff	
0.5	220						
1						Very stiff	
1.5							
			SC	RESIDUAL: Sandy CLAY: CW-DW, low plasticity, fine to coarse rounded to sub-rounded sandstone gravels, brown, orange yellow, fine to medium sands, moisture content < plastic limit	Slightly moist to moist	Stiff to very stiff	
2							
	220						
2.5							
3				Termination Depth at:3.0 m.			

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EIS Appendix 9: Air Quality Impact Assessment

AIR QUALITY IMPACT ASSESSMENT
PREPARED FOR
344 PARK ROAD, WALLACIA NSW 2745

Prepared for: Greenfields Resource Recovery Facility
Ellie Barikhan, Site Owner
Carlo Ranieri, Carlo Ranieri and Associates Pty Ltd

Prepared by: Matthew Taylor, Environmental Scientist
Kate Barker, Environmental Scientist
R T Benbow, Principal Consultant

Report No: 191318_AQIA_Rev3
February 2022
(Released: 17 February 2022)

Benbow
ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

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1	24-4-2020	Rev 1	E Hansma	R T Benbow
2	14-8-2020	Rev 2	E Hansma	R T Benbow
3	17-2-2022	Rev 3	L Zanotto	R T Benbow

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Revision	Issue Date	Issued To	Issued By
1	24-4-2020	Greenfields Resource Recovery Facility	Benbow Environmental
2	14-8-2020	Greenfields Resource Recovery Facility	Benbow Environmental
3	17-2-2022	Greenfields Resource Recovery Facility	Benbow Environmental

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ADDENDUM

Benbow Environmental has been engaged to review the Air Quality Impact Assessment (Ref #: 191318_AQIA_Rev2) for the site located at 344 Park Road, Wallacia NSW 2745 and evaluate impacts from changes to the proposed site made after Revision 2 of the AQIA was completed. The assessment is in support of an Environmental Impact Statement (EIS) being undertaken for the installation and operation of a resource recovery facility on site.

Consultation with council has resulted in several changes to the proposed site, including: change to hours, building size, and layout of proposed operations.

The proposed facility would operate to the new hours:

Monday – Friday 7am – 6pm
Saturday – 8am – 1pm
Sunday and public Holidays – No operation.

Although the facility will generally operate from 7am – 6pm, the *Approved Methods* requires a daily assessment. A limitation of the AERMOD model is such that any hours within a 24 period will be averaged. Therefore, it is conservative to calculate and include all hours within the 24 hour period. It is not necessary to re-model due to operational hours.

The site layout has been updated so that the building has been extended and the external stockpiles, conveyor drop points, and truck loading with front end loader are now within the building. Enclosed buildings provide a reduction efficiency over 99% however it is more conservative to use the reduction efficiency of 90% used for enclosures with 2-3 walls to account for door openings. Moving additional sources inside the building will decrease emission from the sources. It is not necessary to re-model due to the extension of the building.

Table 0-1 below summarises the total emissions from the previous assessment layout, the total emissions from the new proposed layout, and the reduction that would result from the changes. Table 0-2 provides a detailed breakdown of emission rate calculations.

Table 0-1: Comparison of total emissions and reduction achieved

Source Name	Emission rates after reduction factors applied (input into model)				
	Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
	PM2.5	PM10	PM2.5	PM10	TSP
Previous proposed total emissions (Building and external sources)	4.11E-03	2.01E-02	2.12E-03	1.05E-02	2.85E-02
New proposed total emissions (One Building source)	3.52E-03	1.79E-02	1.82E-03	9.19E-03	2.51E-02
% reduction in new emissions for layout	14%	11%	15%	12%	12%

The ground floor area of the building is increasing in size. The building was modelled as a volume source to account for potential fugitive emissions from any cracks. Increasing the building size is not expected to increase emissions as the amount of internal emissions would remain the same, it would solely an increase the initial dispersal area which would reduce impacts at sensitive receptors. It is a more conservative assessment to not increase the building size.

The AQIA assessment shows exceedances due to elevated background dust levels but contemporaneous assessment in the AQIA shows no additional exceedances due to proposed site activities. As the previous assessment demonstrated compliance, and the proposed changes are expected to reduce total dust emissions from the site, no further assessment is warranted.

Table 0-2: Detailed breakdown of emission sources and calculations.

Timeline	Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
Previous emissions breakdown	Front-end Loader (4)	Volume	500/95000	95000	4	0.00005	9.80E-05*	kg/t	4.34E-05	2.90E-05	2.26E-05	1.51E-04	2.96E-04	0.5	2.17E-05	1.45E-05	1.13E-05	7.53E-05	1.48E-04
	60 mm Aggregate stockpile	Area	500	-	80	0.2	0.4	kg/ha/hr	2.78E-06	1.85E-05	2.78E-06	1.85E-05	3.70E-05	0.5	1.39E-06	9.26E-06	1.39E-06	9.26E-06	1.85E-05
	32 mm Aggregate stockpile	Area	500	-	120	0.2	0.4	kg/ha/hr	4.16E-06	2.78E-05	4.16E-06	2.78E-05	5.56E-05	0.5	2.08E-06	1.39E-05	2.08E-06	1.39E-05	2.78E-05
	16 mm Aggregate stockpile	Area	90	-	96	0.2	0.4	kg/ha/hr	7.78E-06	2.22E-05	7.78E-06	2.22E-05	8.88E-05	0.5	3.89E-06	1.11E-05	3.89E-06	1.11E-05	4.44E-05
	-6 mm Aggregate stockpile	Area	40	-	64	0.2	0.4	kg/ha/hr	5.18E-06	1.48E-05	5.18E-06	1.48E-05	2.96E-05	0.5	2.59E-06	7.41E-06	2.59E-06	7.41E-06	1.48E-05
	Conveyor drop to 60 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	0.5	9.31E-05	6.21E-04	4.85E-05	3.23E-04	8.81E-04
	Conveyor drop to 32 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	0.5	9.31E-05	6.21E-04	4.85E-05	3.23E-04	8.81E-04
	Conveyor drop to 16 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	0.5	2.17E-04	6.21E-04	1.13E-04	3.23E-04	8.81E-04
	Conveyor drop to -6 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	0.5	2.17E-04	6.21E-04	1.13E-04	3.23E-04	8.81E-04
	Previous Building total	Volume	*See below*	*See below*	5800	-	-	-	6.94E-02	3.54E-01	3.57E-02	1.82E-01	4.96E-01	0.05 (=0.1 × 0.5)	3.46E-03	1.76E-02	1.78E-03	9.06E-03	2.47E-02
Previous total emissions	Total	-	-	-	-	-	-	-	-	-	-	-	-	-	4.11E-03	2.01E-02	2.12E-03	1.05E-02	2.85E-02
New proposed emissions breakdown	Front-end Loader (4) (truck loading)	Volume	500	95000	4	0.00005	9.80E-05*	kg/t	4.34E-05	2.90E-05	2.26E-05	1.51E-04	2.96E-04	-	-	-	-	-	-
	60 mm Aggregate stockpile	Area	500	-	80	0.2	0.4	kg/ha/hr	2.78E-06	1.85E-05	2.78E-06	1.85E-05	3.70E-05	-	-	-	-	-	-

Timeline	Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
	32 mm Aggregate stockpile	Area	500	-	120	0.2	0.4	kg/ha/hr	4.16E-06	2.78E-05	4.16E-06	2.78E-05	5.56E-05	-	-	-	-	-	-
	16 mm Aggregate stockpile	Area	90	-	96	0.2	0.4	kg/ha/hr	7.78E-06	2.22E-05	7.78E-06	2.22E-05	8.88E-05	-	-	-	-	-	-
	-6 mm Aggregate stockpile	Area	40	-	64	0.2	0.4	kg/ha/hr	5.18E-06	1.48E-05	5.18E-06	1.48E-05	2.96E-05	-	-	-	-	-	-
	Conveyor drop to 60 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	-	-	-	-	-	-
	Conveyor drop to 32 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	-	-	-	-	-	-
	Conveyor drop to 16 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	-	-	-	-	-	-
	Conveyor drop to -6 mm	Volume	195	37050	1	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	-	-	-	-	-	-
	Truck unloading inside	-	*500*	*95000*	-	*0.000008*	*1.57E-05**	*kg/t*	*6.94E-06*	*4.63E-05*	*3.61E-06*	*2.41E-05*	*4.73E-05*	-	-	-	-	-	-
	Pre-sort stockpile	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-
	Excavator sorting	-	*500*	*95000*	-	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	-	-	-	-	-	-
	Internal storage area 1	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-
	Internal storage area 2	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-
	Internal storage area 3	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-
	Internal storage area 4	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-
	Paper storage area	-	-	-	*125*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	-	-	-	-	-

Timeline	Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
	Front end loader sorting	-	*500*	*95000*	-	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	-	-	-	-	-	-
	Shredder	-	*500*	*95000*	-	*0.0012*	*0.0027*	*kg/t*	*1.04E-03*	*6.94E-03*	*5.42E-04*	*3.61E-03*	*8.13E-03*	-	-	-	-	-	-
	Conveyor 1	-	-	-	*20*	*0.2*	*0.4*	*kg/ha/hr*	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*	-	-	-	-	-	-
	Mobile crusher	-	*195*	*37050*	-	*0.0012*	*0.0027*	*kg/t*	*4.06E-04*	*2.71E-03*	*2.11E-04*	*1.41E-03*	*3.17E-03*	-	-	-	-	-	-
	Waste screen (Under 60 over 250)	-	*480*	*91200*	-	*0.0043*	*0.0125*	*kg/t*	*3.58E-03*	*2.39E-02*	*1.87E-03*	*1.24E-02*	*3.61E-02*	-	-	-	-	-	-
	Conveyer 2	-	-	-	*12*	*0.2*	*0.4*	*kg/ha/hr*	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*	-	-	-	-	-	-
	Picking station	-	-	-	*12*	*0.2*	*0.4*	*kg/ha/hr*	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*	-	-	-	-	-	-
	Conveyor 3	-	-	-	*8*	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	-	-	-	-	-
	Air separator	-	*100*	*19000*	-	*0.0043*	*0.0125*	*kg/t*	*7.47E-04*	*4.98E-03*	*3.89E-04*	*2.59E-03*	*7.53E-03*	-	-	-	-	-	-
	Conveyor 4	-	-	-	*20*	*0.2*	*0.4*	*kg/ha/hr*	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*	-	-	-	-	-	-
	Bounce separator	-	*100*	*19000*	-	*0.0043*	*0.0125*	*kg/t*	*7.47E-04*	*4.98E-03*	*1.49E-08*	*9.95E-08*	*7.53E-03*	-	-	-	-	-	-
	Heavy stockpile	-	-	-	*41.5*	*0.2*	*0.4*	*kg/ha/hr*	*1.43E-06*	*9.55E-06*	*1.43E-06*	*9.55E-06*	*1.91E-05*	-	-	-	-	-	-
	Light stockpile	-	-	-	*33.75*	*0.2*	*0.4*	*kg/ha/hr*	*1.17E-06*	*7.81E-06*	*1.17E-06*	*7.81E-06*	*1.56E-05*	-	-	-	-	-	-
	Front end loader to sorting or reprocessing	-	*500*	*95000*	-	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	-	-	-	-	-	-
	Conveyor to aggregates screen	-	-	-	*9*	*0.2*	*0.4*	*kg/ha/hr*	*3.13E-07*	*2.08E-06*	*3.13E-07*	*2.08E-06*	*4.17E-06*	-	-	-	-	-	-
	60-32 Aggregate screen	-	*195*	*37050*	-	*0.0043*	*0.0125*	*kg/t*	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*	-	-	-	-	-	-
	Conveyor out to 60 mm	-	-	-	*7*	*0.2*	*0.4*	*kg/ha/hr*	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*	-	-	-	-	-	-
	Conveyor to screen	-	-	-	*8*	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	-	-	-	-	-
	32-16 Aggregate screen	-	*195*	*37050*	-	*0.0043*	*0.0125*	*kg/t*	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*	-	-	-	-	-	-

Timeline	Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
	Conveyor out to 32 mm	-	-	-	*7*	*0.2*	*0.4*	*kg/ha/hr*	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*	-	-	-	-	-	-
	Conveyor to screen	-	-	-	*8*	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	-	-	-	-	-
	16-6 Aggregate screen	-	*195*	*37050*	-	*0.036*	*0.15*	*kg/t*	*2.84E-02*	*8.13E-02*	*1.48E-02*	*4.23E-02*	*1.76E-01*	-	-	-	-	-	-
	Conveyor out to 16 mm	-	-	-	*7*	*0.2*	*0.4*	*kg/ha/hr*	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*	-	-	-	-	-	-
	Conveyor across	-	-	-	*7*	*0.2*	*0.4*	*kg/ha/hr*	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*	-	-	-	-	-	-
	Conveyor out to -6 mm	-	*195*	*37050*	*8*	*0.2*	*0.4*	*kg/ha/hr*	*6.48E-07*	*1.85E-06*	*6.48E-07*	*1.85E-06*	*3.70E-06*	-	-	-	-	-	-
New proposed total emissions	Total (One Building source)	Volume	*See below*	*See below*	5800	-	-	-	7.04E-02	3.58E-01	3.63E-02	1.84E-01	5.02E-01	0.05 (=0.1 × 0.5)	3.52E-03	1.79E-02	1.82E-03	9.19E-03	2.51E-02

EXECUTIVE SUMMARY

This report presents an Air Quality Impact Assessment (AQIA) for the site located at 344 Park Road, Wallacia NSW 2745. The assessment is in support of an Environmental Impact Statement (EIS) being undertaken for the installation and operation of a resource recovery facility on site.

The facility would receive and process up to 95,000 per annum of C&D and C&I waste. The assessment determines the predicted dust and particulate matter contribution from the proposed site operations. The assessment does not include an assessment of odour impacts, as no odour is expected to be generated from the proposed development.

This AQIA has been prepared in accordance with the NSW EPA guidelines *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (2016) (AMMAAP), using background data which is then combined with the predicted levels resulting from the proposed operations to assess the cumulative air quality impacts.

This AQIA has been assessed using emission factors adopted from the National Pollutant Inventory's *Emission Estimation Technique Manual for Mining* (2012) and the *Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals* (2014.

The air dispersion model AERMOD was used for the prediction of off-site dust impacts associated with the air emissions from the operations.

Annual TSP, PM_{10} and $PM_{2.5}$ emissions at all receptors are predicted to comply with the *Approved Methods* criterion.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$ exceeded the relevant criteria. The background concentrations for PM_{10} and $PM_{2.5}$ for 24-hour averaging periods are considered elevated, with levels of at 24.96 µg/m^3 and 62.42 µg/m^3 respectively in comparison to the *Approved Methods* criteria of 25 µg/m^3 and 50 µg/m^3.

In cases of elevated background concentrations, the NSW EPA requires a demonstration that no additional exceedances of the impact assessment criteria will occur as a result of the proposed site activities.

Contemporaneous addition of the predicted daily increments of PM_{10} and $PM_{2.5}$ with daily measured background levels for 2015 showed no additional exceedances due to proposed site activities.

With the proposed site activities and dust controls in place, it is considered that emissions to air from the site's operation are unlikely to cause harm to health or the environment.

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1. INTRODUCTION

This report presents an Air Quality Impact Assessment (AQIA) for the site located at 344 Park Road, Wallacia NSW 2745. The assessment is in support of an Environmental Impact Statement (EIS) for the installation and operation of a resource recovery facility on site.

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This AQIA has been prepared in accordance with the NSW EPA guidelines *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (2016) (AMMAAP), using background data which is then combined with the predicted levels resulting from the proposed operations to assess the cumulative air quality impacts.

This AQIA uses existing air quality data to establish the background levels of dust and particulates. This background data is then combined with the predicted levels resulting from the proposed operations of the resource recovery facility to assess the cumulative air quality impacts.

2. PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The subject site is located at 344 Park Road, Wallacia NSW 2745 (legally known as Lot 5 DP 655046) in the Penrith City Council Local Government Area. The proposed development is located towards the north eastern section of the site.

The site is bounded by Park Road on its northern side, which connects Luddenham and Wallacia.

The site is approximately 200,730 m^2 in area. However, only approximately 50,000 m^2, or 25%, of the site will be used for the proposed development.

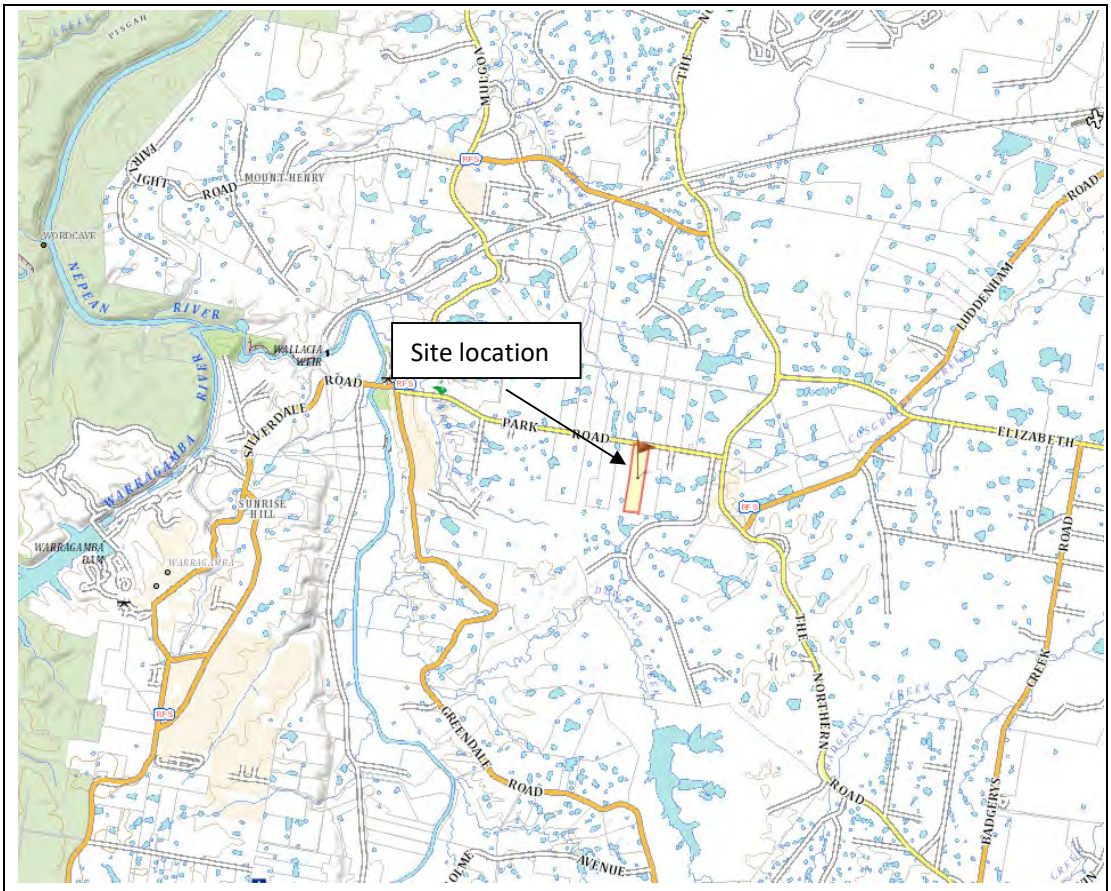
The location of the subject site as an aerial view is shown in Figure 2-1 and its location in a local context is shown in Figure 2-2.

Figure 2-1: Aerial view of the site

Source: SIX Maps 2019

↑N	LEGEND: Site boundary	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

Figure 2-2: Site location in a local context



Source: Six Maps 2019

↑N		Benbow Environmental 25-27 Sherwood Road Northmead NSW 2152

2.2 LAND USE

The current land zoning for the site is RU1 – Primary Production under the Penrith Local Environmental Plan (LEP) 2010, as displayed in Figure 2-4.

Surrounding land zoning to the north, east and west is also RU1 – Primary Production. To the south of the site, the existing land zoning is RU4 – Primary Production Small Lots. The potential usage for these land zones enable similar developments and allow synergies between businesses.

Surrounding land use zoning showing the location of the site is shown in Figure 2-3.

Figure 2-3: Surrounding land use zoning

Source: https://www.planningportal.nsw.gov.au

Legend:

B1	Neighbourhood Centre	R2	Low Density Residential
B2	Local Centre	R3	Medium Density Residential
B3	Commercial Core	R4	High Density Residential
B4	Mixed Use	R5	Large Lot Residential
B5	Business Development	RE1	Public Recreation
B6	Enterprise Corridor	RE2	Private Recreation
E1	National Parks and Nature Reserves	RU1	Primary Production
E2	Environmental Conservation	RU2	Rural Landscape
E3	Environmental Management	RU4	Primary Production Small Lots
IN1	General Industrial	SP1	Special Activities
IN2	Light Industrial	SP2	Infrastructure
IN3	Heavy Industrial	W1	Natural Waterways
R1	General Residential	WSP	SEPP Western Sydney Parklands

2.3 HOURS OF OPERATIONS

The proposed facility would operate to the following hours:

Monday – Friday 7am – 6pm
Saturday – 8am – 1pm
Sunday and public Holidays – No operation.

2.4 PROPOSED DEVELOPMENT DESCRIPTION

The proposed development is for the establishment and operation of a resource recovery facility that would accept, process and store construction and demolition (C&D) and commercial and industrial (C&I) waste.

The facility would receive and process up to 95,000 per annum of C&D and C&I waste. No other waste would be accepted. Material accepted on site will be made up of the following waste streams:

- Construction & Demolition
  - Wood
  - Gyprock – plaster board
  - Concrete
  - Brick
  - Aggregates, roadbase or ballast
  - Asphalt
  - Steel

- Commercial & Industrial
  - Paper and cardboard
  - Plastic
  - Steel
  - Aluminium
  - Wood

Processes on site that may impact the air quality are:

- Incoming and outgoing truck deliveries;
- Storage of waste materials;
- Sorting and screening of waste materials; and,
- Blending and crushing waste materials.

Due to the nature of materials handled and stored at the facility, odour will not be released from the site. As such, dust is the major issue regarding the sites air quality.

2.5 NEAREST SENSITIVE RECEPTORS

Table 2-1 lists the location of representative potentially affected receptors that are considered in this assessment. The locations are shown in Table 2-1 and Figure 2-4.

The air quality guidelines protect the health of the residential community and consider the need to protect the health of children, the elderly, and the infirm. These guidelines are not applicable to workers on industrial premises; however, it can be informative to include industrial receptors in air quality dispersion models to gain a better understanding of the air quality impacts of the proposed site activities on adjacent businesses.

Table 2-1: Table of nearest receptors

Receptor ID	Address	Direction from Site	Lot and DP	Approximate distance to proposed development	Easting	Northing	Type of receiver
R1	334 Park Road Wallacia	W	Lot 1 DP1145597	120 m	285021.638	6249439.302	Residential
R2	322 Park Road Wallacia	W	Lot 1 DP1145716	225 m	284933.078	6249512.917	Residential
R3	323-341 Park Road Wallacia	NW	Lot 8 DP666928	170 m	285037.927	6249646.635	Residential
R4	343-351 Park Road Wallacia	NNW	Lot 71 DP594632	175 m	285134.703	6249714.806	Residential
R5	353-361 Park Road Wallacia	N	Lot 72 DP594632	220 m	285292.865	6249747.295	Residential
R6	363 Park Road Luddenham	NE	Lot 6 DP651102	200 m	285481.825	6249581.294	Residential
R7	364 Park Road Luddenham	E	Lot 4 DP653236	115 m	285403.646	6249481.174	Residential
R8	386 Park Road Luddenham	E	Lot 1 DP557920	245 m	285485.226	6249150.151	Residential
R9	384 Park Road Luddenham	E	Lot 2 DP557920	275 m	285490.185	6248944.237	Residential
R10	45 Willowdene Avenue Luddenham	S	Lot 3 DP248069	565 m	285042.472	6248548.515	Residential
R11	115 Willowdene Avenue Luddenham	SW	Lot 4 DP248069	720 m	284827.59	6248489.29	Residential
R12	288A Park Road Wallacia	WSW	Lot 1 DP1195400	610 m	284516.692	6249018.95	Residential
R13	32 Willowdene Avenue Luddenham	SE	Lot 32 DP771596	865 m	285871.683	6248638.714	School
R14	288A Park Road Wallacia	W	Lot 1 DP1195400	445 m	284654.005	6249225.993	Industrial
R15	380 Park Road Luddenham	E	Lot 1 DP215057	185 m	285441.875	6249297.194	Industrial

Note: distances measured from the boundaries of the site development area

Figure 2-4: Aerial of nearest receptors

Source: SIX Maps 2020

↑N Not to scale	LEGEND: Receptor: + R1 Development border: Site border:	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

3. AIR QUALITY CRITERIA AND GUIDELINES

3.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) applies the following definitions relating to air pollution:

> ***"Air pollution"*** *means the emission into the air of any air impurity.*
>
> *While "air impurity" includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists odours, and radioactive substances'*

The following sections of this Act have most relevance to the site:

- *Section 124 Operation of Plant - other than domestic plant*

> *The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier's failure:*
>
> *(a) to maintain the plant in an efficient condition, or*
>
> *(b) to operate the plant in a proper and efficient manner.*

- *Section 126 Dealing with Materials*

> *(1) The occupier of any premises who deals with materials in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupiers failure to deal with those materials in a proper and efficient manner.*
>
> *(2) In this section:*
>
> ***deal*** *with materials means process, handle, move, store or dispose of the materials.*
>
> ***Materials*** *includes raw materials, materials in the process of manufacture, manufactured materials, by-products or waste materials.*

- *Section 128 Standards of air impurities not to be exceeded*

> *(1) The occupier of any premises must not carry on any activity, or operate any plant, in or on the premises in such a manner as to cause or permit the emission at any point specified in or determined in accordance with the regulations of air impurities in excess of:*
>
> *(a) The standard of concentration and the rate, or*
>
> *(b) The standard of concentration or the rate.*
>
> *Prescribed by the regulations in respect of any such activity or any such plant.*

(2) Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

- *Section 129 Standards of air impurities not to be exceeded*

(1) The occupier of any premises at which scheduled activities are carried on under the authority conferred by a licence must not cause or permit the emission of any offensive odour form the premises to which the licence applies.

(2) It is a defence in proceedings against a person for an offence against this section if the person establishes that:

(a) The emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of the licence directed at minimising the odour, or

(b) The only persons affected by the odour were persons engaged in the management or operation of the premises.

(3) A person who contravenes this section is guilty of an offence.

The proposed development is required to comply with this Act.

3.2 PROTECTION OF ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010

In accordance with Part 5 of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (herein referred to as the Clean Air Regulation), the proposed waste recycling facility would belong to Group 6 (Standards for scheduled premises) as the activity is to be "*commenced to be carried on, or to operate, on or after 1 September 2005 as a result of an environment protection licence granted under the* Protection of the Environment Operations Act 1997 *pursuant to an application made on or after 1 September 2005".*

Schedule 4 of the Clean Air Regulation provides standards of concentration for scheduled premises general activities and plant, any crushing, grinding, separating or materials handling activity:

Solid Particles (total) = 20 mg/m^3

The facility would be required to meet the above standard of concentration.

3.3 ADOPTED CRITERIA & NSW ENVIRONMENT PROTECTION AUTHORITY GUIDELINES

The *Approved Methods* (EPA 2016) provides guidance on methodology and thresholds that are to be used for the air impact assessment of a proposed development. This air impact assessment has been conducted in accordance with this guideline. Assessable pollutants (along with their corresponding limits) are summarised in Table 3-1. These criteria are applied at the nearest existing or likely future off-site sensitive receptor.

Table 3-1: Applicable Particulate Criteria at Sensitive Receptors from the NSW EPA Modelling Guidelines (*Approved Methods* 2016)

Pollutant	Averaging Period	Percentile	Concentration µg/m^3
Total Suspended Particulates (TSP)	Annual	100th	90
PM_{10}	24 Hours	100th	50
	Annual	100th	25
$PM_{2.5}$	24 Hours	100th	25
	Annual	100th	8

4. METEOROLOGY AND LOCAL AIR QUALITY

The meteorological data used in the modelling of this assessment was no-observation prognostic meteorological data. A prognostic meteorological data file was created by Lakes Environmental with WRF and AERMET using a representative year. The representative year is selected based on the evaluation of weather monitoring stations for their proximity to the site, completeness of data, and similarity of topography to the subject site.

Referenced and relevant meteorological parameters are detailed in this section.

4.1.1 Selecting a Representative Meteorological Year

The weather monitoring station operated by the Bureau of Meteorology nearest to the subject site with monthly climate statistics and graphs for all available years for temperature, daily wind run and rainfall is the Badgerys Creek AWS (Station No. 067108. This monitoring station is located approximately 5.3 km south-east of the subject site and was considered to be the most appropriate source of data for determining the representative year due to its proximity to the site, completeness of data, and similar topography to the subject site. Table 4-1 summarises the long-term data for temperature, wind and rainfall at the referenced AWS.

Long term averages from Badgerys Creek AWS meteorological data (see Section 4.2) was compared to each of the date the five (5) years preceding 2020 (2015-2019) (Attachment 1). The meteorological year of 2015 was selected as a representative year due to similarity to long term trends and the completeness of available data, however all preceding years showed reasonably similar results with little variation between selected parameters.

Additional meteorological parameters such atmospheric stability, mixing height and katabatic flow relative to the site are described in the below sections.

A 2015 prognostic meteorological data file was created by Lakes Environmental using the MMIF. This data set was used as input into AERMOD as AERMOD- Ready Surface & Profile.

4.1.2 MMIF and AERMET

Data files created by Lakes Environmental was output using the US EPA's Mesoscale Model Interface Program (MMIF).

Execution of MMIF was done according to the recommendations found in the EPA's Guidance on the Use of the Mesoscale Model Interface Program (MMIF) for AERMOD Applications. The AERMOD-Ready files were generated by processing the AERMET-Ready data files output by MMIF through the most recent version of the US EPA's AERMET meteorological pre-processor executable (Version 19191). This includes use of the MMIF-generated AERSURFACE output file for Stage 3 surface characteristics.

AERMET is a meteorological pre-processor that organises data and estimates the necessary boundary layer parameters for dispersion calculations in AERMOD.

4.1.3 AERMOD Parameters

The meteorological dataset obtained from Lakes Environmental and pre-processing by AERMET provides the necessary boundary layer parameters for dispersion calculations in AERMOD. Their inclusion within the AERMOD dispersion model are described below. As per the AERMOD technical guide, the following parameters relate to data input:

> ***Data flow in the AERMOD modelling system***
> *Surface characteristics in the form of albedo, surface roughness and Bowen ratio, plus standard meteorological observations (wind speed, wind direction, temperature, and cloud cover), are input to AERMET. AERMET then calculates the PBL parameters: friction velocity (u*), Monin-Obukhov length (L), convective velocity scale (w*), temperature scale (*), mixing height (z i), and surface heat flux (H) These parameters are then passed to the INTERFACE (which is within AERMOD) where similarity expressions (in conjunction with measurements) are used to calculate vertical profiles of wind speed (u), lateral and vertical turbulent fluctuations (v , w), potential temperature gradient (d/dz), potential temperature ( ), and the horizontal Lagrangian time scale (TLy).*

Many of the meteorological parameters not available from BoM, such as site representative cloud cover, mixing height and surface heat flux, are considered within the Lakes Environmental AERMET/AERMOD interface.

4.2 CLIMATE

Long term climate data including temperature, wind run and rainfall was collected from the Badgerys Creek AWS. The AWS has monthly statistics from 1995-2020 for minimum temperature, maximum temperature and rainfall, and 2003-2020 for daily wind run. The monthly and annual statistics are summarised in Table 4-1.

Table 4-1: Long-term climate data from the Badgerys Creek AWS

Month	Mean Minimum Temperature (°C) 1995-2020	Mean Maximum Temperature (°C) 1995-2020	Daily Wind Run (km) 2003-2020	Mean Rainfall (mm) 1995-2020
January	17.3	30.3	215	75.1
February	17.2	28.9	205	108.8
March	15.3	26.8	191	84.1
April	11.5	24.1	185	46.8
May	7.6	20.8	185	36.8
June	5.6	17.8	198	59.2
July	4.1	17.5	204	24.8
August	4.7	19.2	227	34.7
September	7.7	22.6	241	34.9
October	10.5	24.9	224	52.1
November	13.5	26.6	227	67.6
December	15.5	28.7	218	53.6
Annual	10.9	24	210	680.2

4.2.1 Temperature and Humidity

Site representative temperature data for the most recent 5 years is displayed in Attachment 1. Long term minimum and maximum temperature statistics are displayed in Column 2 and 3 of Table 4-1. The mean minimum and maximum temperatures were lowest in July and highest in January.

Humidity data for the referenced AWS was only available for years 1995-2010; for these years, the mean annual humidity for 9am and 3pm was 75% and 50% respectively.

4.2.2 Rainfall, Evaporation and Cloud Cover

Rainfall data for the most recent 5 years is displayed in Attachment 1. Long term rainfall statistics are displayed in Column 5 of Table 4-1. Evaporation and cloud cover data relative to the site was unavailable. The mean rainfall was lowest in July and highest in February.

4.2.3 Wind Speed and Direction

Long term daily wind run statistics are displayed in Column 4 of Table 4-1. Wind rose plots and local wind trends relative to the site are described below. The daily wind run was equally lowest in April and May, and equally highest in August and November.

4.2.3.1 Wind Rose Plots

Wind rose plots show the direction from which the wind is coming with triangles known as “petals”. The petals of the plots in summarise wind direction data into 8 compass directions i.e. north, north-east, east, south-east, etc.

The length of the triangles, or “petals”, indicates the frequency that the wind blows from the direction presented. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes. Thus, the segments of a petal show what proportion of wind for a given direction falls into each class.

The proportion of time for which wind speed is equal to or less than 0.5 m/s, when speed is negligible, is referred to as calm hours or “calms”. Calms are not shown on a wind rose as they have no direction, but they are noted under each wind rose as a temporal percentage.

The concentric circles in each wind rose are the axes that denote wind frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are the same size. The frequencies shown in the first quadrant (top-left quarter) of each wind rose are stated beneath the wind rose.

4.2.3.2 Local Wind Trends

Seasonal wind rose plots for this site utilising Badgerys Creek AWS 2015 data have been included in Figure 4-1. Annual average wind speeds of 2.34 m/s and a calms frequency of 7.06% were estimated. Annual winds from the south-west were found to be dominant and were present for approximately 27% of the time.

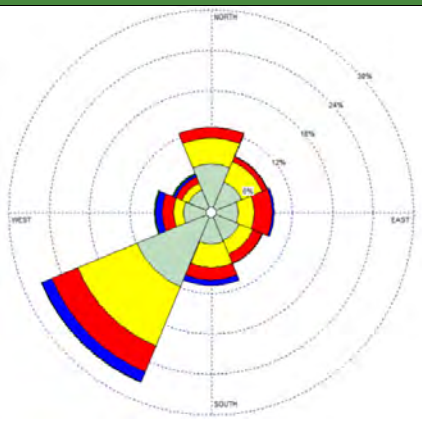
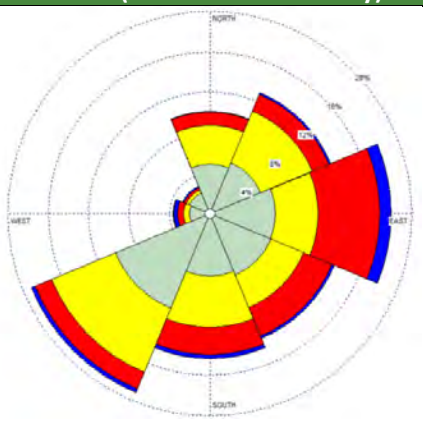
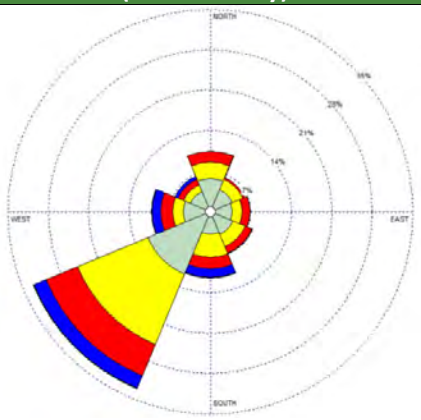
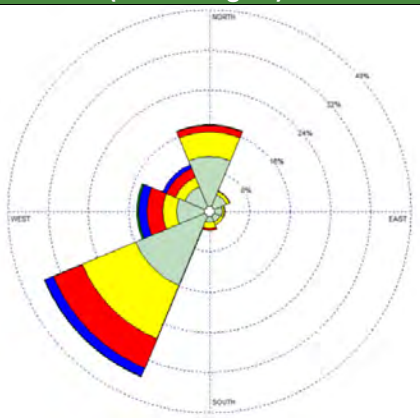
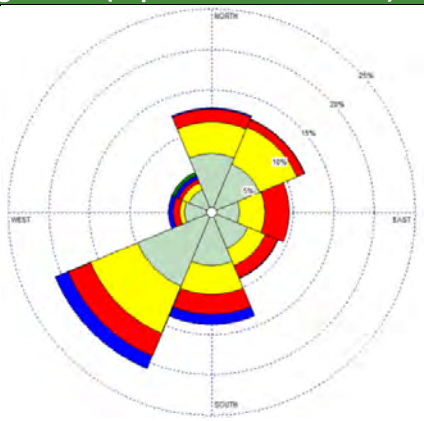
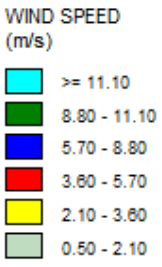
The average summer wind speed was 2.35 m/s, with a calms frequency of 5.74%. South-west and easterly winds were found to be the most dominant at a frequency of approximately 18-19% each.

In autumn, dominant winds were blowing from the south-west (~33%). The average autumn wind speed was 2.47 m/s with a calms frequency of 6.88%.

The winter season data showed the prevalence of winds from the south-west, which accounted for ~35% of winds. Followed by winds from the north accounting for ~17% of wind directions. The average winter wind speed was determined to be 2.18 m/s with a calms frequency of 8.65%.

In the spring time, average wind speeds of 2.34 m/s with a frequency of calms of 6.92% were recorded. Winds from the south-west were most dominant and accounted for approximately 21%. Winds from the south were approximately 13% each. The rest of the wind directions were found to be present at frequencies less than 12%.

Figure 4-1: Wind Rose Plots for the Referenced Meteorological Station – BOM Badgerys Creek AWS ID 067108 (2015)

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.34 m/s Calms Frequency: 7.06% Axis Frequencies: 6%, 12%, 18%, 24%, 30%	Average Wind Speed: 2.35 m/s Calms Frequency: 5.74% Axis Frequencies: 4%, 8%, 12%, 16%, 20%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.47 m/s Calms Frequency: 6.88 % Axis Frequencies: 7%, 14%, 21%, 28%, 35%	Average Wind Speed: 2.18 m/s Calms Frequency: 8.65% Axis Frequencies: 8%, 16%, 18%, 24%, 32%, 40%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.34m/s Calms Frequency: 6.92% Axis Frequencies: 6%, 12%, 18%, 24%, 30%	

4.3 ATMOSPHERIC STABILITY CLASS

The "stability" of the atmosphere is a classification used to describe the structure of the atmosphere in terms of temperature, specifically, how temperature changes in the atmosphere with altitude. Classification is often done according to the Pasquill-Gifford classification system that consists of six stability class groups, shown in Table 4-2.

The class "A" describes an atmosphere where the air is well-mixed and there is little hindrance of dispersion into the atmosphere. At the other end of the scale is class "F", which describes conditions under which temperature inversions would occur, where winds are calm or absent and air close to the earth's surface cannot rise into the atmosphere due to the presence of warmer air layers above. The classes in between A and F indicate changing degrees of stability due to variations in temperature in the atmosphere.

Table 4-2: Pasquill-Gifford Stability Class System

Stability Class	Description
A	Extremely Unstable
B	Unstable
C	Slightly Unstable
D	Neutral
E	Slightly Stable
F	Very Stable

Table 4-3 and Table 4-4 present the statistical information related to the atmospheric stability class for the 2015 Badgerys Creek AWS meteorological data. There were 1.1% missing or incomplete data for this file which has been excluded.

Table 4-3: Wind Direction/Stability Class Frequency Distribution (Count) for Badgerys Creek AWS (2015 BoM data)

Frequency Distribution (Count)							
Direction (Blowing From)	Stability Class						
	A	B	C	D	E	F	Total
N	224	140	204	497	125	129	1319
NE	214	120	124	327	72	66	923
E	80	53	162	346	85	74	800
SE	81	140	204	497	125	129	1176
S	224	57	192	451	116	61	1101
SW	121	128	296	1379	311	180	2415
W	75	59	106	405	80	67	792
NW	50	21	87	298	52	69	577
Total	1069	718	1375	4200	966	775	9103

Table 4-4: Wind Direction/Stability Class Frequency Distribution (Percentage) for Badgerys Creek AWS (2015 BoM data)

Frequency Distribution (Percentage %)							
Direction (Blowing From)	Stability Class						
	A	B	C	D	E	F	Total
N	2.5	1.5	2.2	5.5	1.4	1.4	14.5
NE	2.4	1.3	1.4	3.6	0.8	0.7	10.1
E	0.9	0.6	1.8	3.8	0.9	0.8	8.8
SE	0.9	1.5	2.2	5.5	1.4	1.4	12.9
S	2.5	0.6	2.1	5.0	1.3	0.7	12.1
SW	1.3	1.4	3.3	15.1	3.4	2.0	26.5
W	0.8	0.6	1.2	4.4	0.9	0.7	8.7
NW	0.5	0.2	1.0	3.3	0.6	0.8	6.3
Total	11.7	7.9	15.1	46.1	10.6	8.5	100.0

Stability class D is the most frequent with an occurrence of 46.1%. Stability classes A, B, and C, which offer the best dispersion conditions, occur with frequencies of 11.7%, 7.9% and 15.1% respectively.

Worst case dispersion conditions for emissions would occur during F-class stability conditions – generally associated with still/light winds and clear skies during the night time or early morning period (stable conditions). Analysis of the referenced site-specific meteorological data indicates the F-class dispersion conditions were present for approximately 8.5% of the time.

In addition to the above data, the wind speed frequency distribution across wind directions is shown in Table 4-5. There were 7.1% calms which will contribute to the stable conditions in E and F stability classes. The majority of wind speed lies between 0.5 – 3.6 m/s for 72.1% of the time. This is represented in the D stability class which is experienced 46.1% of the time, as shown in Table 4-4.

Table 4-5: Wind Direction/Speed Frequency Distribution (Percentage) for Badgerys Creek AWS (2015 BoM data)

Frequency Distribution (Percentage %)								
Direction (Blowing From)	Wind speed (m/s)							
	<0.50	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	Total
N	-	7.2	3.8	1.5	0.1	0.0	0.0	12.6
NE	-	4.9	3.3	0.8	0.1	0.0	0.0	9.0
E	-	4.1	2.4	2.6	0.3	0.0	0.0	9.3
SE	-	4.5	2.1	1.5	0.1	0.0	0.0	8.2
S	-	4.7	3.4	1.9	0.8	0.0	0.0	10.8
SW	-	11.9	9.4	4.2	1.6	0.1	0.0	27.1
W	-	4.2	1.4	1.7	1.0	0.1	0.0	8.4
NW	-	3.6	1.1	0.9	0.5	0.1	0.0	6.3
Calms	7.1	-	-	-	-	-	-	7.1
Incomplete	1.1	-	-	-	-	-	-	1.1
Total	8.2	45.1	27.0	15.1	4.4	0.4	0.0	100.0

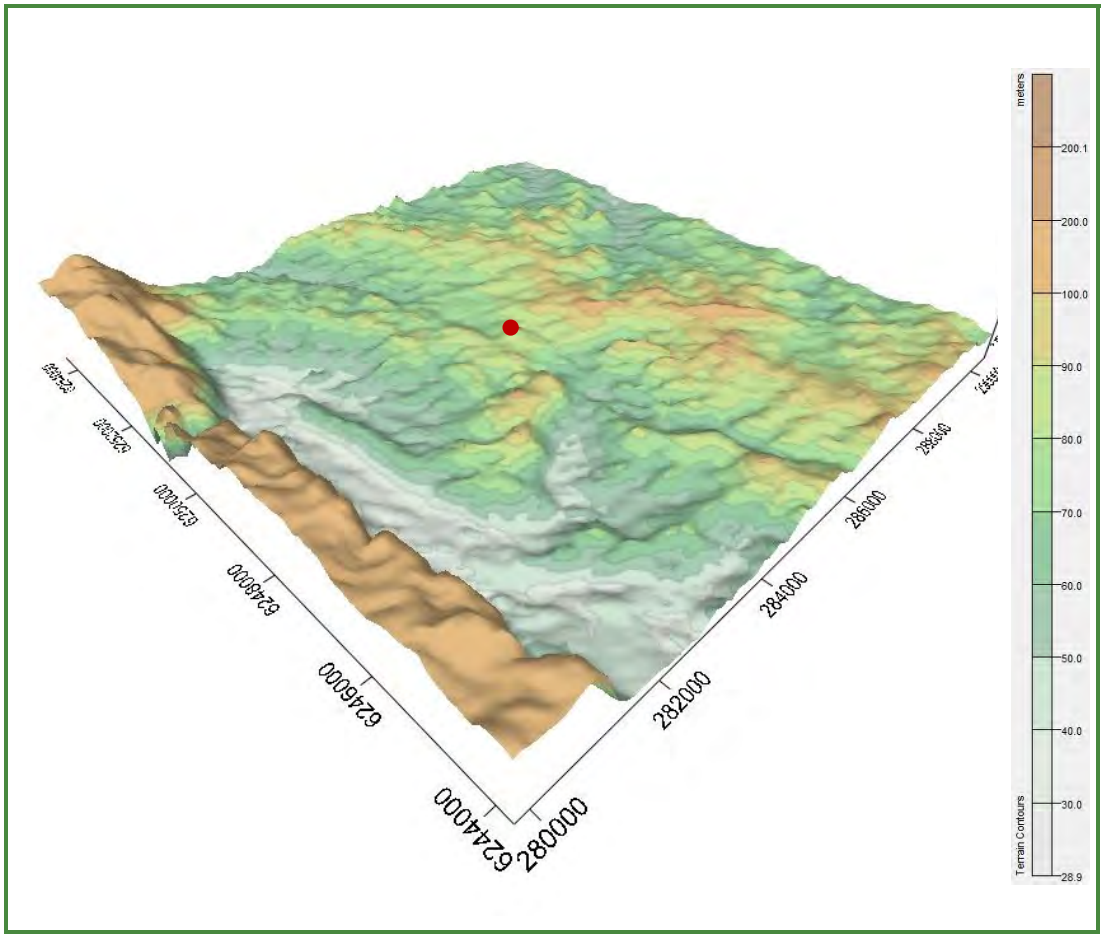
4.4 KATABATIC FLOW, TERRAIN AND STRUCTURAL EFFECTS ON DISPERSION

The meteorological condition known as katabatic flow (or katabatic drift) is often identified as the condition under which maximum environmental impacts from primarily ground-based sources are likely to occur. Katabatic flow is simply the movement of cold air down a slope, generally under stable atmospheric conditions. Under such circumstances, dispersion of airborne pollutants is generally slow and the associated impacts can reach their peak.

Katabatic flow is unlikely to affect emissions from the site's activities as the site is at a low elevation and is relatively flat.

Figure 4-2 shows the terrain with the z-axis (i.e. vertical axis) exaggerated by a factor of 10 (i.e. a given distance on the x-axis or y-axis appears three times as great on the z-axis) in order to provide a clearer description of the topography. A coloured scale bar shows elevations corresponding to the colours used in the figures. It should be noted that these figures are an approximation of the actual terrain, based on terrain information from NASA SRTM 1-arc second digital elevation models.

Figure 4-2: Local topography of site with a factor of 10 vertical exaggeration



4.5 AIR RE-CIRCULATION

Similar to katabatic flow, atmospheric circulation is affected by temperature and wind. Warm air closest to the equator flows towards the poles and east, and as it travels it is influenced by convection cells relative to latitude. The convection cell relative to the site is the Ferrel cell, which occupies the 30-60 degree latitude. Prevailing westerly winds within this cell distribute heat across the surface as denser, cooler air returns south at ground level.

Due to the site being at a low elevation and relatively flat, coupled with majority of the air stability percentage being "neutral-slightly unstable", particle dispersion from atmospheric movement can be considered relatively good and negative impacts from atmospheric re-circulation on emissions considered low.

4.6 LOCAL AIR QUALITY

No air quality measurements have been undertaken specifically for this project. Instead, the air quality data from a representative monitoring station was used to gain an understanding of what current pollutant levels may be around the site and to provide background air quality parameters for the assessment.

Background air quality parameters were obtained from the NSW EPA air quality monitoring station in Camden. This station is located approximately 18 km south of the subject site and is considered appropriately representative. Although Bringelly monitoring station is 9km from the subject site it does not have $PM_{2.5}$ data available. The relevant assessable pollutant parameters available from the monitoring station are $PM_{2.5}$ and PM_{10}. The relevant data is summarised in Table 4-6.

Table 4-6: Summary of 2015 Data for $PM_{2.5}$ and PM_{10} from Camden Air Quality Monitoring Station.

Pollutant	Averaging period	Concentration (µg/m^3)
$PM_{2.5}$	Maximum 24 hr average for 2015	24.96
	2nd highest 24 hr average for 2015	20.70
	3rd highest 24 hr average for 2015	17.96
	Annual average for 2015	6.44
PM_{10}	Maximum 24 hr average for 2015	**62.42**
	2nd highest 24 hr average for 2015	34.90
	3rd highest 24 hr average for 2015	32.66
	Annual average for 2015	14.06

Note: Average values are calculated from hourly data available on https://www.environment.nsw.gov.au/. Bold values exceed the *Approved Methods* criteria.

No ambient air quality data for Total Suspended Particulates (TSP) is available from the referenced monitoring station. Therefore, the worst-case particle size distribution data from the AP-42 Emissions Database provided by the U.S. Environmental Protection Agency (US EPA, 1995), a PM_{10}-to-TSP ratio of 0.51 was used to estimate the TSP background concentration level of 27.57 µg/m^3 for an annual averaging period.

A summary of the background air quality levels from the Camden air quality monitoring station adopted for this assessment is provided in Table 4-7.

Table 4-7: Adopted particulate matter background levels for assessment

Pollutant	Averaging period	Concentration (µg/m^3)
$PM_{2.5}$	24 hours	24.96
	Annual	6.44
PM_{10}	24 Hours	**62.42**
	Annual	14.06
Total Suspended Particulates (TSP)	Annual	27.57

Note: Bold values exceed the *Approved Methods* criteria.

The data collected from the Camden air quality monitoring station shows elevated 24-hour background levels of PM_{10} that are above the *Approved Methods* 24-hour average criterion of 50 µg/m^3. Although background levels of 24-hour $PM_{2.5}$ do not exceed, they are still considered high as the maximum average is only 0.04 µg/m^3 below the criteria. In cases of elevated background concentrations, the *Approved Methods* states:

> *In some locations, existing ambient air pollutant concentrations may exceed the impact assessment criteria from time to time. In such circumstances, a licensee must demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical.*

This has been addressed in the modelling results and discussion in Section 7 and Section 8.

5. AIR QUALITY IMPACTS

5.1 CONSTRUCTION

Construction activities have the potential to generate dust.

A draft Construction Environmental Management Plan (CEMP) has been prepared that documents the environmental aspects of the construction phase and establishes procedures to manage any potential impacts. An Air Quality Control Procedure is included which sets out the procedure for managing and monitoring air emissions during construction. The following is a summary of the control measures provided in the procedure. Local weather conditions should be taken into account in determining the level and suitability of controls required.

Control Measures

- Monitor local weather conditions and cease dust generating operations when conditions result in visible dust emissions, and implement mitigation measures or until weather conditions improve;
- Erection of wind breaks such as fences or vegetative buffers at the site boundary;
- Locate stockpiles away from drainage paths, easement, kerb, or road surface, and near existing wind breaks such as trees and fences;
- Dust suppression/wind breaks on stockpiles;
- Limit stockpile height to 5 m (maximum) and size;
- Vehicles leaving the site to be cleaned of dirt and other materials to avoid tracking onto public roads;
- Enforce appropriate speed limits for vehicles on site. Recommended speed limit is <15 km/hr;
- Cover all loads entering and leaving the site; and
- Inspect the site daily using a Site Dust Control Checklist to aid with the implementation of air quality control measures.

5.2 OPERATIONS

The proposed development will include the following dust generating activities:

- Incoming and outgoing truck deliveries;
- Storage of waste materials;
- Sorting and screening of waste materials; and
- Blending and crushing waste materials.

Control Measures

The following control measures will be implemented to reduce dust impacts:

- Dust emitting activities limited to inside the building; and
- Extensive water misting system.

6. AIR IMPACT ASSESSMENT

This section assesses the effects of potential emissions on the existing ambient air quality as a direct result of the proposal. The assessment methodology, modelling configurations, results and discussion of the potential impacts as well as any recommendations on mitigation measures are described in detail.

Wheel generated dust has not been considered as a significant source of emissions. The entire working area of the site is to be hardstand such as concrete, bitumen or a compacted road base which releases minimal dust.

Odour emissions associated with the proposed development are considered negligible. Materials stored and the processes undertaken on site are not odour-generating, therefore odour does not warrant any further assessment.

6.1 EMISSION SOURCES

Emission sources for processes on site are confined to resource recovery activities. The main air emissions typical of a C&D/C&I recycling facility are dust and particulates ($PM_{2.5}$, PM_{10} and TSP).

6.1.1 Mitigation Measures

The air quality mitigation measures (for dust control) that are included in the air dispersion model and proposed development are:

- Dust generating activities including unloading, screening, crushing and sorting of materials are conducted within a building;
- Water misting system focused at local point of dust emissions including the storage bunkers, as well as applied throughout the entire inside plant; and
- Water misting system on front end loaders.

6.2 ADOPTED EMISSION FACTORS

The emission factors used for this assessment were sourced from the following National Pollutant Inventory Emission Estimation Technique Manuals:

- NPI EETM for Mining (2012); and
- NPI EETM for Mining and Processing of Non-Metallic Minerals (2014) (crushed stone processing data) were utilised in this assessment to represent the sites activities.

The relevant NPI documents do not include data for estimating emission of $PM_{2.5}$. A summary of selected NPI factors is included in Table 6-1.

Table 6-1: Emission Factors

Reference (NPI EETM)	Site Source	PM_{10} Emission Factor (kg/tonne)	TSP Emission Factor (kg/tonne)
Mining and Processing of Non-Metallic Minerals	Unloading	0.000008	-
Mining	Sorting (Front End Loader)	0.00005	-
Mining	Sorting (Excavator)	0.012	0.025
Mining and Processing of Non-Metallic Minerals	Screening	0.0043	0.0125
Mining and Processing of Non-Metallic Minerals	Screening (fines)	0.036	0.15
Mining and Processing of Non-Metallic Minerals	Crushing	0.0012	0.0027
Mining and Processing of Non-Metallic Minerals	Truck loading crushed stone (Front End Loader)	0.00005	-
Mining	Conveyors	0.2 (kg/ha/hr)	0.4 (kg/ha/hr)
Mining and Processing of Non-Metallic Minerals	Conveyor drop (transfer point)	0.00055	0.0015
Mining	Stockpiles	0.2 (kg/ha/hr)	0.4 (kg/ha/hr)

The *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emissions Factors* (2006) gives a ratio of 0.15 $PM_{2.5}/PM_{10}$ for 'Aggregate Handling and Storage Piles' which was used to estimate $PM_{2.5}$ emissions for from aggregate processing activities.

The US EPA AP-42 *Appendix B.2 Generalized Particle Size Distributions* (1996) data for 'Mechanically Generated Processed Ores and Non-metallic Minerals' gives a ratio of 0.35 $PM_{2.5}/PM_{10}$ which was used to estimate $PM_{2.5}$ emissions from fines processing activities.

In addition, where there is no TSP data available in the NPI a generic PM_{10} to TSP ratio of 0.51 has been assumed to estimate TSP emission factors, as materials are made up of a variety of products (bricks, concrete, timber, metal, glass).

6.2.1 Reduction Factors

Reduction factors for the facility have been based on the *Emission Estimation Technique Manual for Concrete Batching and Concrete Product Manufacturing* (NPI DEH, 1999) which are shown in Table 6-2.

Table 6-2: Reduction Factors for PM_{10} for Concrete Batching Activities from NPI EETM for Concrete Batching and Concrete Products

Control	Reduction Factor (Materials Handling)	Reduction Factor (Materials Storage)
Default	-	0.3
Wind Breaks	0.7	0.7
Water Sprays	0.5	0.5
Chemical Suppression	0.2	0.2
Enclosure (2-3 walls)	0.1	0.1
Covered Stockpiles	0.0	0.0
Enclosed	0.0	-

Reduction factors were applied to the NPI EETM emission factors from Table 6-2 depending on the emission reduction controls in place for each process, as outlined in Table 6-3.

Table 6-3: Emission Reduction Factors Applied to NPI EETM Emission Factors

Processes at Proposed Site	Control in Place	Reduction Factor Applied
Stockpiles	Water Sprays	0.5
Conveyor drop	Water Sprays	0.5
Front end loader	Water Sprays	0.5
Activities within a building	Enclosed by 2-3 walls Water Sprays	0.05 (0.1 × 0.5)

6.3 SOURCE CONFIGURATIONS AND PARAMETERS

6.3.1 Assumptions and Emission Sources Modelled

The following assumptions were used in the model site activities.

- A total of 95,000 tonnes per annum of raw material processed was used to estimate emissions from the subject site;
- The maximum peak daily processing of 500 tonnes of materials was used to estimate emissions based on daily truck deliveries (~55/day);
- The breakdown of materials is assumed to be:
  - Waste to landfill 10%,
  - Light SRF 10&,
  - Plastic 8%,
  - Wood 15%,
  - Cardboard/paper 10%,

  - Metals 8%, and
  - Aggregates 39%;
- All sources were modelled for 24 hours per day, 7 days per week;
- All stockpiles released from 0 m; and
- All processing activities in the building are a combined source on the site;
- All doors on the building are assumed open with a release height of 6 m.

Each potential dust emitting process outside the building was allocated a separate source in the dispersion model, all activities within the building were calculated and then summed to be modelled as one combined source. Emission sources are detailed below in Table 6-4 and shown in Figure 6-1.

Table 6-4: Emission source inventory

Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	Release Height (m)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
Front-end Loader (4)	Volume	500	95000	4	3	0.00005	9.80E-05*	kg/t	4.34E-05	2.90E-05	2.26E-05	1.51E-04	2.96E-04	0.5	2.17E-05	1.45E-05	1.13E-05	7.53E-05	1.48E-04
60 mm Aggregate stockpile	Area	500	-	80	0	0.2	0.4	kg/ha/hr	2.78E-06	1.85E-05	2.78E-06	1.85E-05	3.70E-05	0.5	1.39E-06	9.26E-06	1.39E-06	9.26E-06	1.85E-05
32 mm Aggregate stockpile	Area	500	-	120	0	0.2	0.4	kg/ha/hr	4.16E-06	2.78E-05	4.16E-06	2.78E-05	5.56E-05	0.5	2.08E-06	1.39E-05	2.08E-06	1.39E-05	2.78E-05
16 mm Aggregate stockpile	Area	90	-	96	0	0.2	0.4	kg/ha/hr	7.78E-06	2.22E-05	7.78E-06	2.22E-05	8.88E-05	0.5	3.89E-06	1.11E-05	3.89E-06	1.11E-05	4.44E-05
-6 mm Aggregate stockpile	Area	40	-	64	0	0.2	0.4	kg/ha/hr	5.18E-06	1.48E-05	5.18E-06	1.48E-05	2.96E-05	0.5	2.59E-06	7.41E-06	2.59E-06	7.41E-06	1.48E-05
Conveyor drop to 60 mm	Volume	195	37050	1	4.5	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	0.5	9.31E-05	6.21E-04	4.85E-05	3.23E-04	8.81E-04
Conveyor drop to 32 mm	Volume	195	37050	1	4.5	0.00055	0.0015	kg/t	1.86E-04	1.24E-03	9.70E-05	6.46E-04	1.76E-03	0.5	9.31E-05	6.21E-04	4.85E-05	3.23E-04	8.81E-04
Conveyor drop to 16 mm	Volume	195	37050	1	4.5	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	0.5	2.17E-04	6.21E-04	1.13E-04	3.23E-04	8.81E-04
Conveyor drop to -6 mm	Volume	195	37050	1	4.5	0.00055	0.0015	kg/t	4.34E-04	1.24E-03	2.26E-04	6.46E-04	1.76E-03	0.5	2.17E-04	6.21E-04	1.13E-04	3.23E-04	8.81E-04
Building total	Volume	*See below*	*See below*	5800	6	-	-	-	6.94E-02	3.54E-01	3.57E-02	1.82E-01	4.96E-01	0.05 (0.1 × 0.5)	3.46E-03	1.76E-02	1.78E-03	9.06E-03	2.47E-02
Sources summed to create building total (note: the below calculated emission rates have not had reduction factors applied. Reduction factors are applied to the building total volume source above)																			
Truck unloading inside	*-*	*500*	*95000*	*-*	*-*	*0.000008*	*1.57E-05**	*kg/t*	*6.94E-06*	*4.63E-05*	*3.61E-06*	*2.41E-05*	*4.73E-05*	*-*	*6.94E-06*	*4.63E-05*	*3.61E-06*	*2.41E-05*	*4.73E-05*
Pre-sort stockpile	*-*	*-*	*-*	*125*	*-*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	*-*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*
Excavator sorting	*-*	*500*	*95000*	*-*	*-*	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	*-*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*
Internal storage area 1	*-*	*-*	*-*	*125*	*-*	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	*-*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*

Table 6-4: Emission source inventory

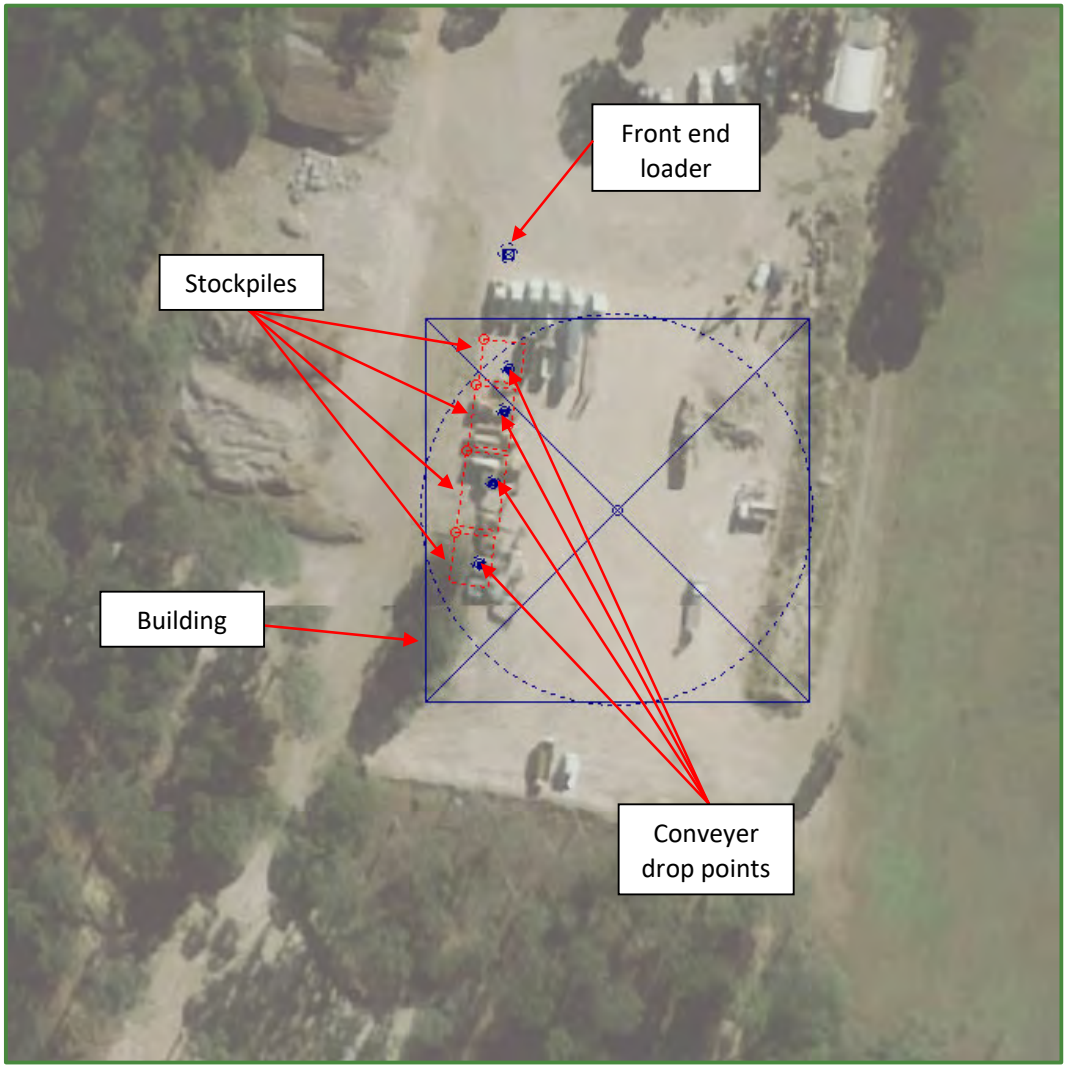
Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	Release Height (m)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
Internal storage area 2	-	-	-	*125*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*
Internal storage area 3	-	-	-	*125*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*
Internal storage area 4	-	-	-	*125*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*
Paper storage area	-	-	-	*125*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*	-	*4.34E-06*	*2.89E-05*	*4.34E-06*	*2.89E-05*	*5.79E-05*
Front end loader sorting	-	*500*	*95000*	-	-	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	-	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*
Shredder	-	*500*	*95000*	-	-	*0.0012*	*0.0027*	*kg/t*	*1.04E-03*	*6.94E-03*	*5.42E-04*	*3.61E-03*	*8.13E-03*	-	*1.04E-03*	*6.94E-03*	*5.42E-04*	*3.61E-03*	*8.13E-03*
Conveyor 1	-	-	-	*20*	-	*0.2*	*0.4*	*kg/ha/hr*	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*	-	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*
Mobile crusher	-	*195*	*37050*	-	-	*0.0012*	*0.0027*	*kg/t*	*4.06E-04*	*2.71E-03*	*2.11E-04*	*1.41E-03*	*3.17E-03*	-	*4.06E-04*	*2.71E-03*	*2.11E-04*	*1.41E-03*	*3.17E-03*
Waste screen (Under 60 over 250)	-	*480*	*91200*	-	-	*0.0043*	*0.0125*	*kg/t*	*3.58E-03*	*2.39E-02*	*1.87E-03*	*1.24E-02*	*3.61E-02*	-	*3.58E-03*	*2.39E-02*	*1.87E-03*	*1.24E-02*	*3.61E-02*
Conveyer 2	-	-	-	*12*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*	-	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*
Picking station	-	-	-	*12*	-	*0.2*	*0.4*	*kg/ha/hr*	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*	-	*4.17E-07*	*2.78E-06*	*4.17E-07*	*2.78E-06*	*5.56E-06*
Conveyor 3	-	-	-	*8*	-	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*
Air separator	-	*100*	*19000*	-	-	*0.0043*	*0.0125*	*kg/t*	*7.47E-04*	*4.98E-03*	*3.89E-04*	*2.59E-03*	*7.53E-03*	-	*7.47E-04*	*4.98E-03*	*3.89E-04*	*2.59E-03*	*7.53E-03*
Conveyor 4	-	-	-	*20*	-	*0.2*	*0.4*	*kg/ha/hr*	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*	-	*6.94E-07*	*4.63E-06*	*6.94E-07*	*4.63E-06*	*9.26E-06*
Bounce separator	-	*100*	*19000*	-	-	*0.0043*	*0.0125*	*kg/t*	*7.47E-04*	*4.98E-03*	*1.49E-08*	*9.95E-08*	*7.53E-03*	-	*7.47E-04*	*4.98E-03*	*1.49E-08*	*9.95E-08*	*7.53E-03*
Heavy stockpile	-	-	-	*41.5*	-	*0.2*	*0.4*	*kg/ha/hr*	*1.43E-06*	*9.55E-06*	*1.43E-06*	*9.55E-06*	*1.91E-05*	-	*1.43E-06*	*9.55E-06*	*1.43E-06*	*9.55E-06*	*1.91E-05*
Light stockpile	-	-	-	*33.75*	-	*0.2*	*0.4*	*kg/ha/hr*	*1.17E-06*	*7.81E-06*	*1.17E-06*	*7.81E-06*	*1.56E-05*	-	*1.17E-06*	*7.81E-06*	*1.17E-06*	*7.81E-06*	*1.56E-05*
Front end loader to sorting or reprocessing	-	*500*	*95000*	-	-	*0.012*	*0.025*	*kg/t*	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*	-	*1.04E-02*	*6.94E-02*	*5.42E-03*	*3.61E-02*	*7.53E-02*

Table 6-4: Emission source inventory

Source Name	Source Type	Daily tonnage	Annual Tonnage	Source Area (m^2)	Release Height (m)	PM_{10} Emission Factor	TSP Emission Factor	Units	Calculated Emission Rates as per NPI EETM					Reduction Factor Applied	Emission rates after reduction factors applied (input into model)				
									Daily Emission Rate (g/s)		Annual Emission Rate (g/s)				Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
									$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
Conveyor to aggregates screen	-	-	-	*9*	-	*0.2*	*0.4*	*kg/ha/hr*	*3.13E-07*	*2.08E-06*	*3.13E-07*	*2.08E-06*	*4.17E-06*	-	*3.13E-07*	*2.08E-06*	*3.13E-07*	*2.08E-06*	*4.17E-06*
60-32 Aggregate screen	-	*195*	*37050*	-	-	*0.0043*	*0.0125*	*kg/t*	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*	-	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*
Conveyor out to 60 mm	-	-	-	*7*	-	*0.2*	*0.4*	*kg/ha/hr*	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*	-	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*
Conveyor to screen	-	-	-	*8*	-	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*
32-16 Aggregate screen	-	*195*	*37050*	-	-	*0.0043*	*0.0125*	*kg/t*	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*	-	*1.46E-03*	*9.70E-03*	*7.58E-04*	*5.05E-03*	*1.47E-02*
Conveyor out to 32 mm	-	-	-	*7*	-	*0.2*	*0.4*	*kg/ha/hr*	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*	-	*2.43E-07*	*1.62E-06*	*2.43E-07*	*1.62E-06*	*3.24E-06*
Conveyor to screen	-	-	-	*8*	-	*0.2*	*0.4*	*kg/ha/hr*	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*	-	*2.78E-07*	*1.85E-06*	*2.78E-07*	*1.85E-06*	*3.70E-06*
16-6 Aggregate screen	-	*195*	*37050*	-	-	*0.036*	*0.15*	*kg/t*	*2.84E-02*	*8.13E-02*	*1.48E-02*	*4.23E-02*	*1.76E-01*	-	*2.84E-02*	*8.13E-02*	*1.48E-02*	*4.23E-02*	*1.76E-01*
Conveyor out to 16 mm	-	-	-	*7*	-	*0.2*	*0.4*	*kg/ha/hr*	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*	-	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*
Conveyor across	-	-	-	*7*	-	*0.2*	*0.4*	*kg/ha/hr*	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*	-	*5.67E-07*	*1.62E-06*	*5.67E-07*	*1.62E-06*	*3.24E-06*
Conveyor out to -6 mm	-	*195*	*37050*	*8*	-	*0.2*	*0.4*	*kg/ha/hr*	*6.48E-07*	*1.85E-06*	*6.48E-07*	*1.85E-06*	*3.70E-06*	-	*6.48E-07*	*1.85E-06*	*6.48E-07*	*1.85E-06*	*3.70E-06*

*: where an NPI EETM TSP emission factor was not available, a generic PM_{10} to TSP ratio of 0.51 was adopted.

Figure 6-1: Arrangement of Modelled Sources



7. AIR IMPACT MODELLING

7.1 DISPERSION MODEL

The new generation air dispersion model, AERMOD ver. 9.8.0, was used for the prediction of off-site impacts associated with the air emissions from the proposed operations. AERMOD uses air dispersion based on planetary boundary layer turbulence structure and scaling concepts. The AERMOD model replaced AUSPLUME as the air dispersion model accepted by the Victorian EPA in January 2014 and is a suitable model to use for this air assessment.

The model was used to estimate the concentration impacts on receptors for each hour of input meteorology. Terrain was assumed to be elevated.

7.1.1 Meteorological Data

Prognostic meteorological data for the year 2015 was obtained from Lakes Environmental as described in Sections 4.1.1 and 4.1.2. The profile and surface data files were input to AERMOD.

7.2 AIR IMPACT MODELLING RESULTS

7.2.1 Maximum Impacts at Sensitive Receptors

Table 7-1 to Table 7-5 provide the results of the maximum modelled impacts for each identified receptor. Isopleths for each averaging period are provided in Figure 7-1 to Figure 7-5. Background concentrations that exceed the relevant *Approved Methods* criterion are marked with red text.

Table 7-1: TSP Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.31	27.57 µg/m³	27.88	90 µg/m³
R2	0.18		27.75	
R3	0.10		27.67	
R4	0.11		27.68	
R5	0.12		27.69	
R6	0.21		27.78	
R7	0.41		27.98	
R8	0.28		27.85	
R9	0.20		27.77	
R10	0.10		27.67	
R11	0.09		27.66	
R12	0.06		27.63	
R13	0.05		27.62	
R14	0.11		27.68	
R15	0.74		28.31	

Note: Complies / Non-compliance

Figure 7-1: TSP Annual Averaging Period Modelling Results

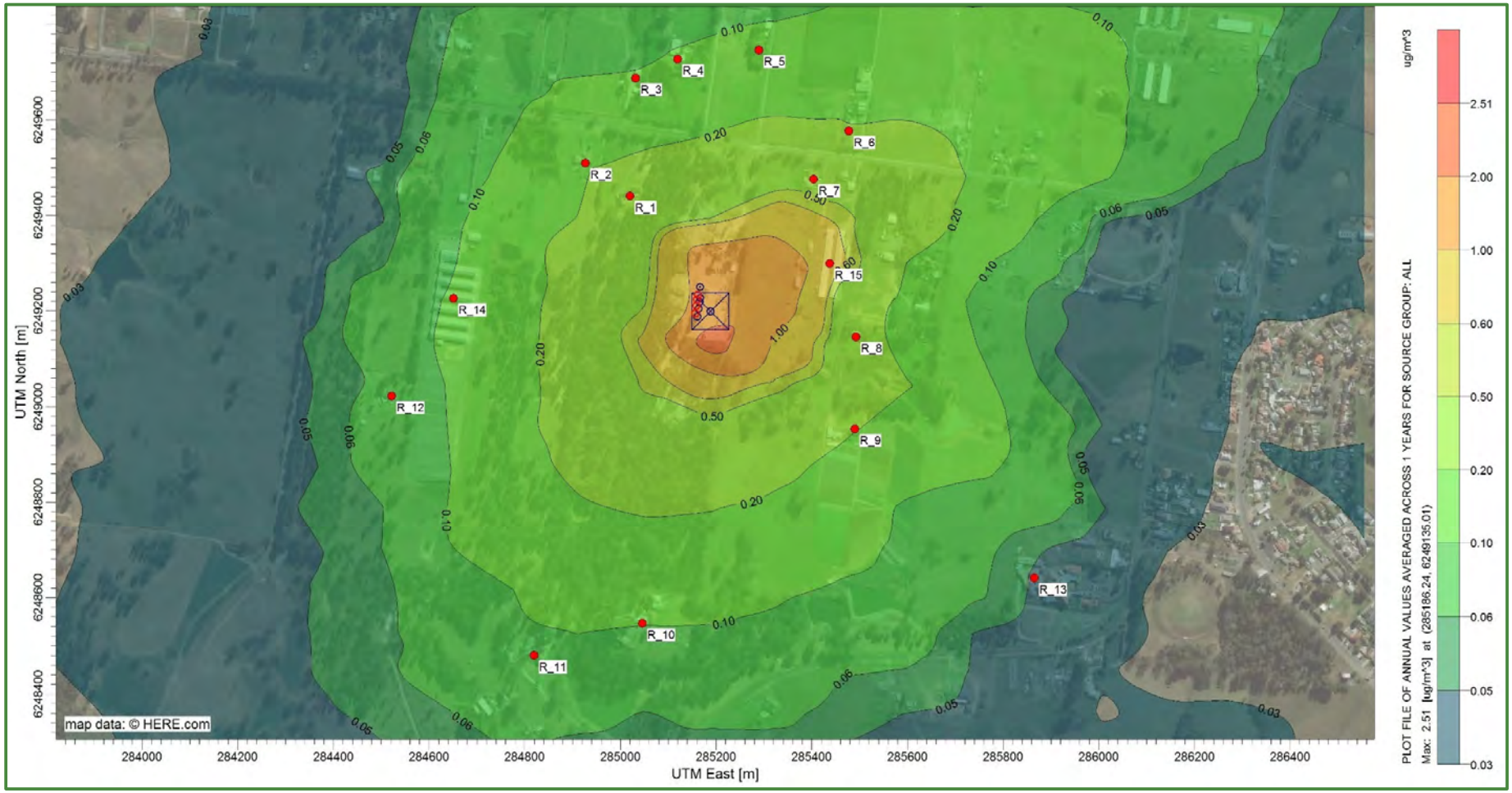


Table 7-2: PM_{10} Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.12	14.06 µg/m³	14.18	25 µg/m³
R2	0.07		14.13	
R3	0.04		14.10	
R4	0.04		14.10	
R5	0.04		14.10	
R6	0.08		14.14	
R7	0.15		14.21	
R8	0.10		14.16	
R9	0.08		14.14	
R10	0.04		14.10	
R11	0.03		14.09	
R12	0.02		14.08	
R13	0.02		14.08	
R14	0.04		14.10	
R15	0.27		14.33	

Note: Complies / Non-compliance

Figure 7-2: PM_{10} Annual Averaging Period Modelling Results

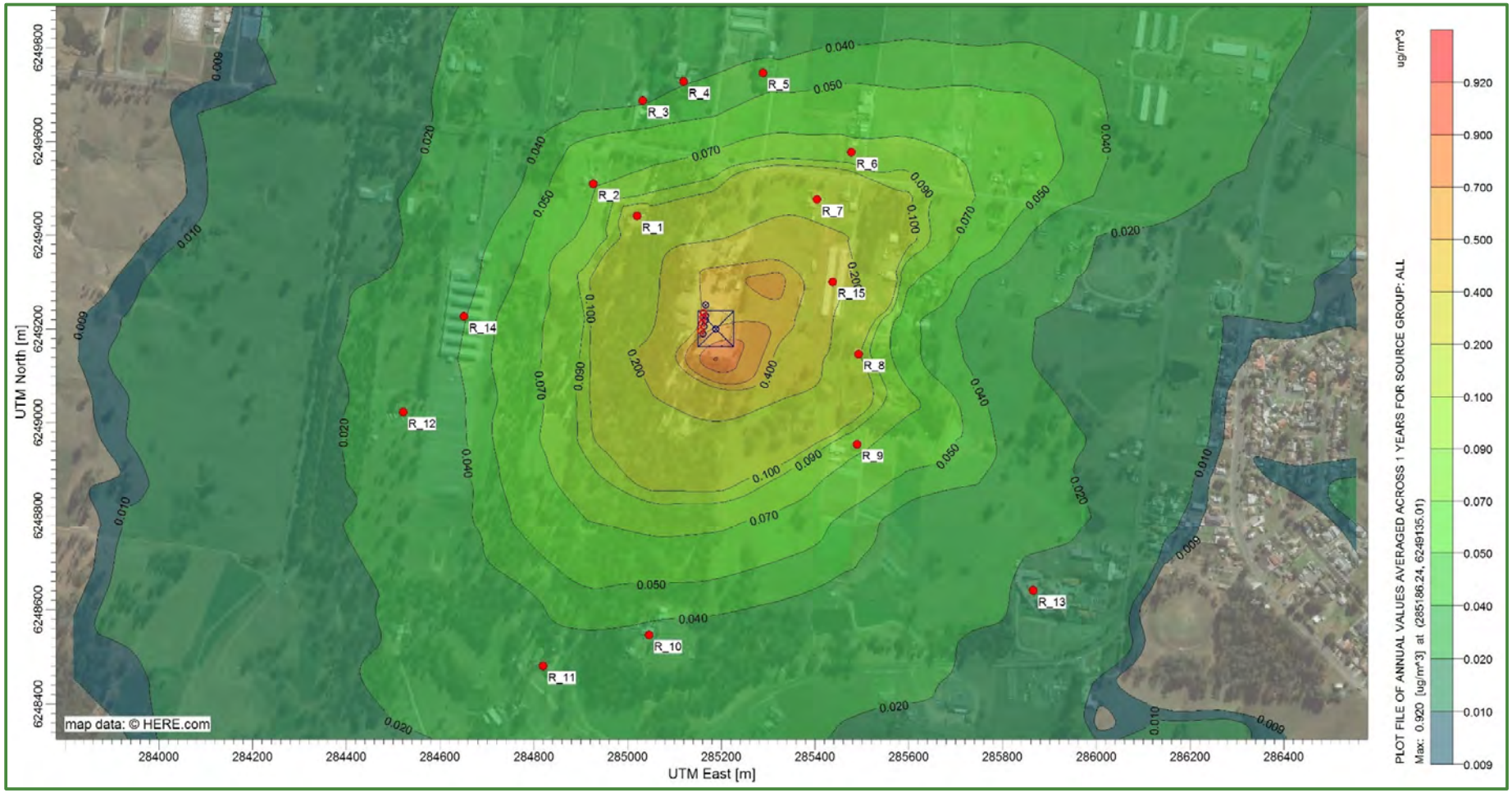


Table 7-3: $PM_{2.5}$ Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.02	6.44 µg/m³	6.46	8 µg/m³
R2	0.01		6.45	
R3	0.01		6.45	
R4	0.01		6.45	
R5	0.01		6.45	
R6	0.02		6.46	
R7	0.03		6.47	
R8	0.02		6.46	
R9	0.02		6.46	
R10	0.01		6.45	
R11	0.01		6.45	
R12	0.00		6.44	
R13	0.00		6.44	
R14	0.01		6.45	
R15	0.06		6.50	

Note: Complies / Non-compliance

Figure 7-3: $PM_{2.5}$ Annual Averaging Period Modelling Results

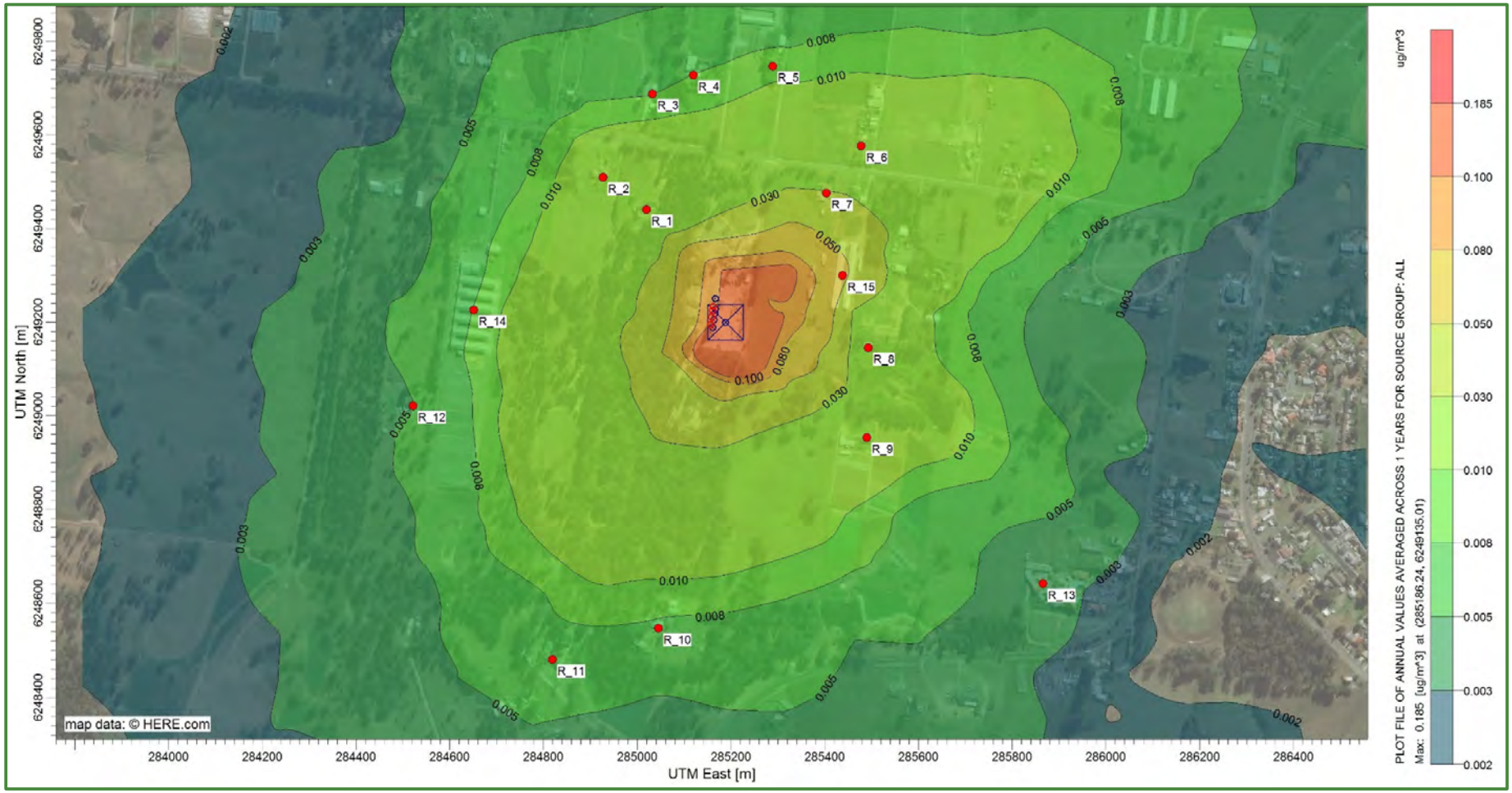


Table 7-4: PM_{10} 24 Hour Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	1.42	62.42 µg/m³	63.84	50 µg/m³
R2	0.96		63.38	
R3	0.56		62.98	
R4	0.61		63.03	
R5	0.80		63.22	
R6	1.17		63.59	
R7	1.85		64.27	
R8	1.75		64.17	
R9	1.18		63.60	
R10	0.61		63.03	
R11	0.63		63.05	
R12	0.59		63.01	
R13	0.40		62.82	
R14	0.64		63.06	
R15	2.62		65.04	

Note: Complies / Non-compliance

Figure 7-4: PM_{10} 24 Hour Averaging Period Modelling Results

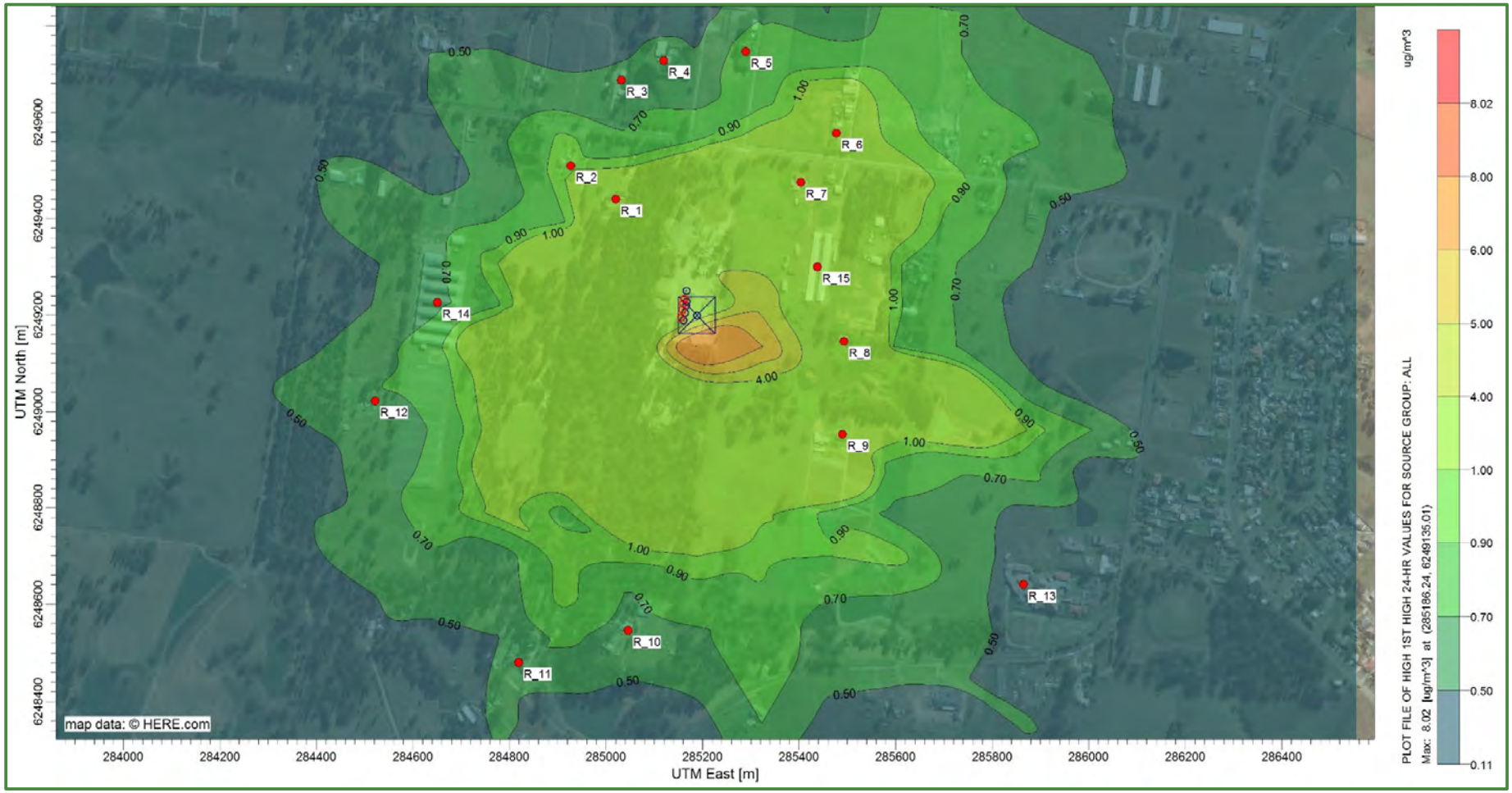
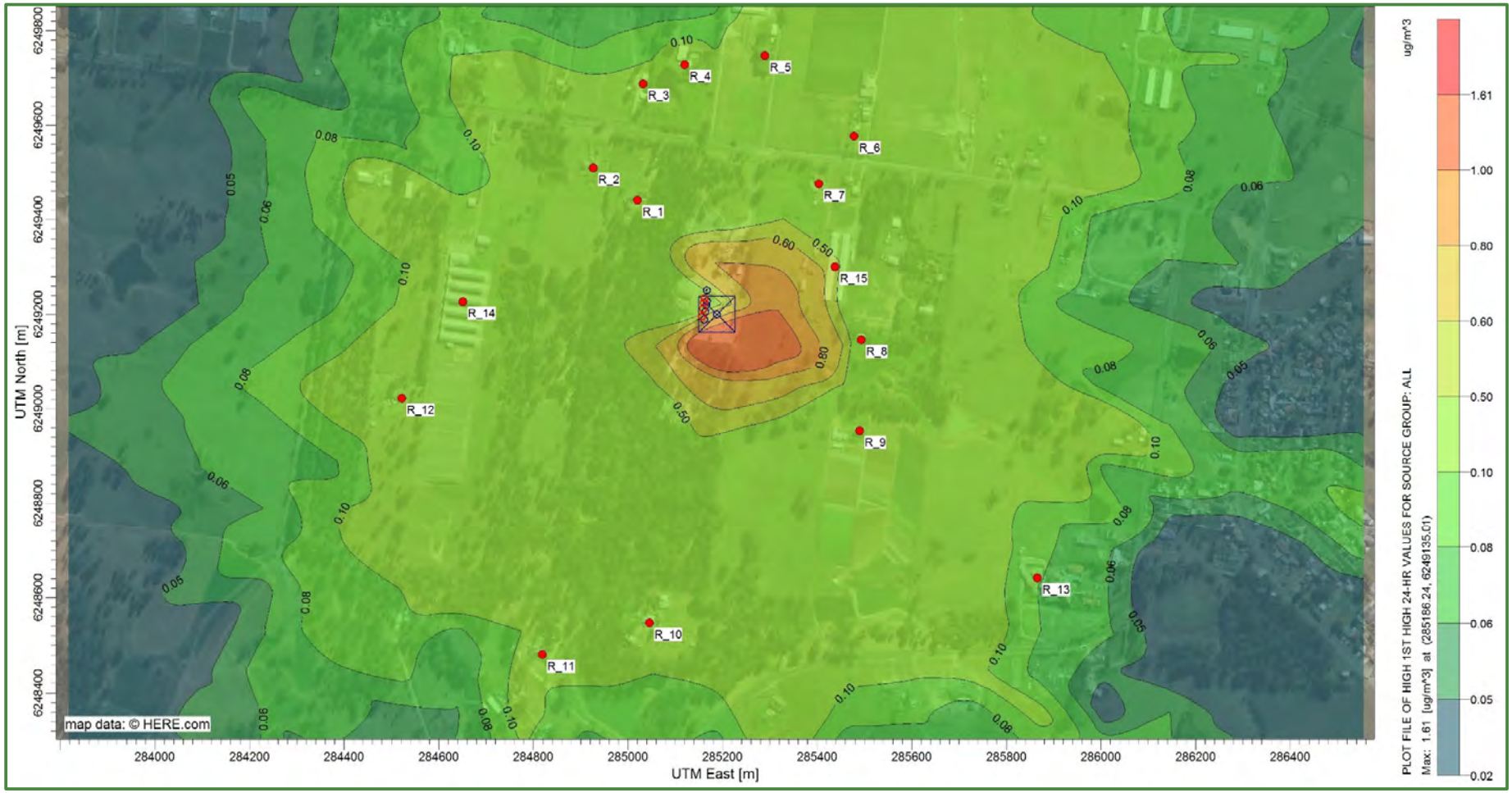


Table 7-5: $PM_{2.5}$ 24 Hour Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.29	24.96 µg/m³	25.25	25 µg/m³
R2	0.20		25.16	
R3	0.11		25.07	
R4	0.12		25.08	
R5	0.16		25.12	
R6	0.24		25.20	
R7	0.38		25.34	
R8	0.36		25.32	
R9	0.24		25.20	
R10	0.12		25.08	
R11	0.13		25.09	
R12	0.12		25.08	
R13	0.08		25.04	
R14	0.13		25.09	
R15	0.53		25.49	

Note: Complies / Non-compliance

Figure 7-5: $PM_{2.5}$ 24 Hour Averaging Period Modelling Results



7.2.2 Predicted Days of Cumulative Exceedance

Due to the high background levels of PM_{10} and $PM_{2.5}$ at the site, the *Approved Methods* require a demonstration that no additional exceedances of the impact assessment criteria will occur as a result of the proposed site activities.

Table 7-6 and Table 7-7 summarise the contemporaneous impact and background of the top eight days of highest background concentrations and the top eight days of highest predicted increment for PM_{10} and $PM_{2.5}$ for the most highly impacted receptor (R15).

Table 7-6: Summary of Top Eight Days of Contemporaneous PM_{10} Impact and Background at Residential Receptor R15 (*Approved Methods* Criterion = 50 µg/m^3)

Date	PM_{10} 24 Hour Average (µg/m^3)			Date	PM_{10} 24 Hour Average (µg/m^3)		
	Highest Background	Predicted Increment	Total		Background	Highest Predicted Increment	Total
06/05/2015	62.42	0.62	63.04	04/06/2015	12.90	2.62	15.52
26/11/2015	34.90	0.04	34.94	22/06/2015	11.00	2.62	13.62
07/10/2015	32.66	0.02	32.68	07/08/2015	8.69	2.30	10.99
22/08/2015	32.36	0.04	32.40	29/08/2015	9.66	2.27	11.93
27/11/2015	31.90	0.38	32.28	12/09/2015	14.84	2.17	17.01
21/08/2015	31.48	0.51	31.99	06/04/2015	9.08	2.13	11.21
05/05/2015	31.01	0.20	31.21	03/06/2015	10.49	2.00	12.49
17/10/2015	31.00	0.81	31.81	11/09/2015	15.01	1.97	16.98

✓Complies × Non-compliance

Table 7-7: Summary of Top Eight Days of Contemporaneous $PM_{2.5}$ Impact and Background at Residential Receptor R15 (*Approved Methods* Criterion = 25 µg/m^3)

Date	$PM_{2.5}$ 24 Hour Average (µg/m^3)			Date	$PM_{2.5}$ 24 Hour Average (µg/m^3)		
	Highest Background	Predicted Increment	Total		Background	Highest Predicted Increment	Total
22/08/2015	24.96	0.01	24.97	22/06/2015	7.73	0.53	8.26
21/08/2015	20.70	0.10	20.80	04/06/2015	8.07	0.52	8.59
10/10/2015	17.96	0.05	18.01	07/08/2015	6.46	0.46	6.92
07/06/2015	17.26	0.24	17.50	29/08/2015	9.57	0.45	10.02
05/07/2015	15.34	0.34	15.68	13/09/2015	9.73	0.43	10.16
08/06/2015	14.18	0.05	14.23	06/04/2015	9.08	0.43	9.51
17/10/2015	13.50	0.16	13.66	03/06/2015	5.82	0.41	6.23
20/08/2015	13.37	0.12	13.49	11/09/2015	5.80	0.40	6.20

✓Complies × Non-compliance

8. DISCUSSION OF MODELLING RESULTS

Annual TSP, PM_{10} and $PM_{2.5}$ emissions at all receptors are predicted to comply with the *Approved Methods* criterion.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$ exceeded the relevant criteria. The background concentrations for PM_{10} and $PM_{2.5}$ for 24 hour averaging periods are considered elevated, with levels of at 24.96 µg/m^3 and 62.42 µg/m^3 respectively in comparison to the *Approved Methods* criteria of 25 µg/m^3 and 50 µg/m^3.

In cases of elevated background concentrations, the NSW EPA requires a demonstration that no additional exceedances of the impact assessment criteria will occur as a result of the proposed site activities.

Contemporaneous addition of the predicted daily increments of PM_{10} and $PM_{2.5}$ with daily measured background levels for 2015 showed no additional exceedances due to proposed site activities.

With the proposed site activities and dust controls in place, it is considered that emissions to air from the site's operation are unlikely to cause harm to health or the environment.

9. STATEMENT OF POTENTIAL AIR QUALITY IMPACTS

Annual TSP, PM_{10} and $PM_{2.5}$ emissions at all receptors are predicted to comply with the *Approved Methods* criterion.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$ exceeded the relevant criteria. The background concentrations for PM_{10} and $PM_{2.5}$ for 24 hour averaging periods are considered elevated, with levels of at 24.96 µg/m^3 and 62.42 µg/m^3 respectively in comparison to the *Approved Methods* criteria of 25 µg/m^3 and 50 µg/m^3.

However, contemporaneous addition of the predicted daily increments of PM_{10} and $PM_{2.5}$ with daily measured background levels for 2015 showed no additional exceedances due to proposed site activities.

Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

Kate Barker
Environmental Scientist

R T Benbow
Principal Consultant

10. REFERENCES

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11. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

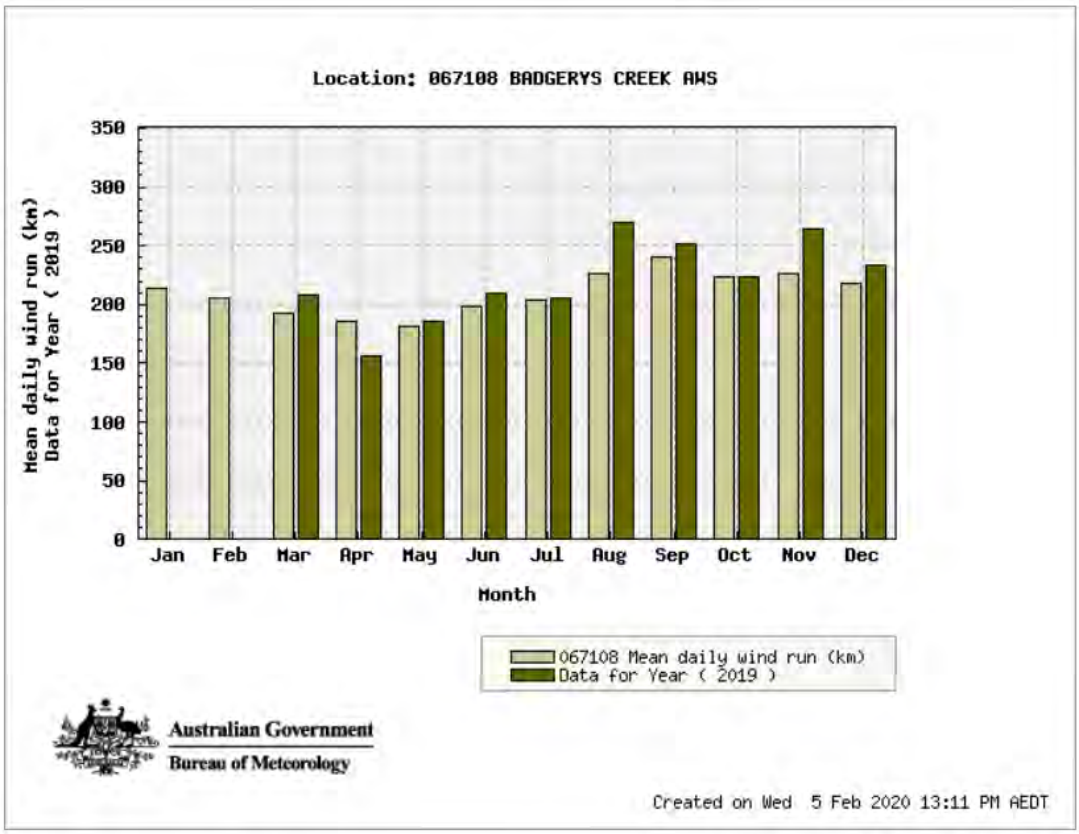
This report has been prepared solely for the use of Greenfields Resource Recovery Facility and as per our agreement for providing environmental services. Only Greenfields Resource Recovery Facility is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

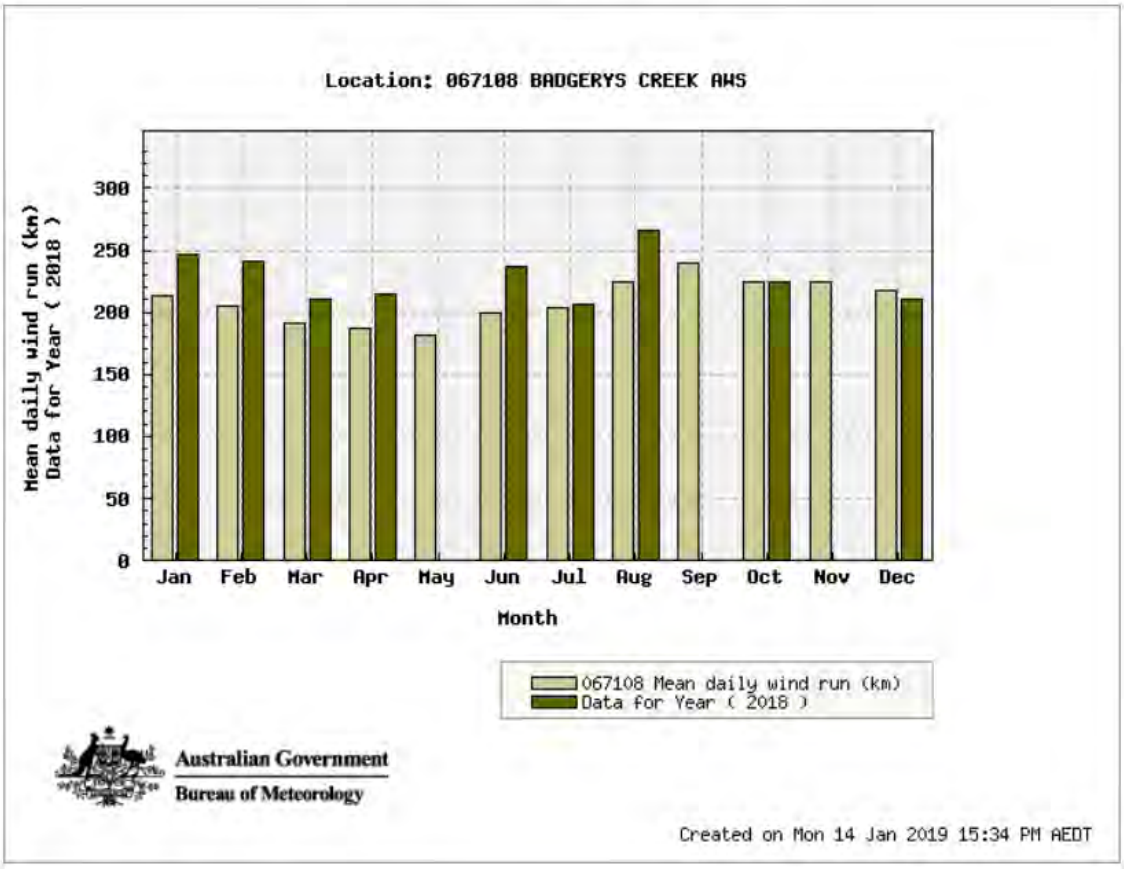
Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Greenfields Resource Recovery Facility for the purposes of preparing this report.

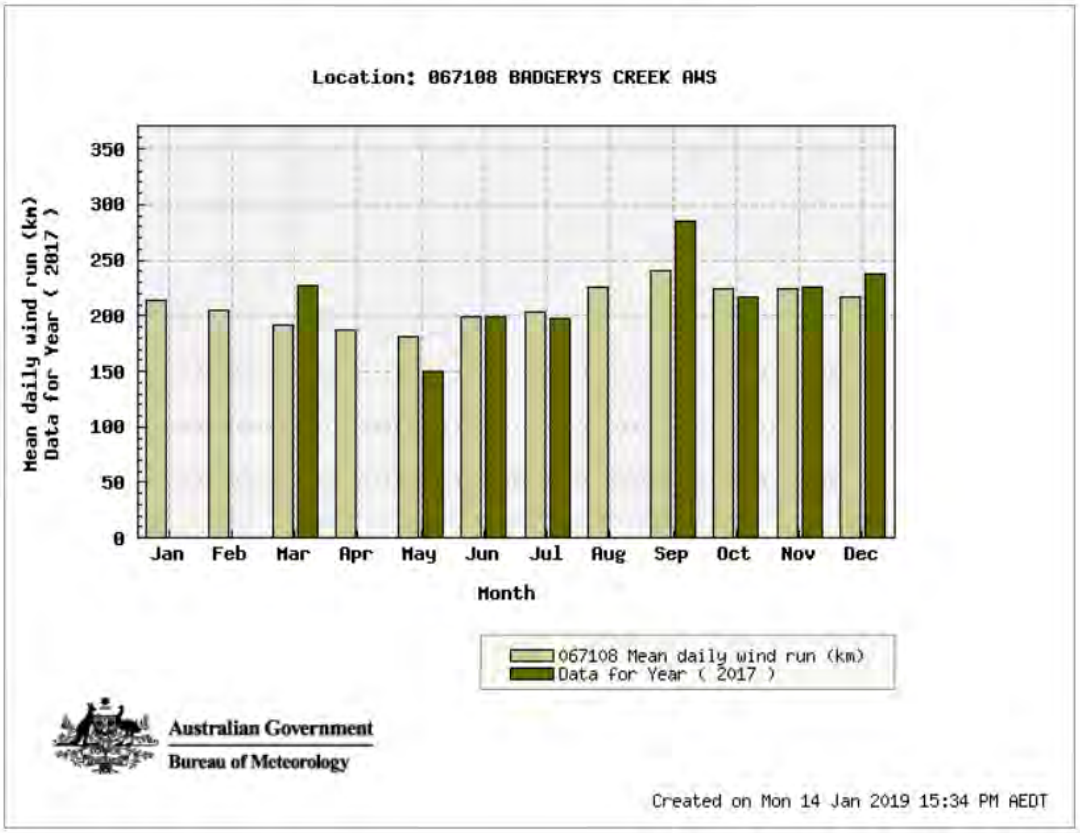
Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

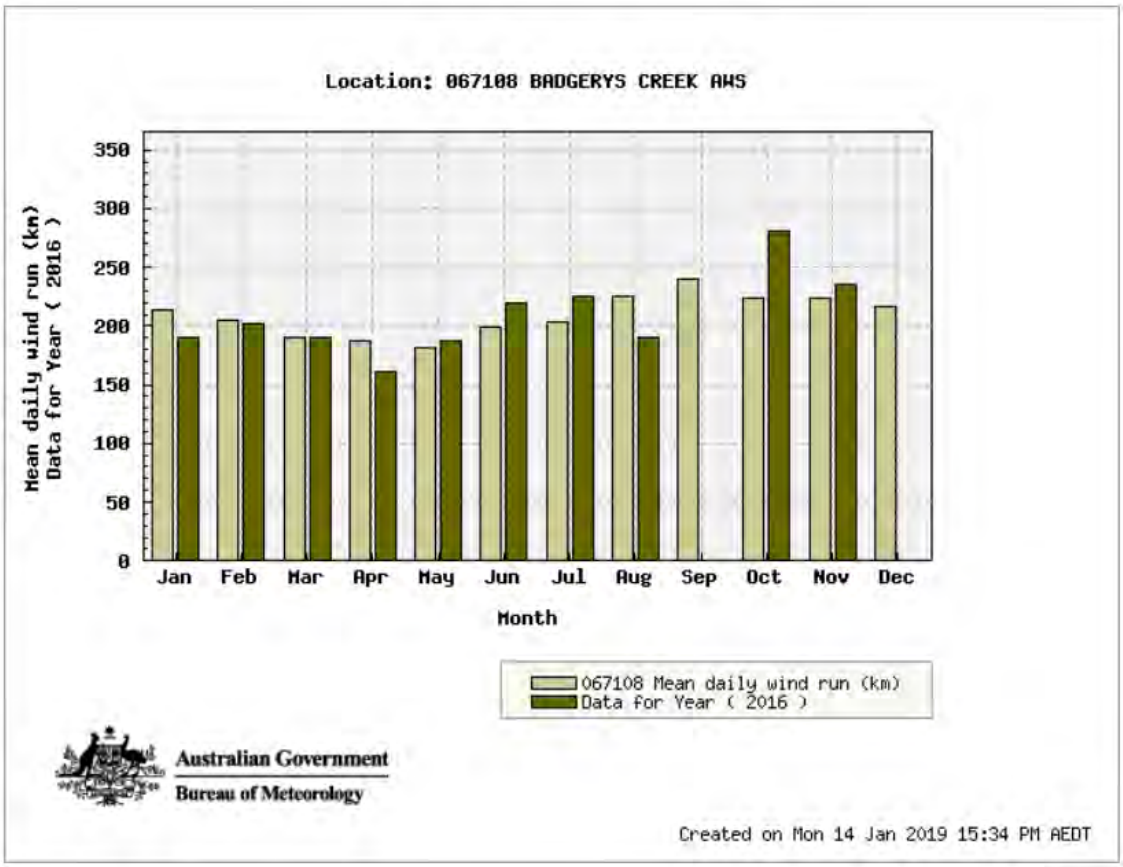
ATTACHMENTS

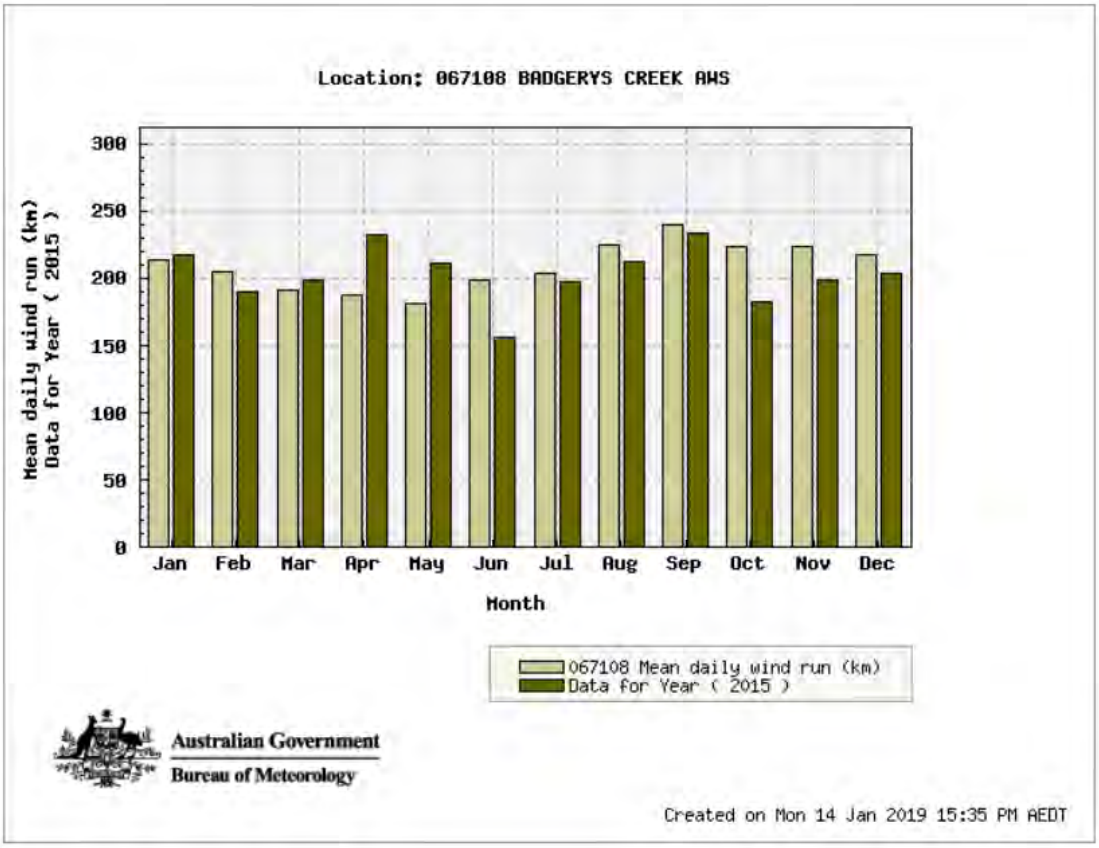
Attachment 1: Long-term Climate Statistics for the Referenced Meteorological Station – Badgerys Creek, Bureau of Meteorology

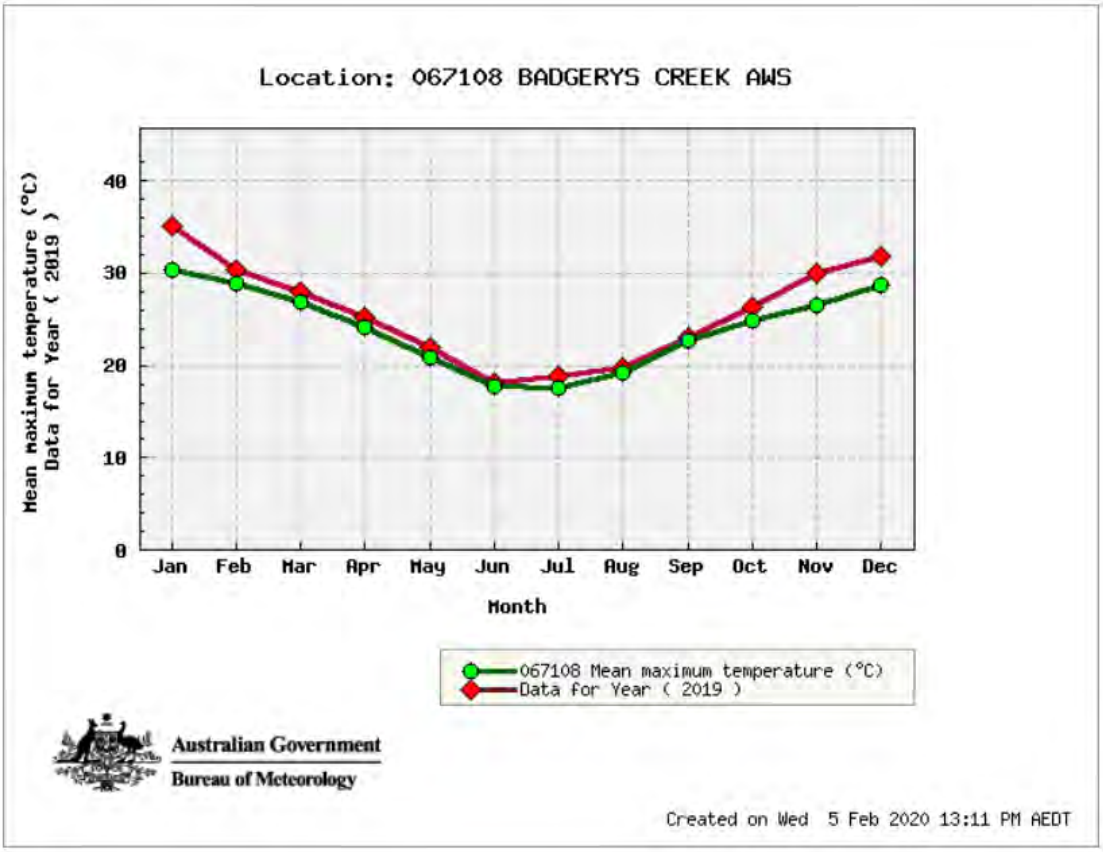


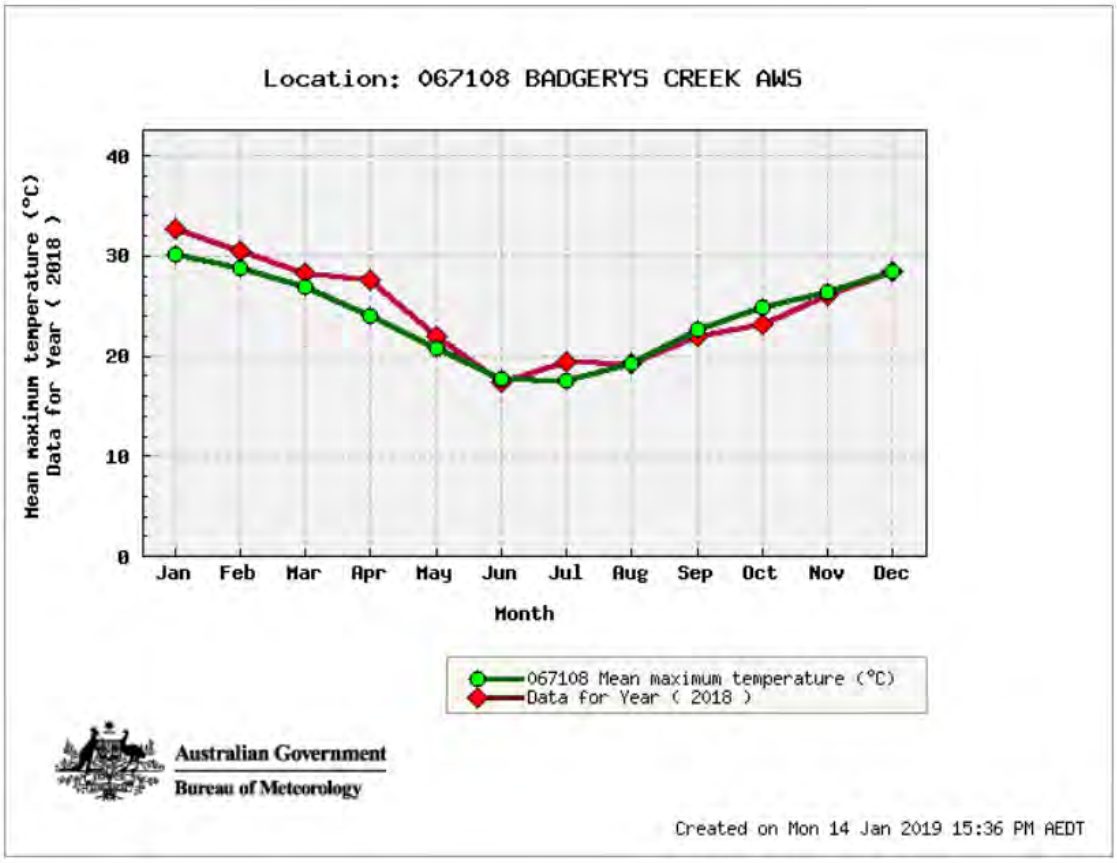


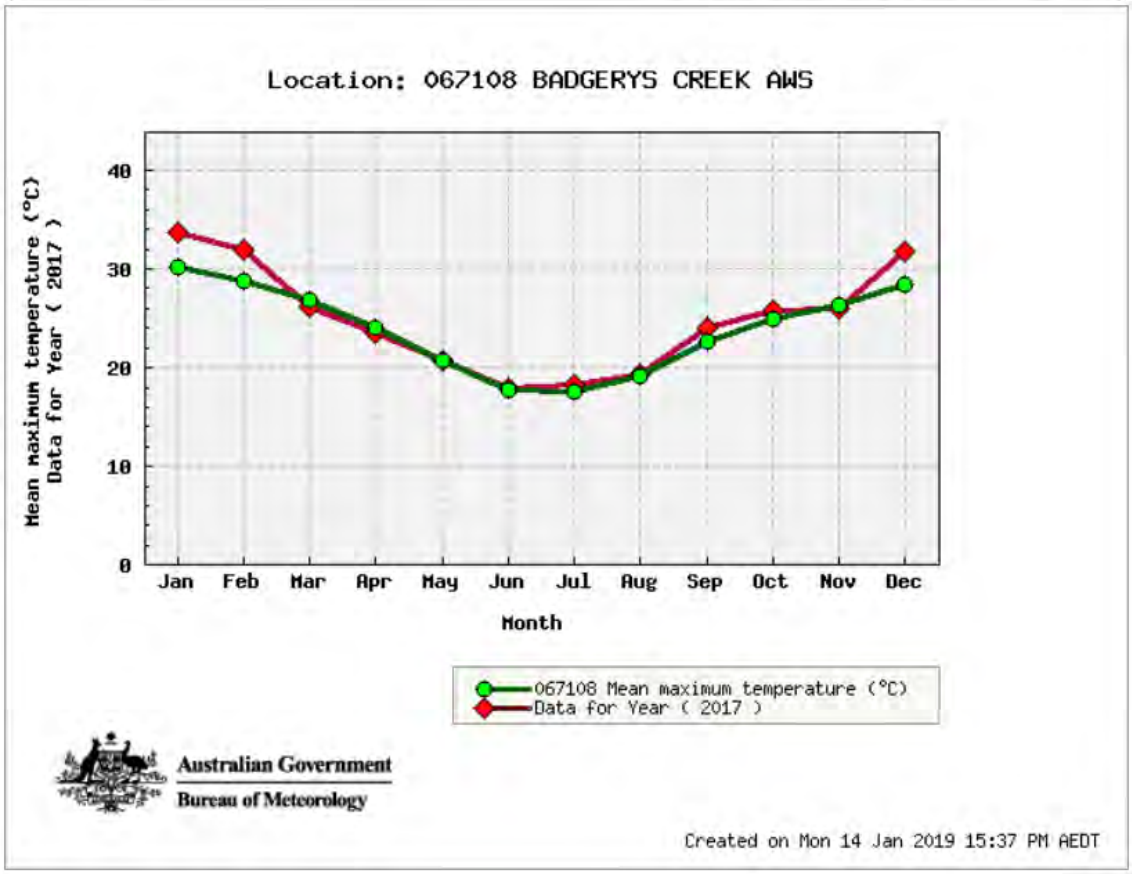


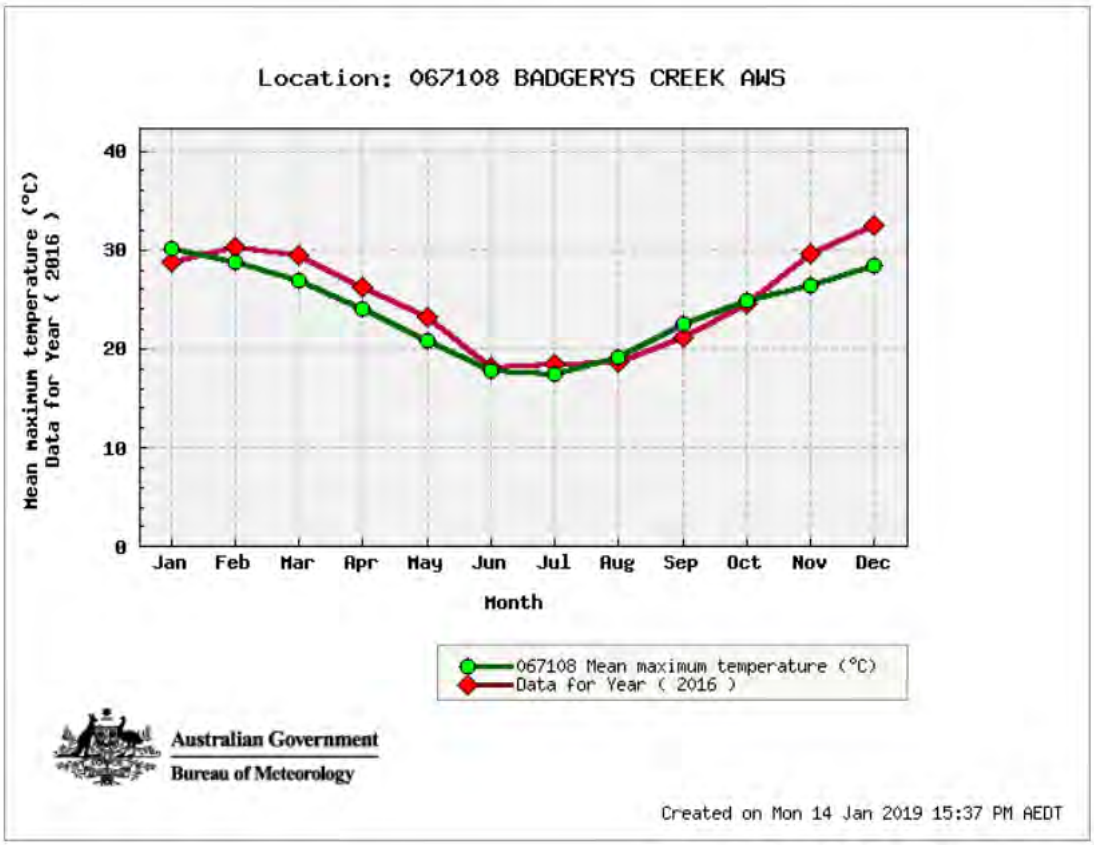


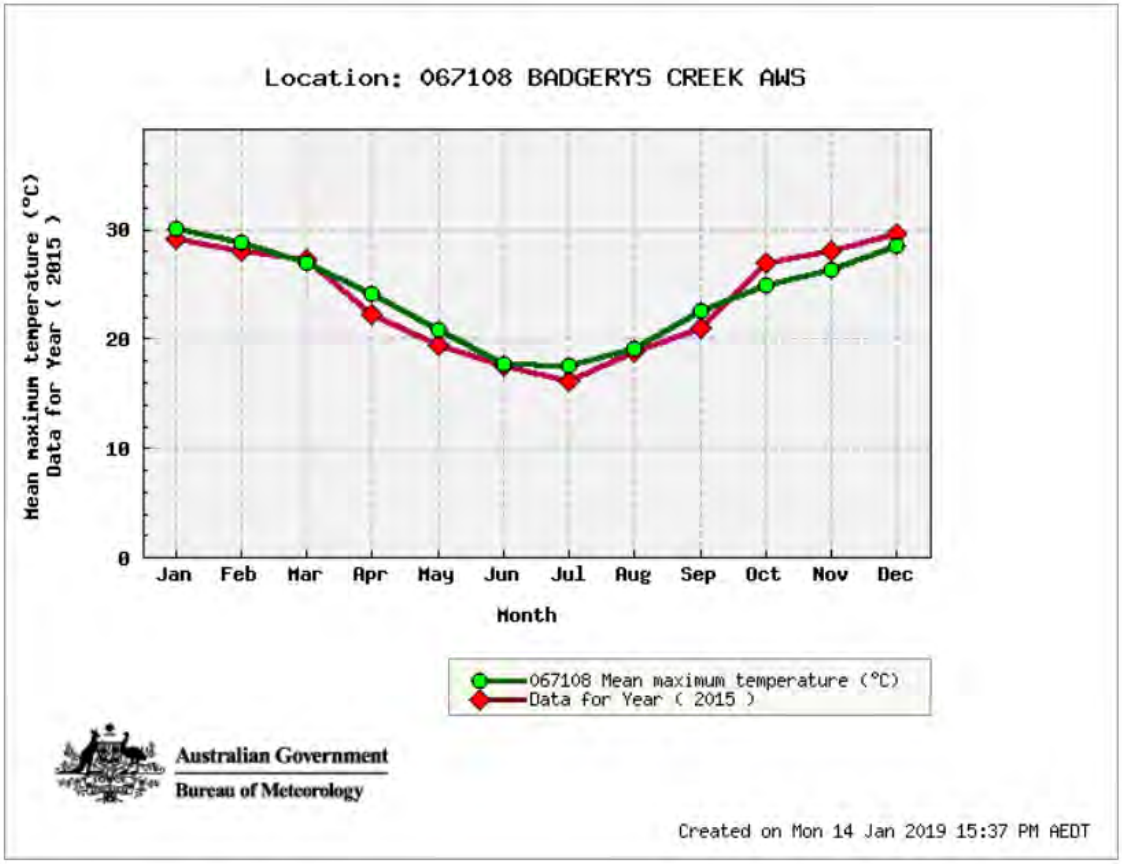


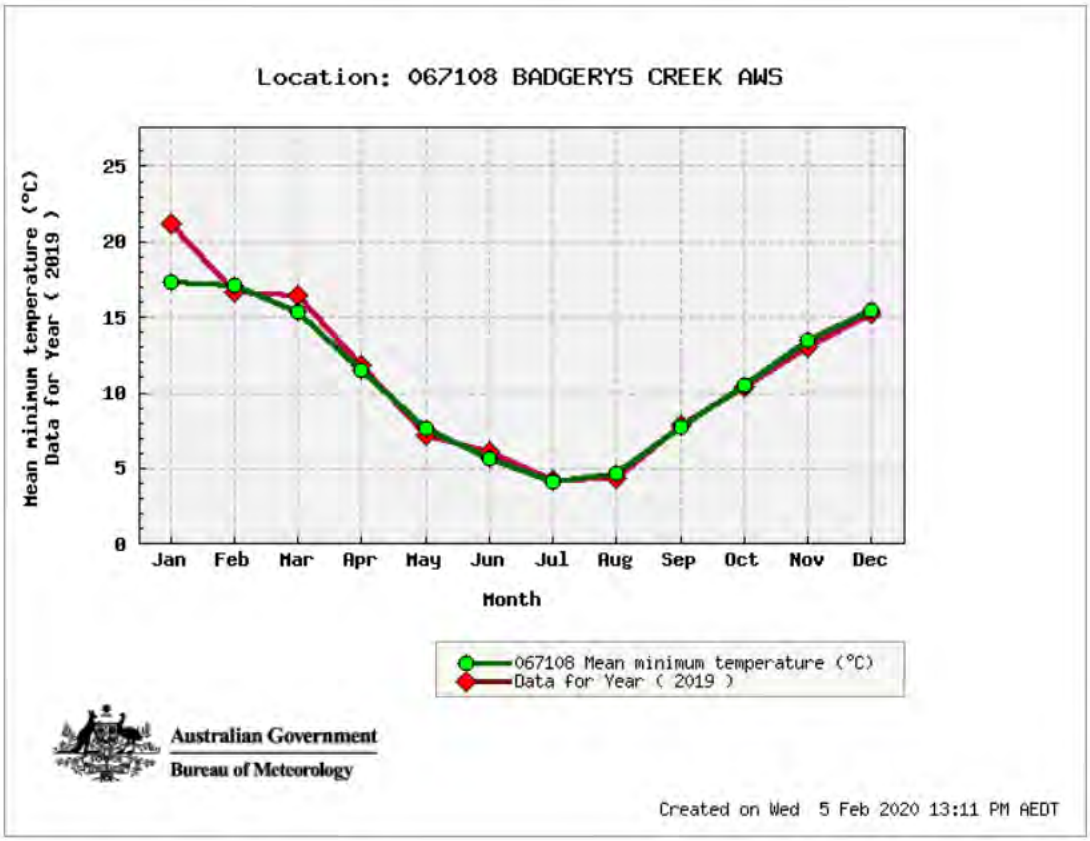


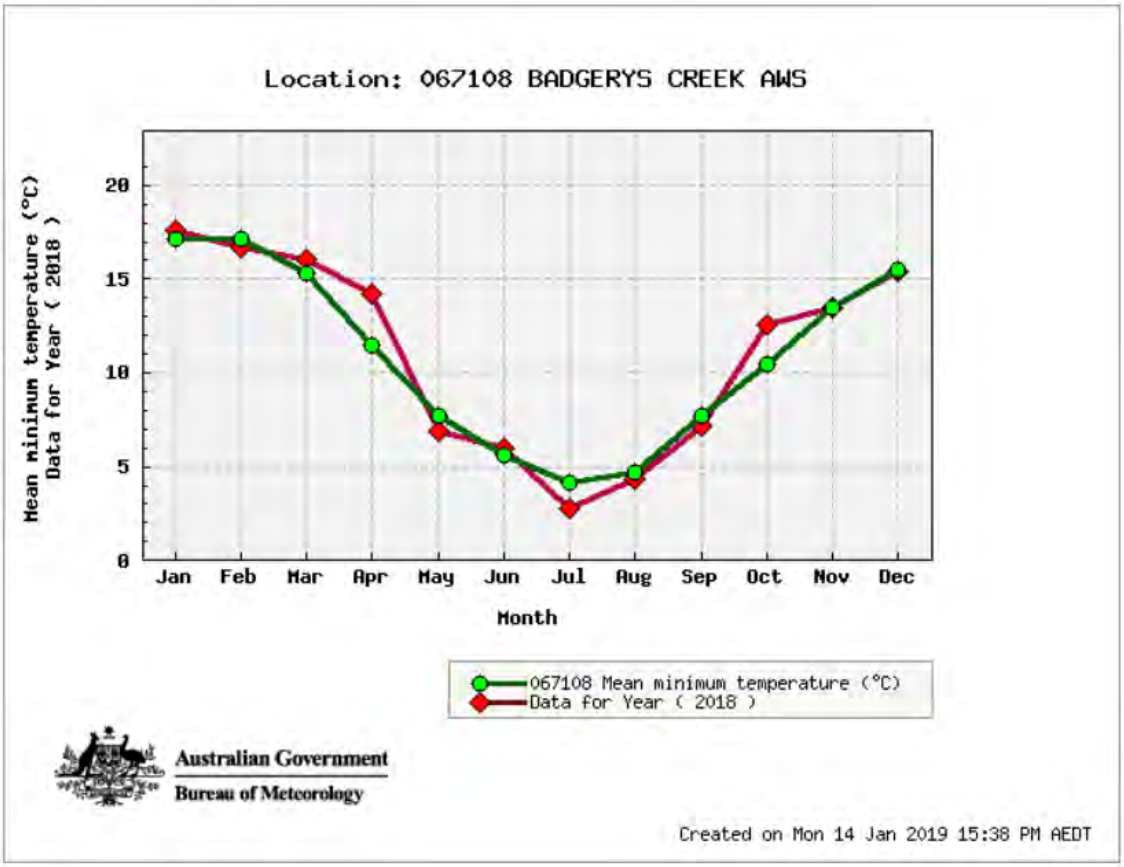


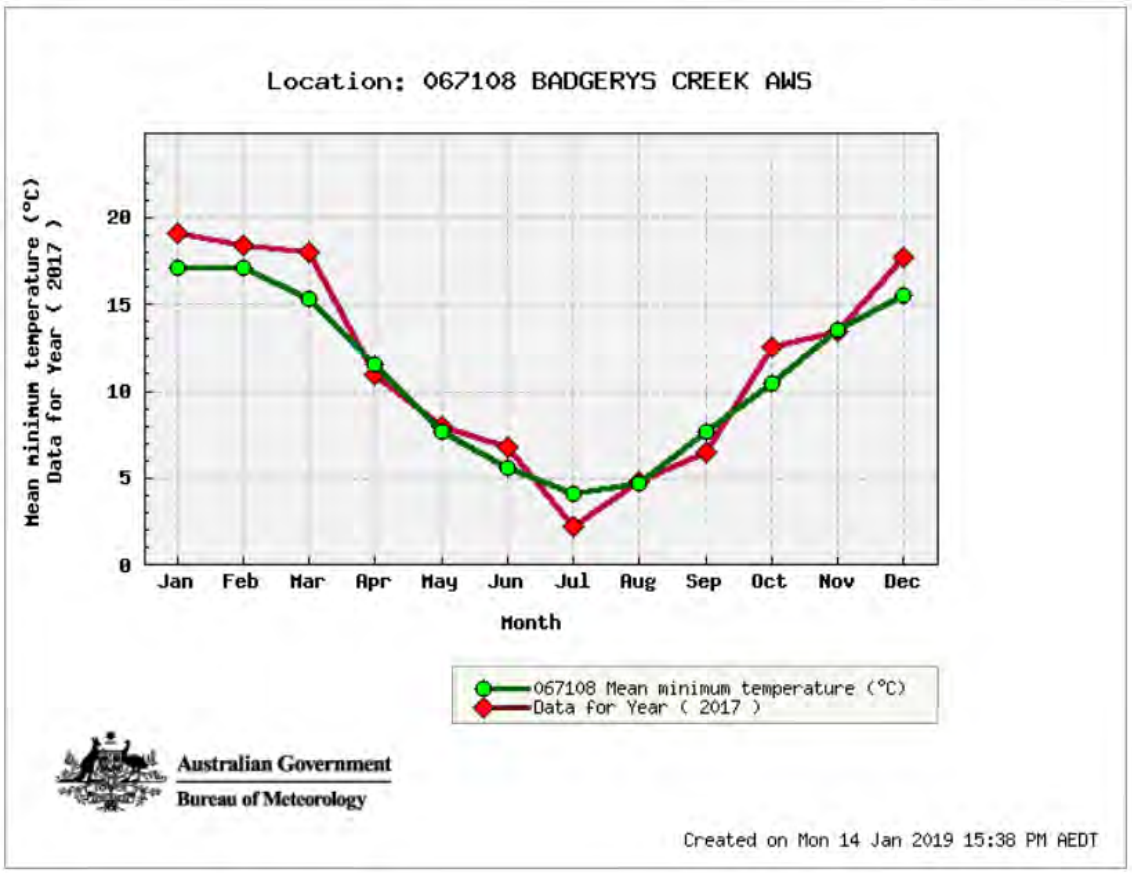


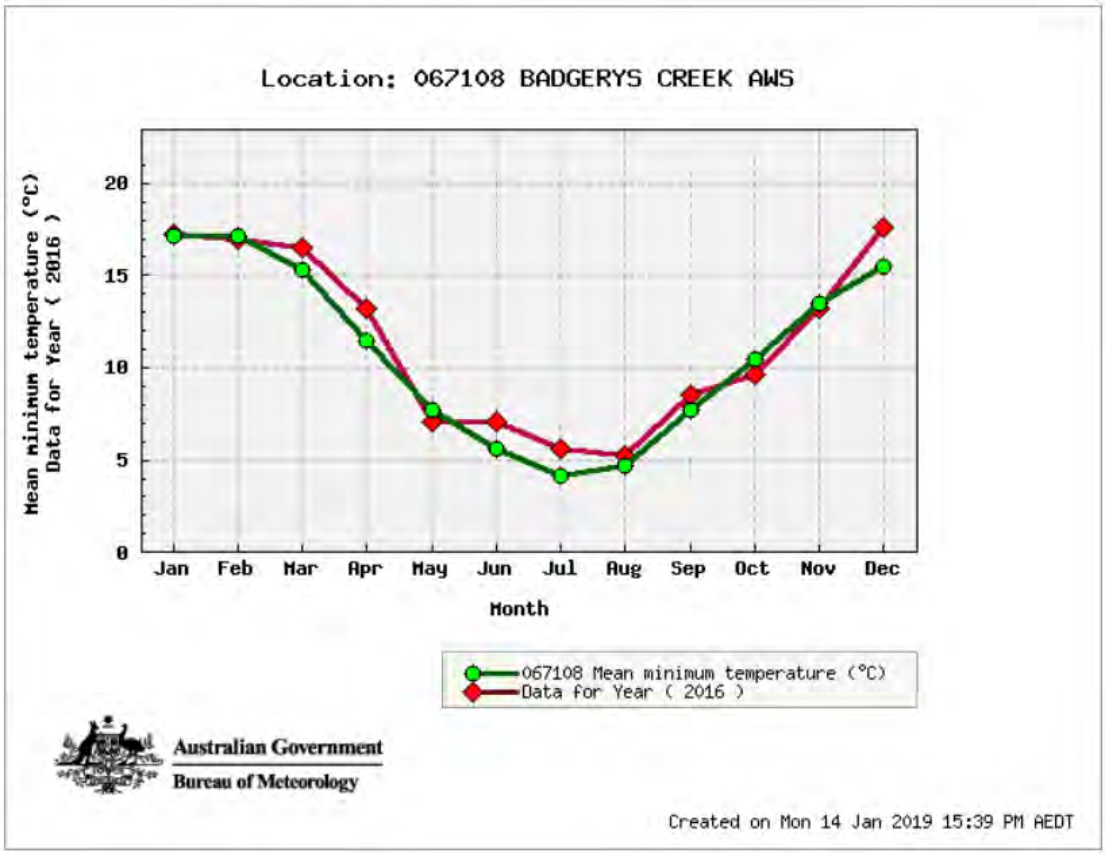


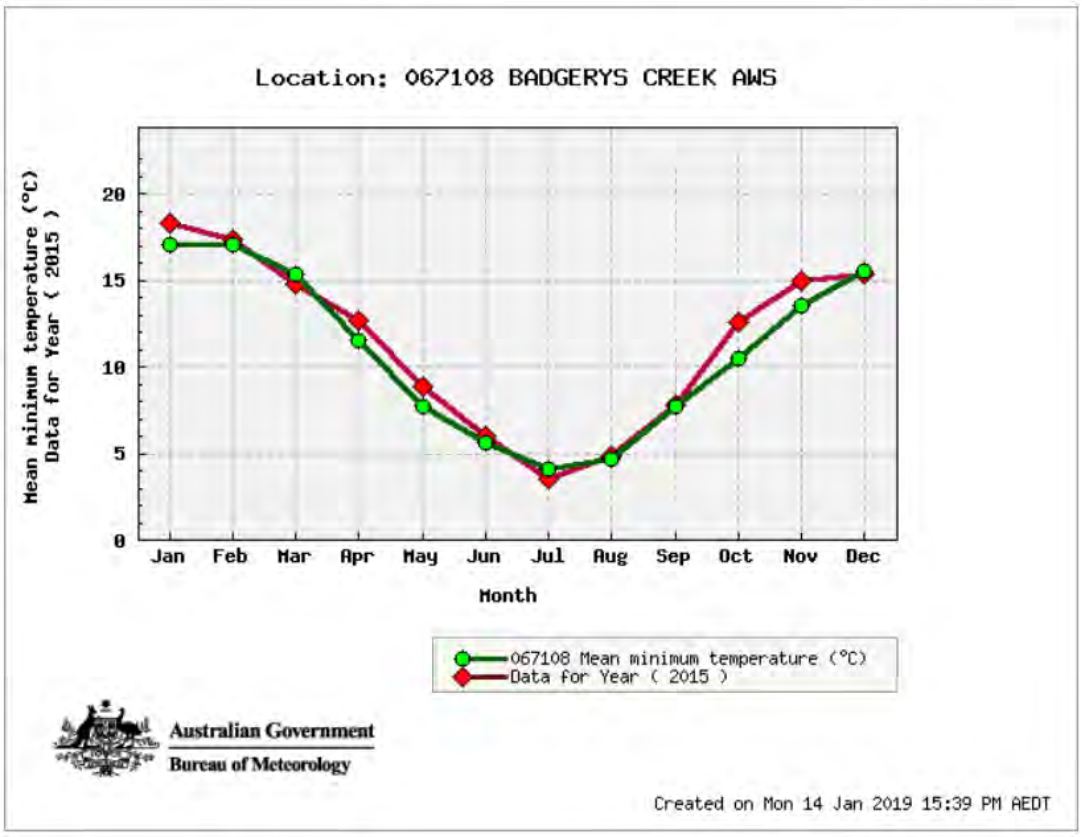


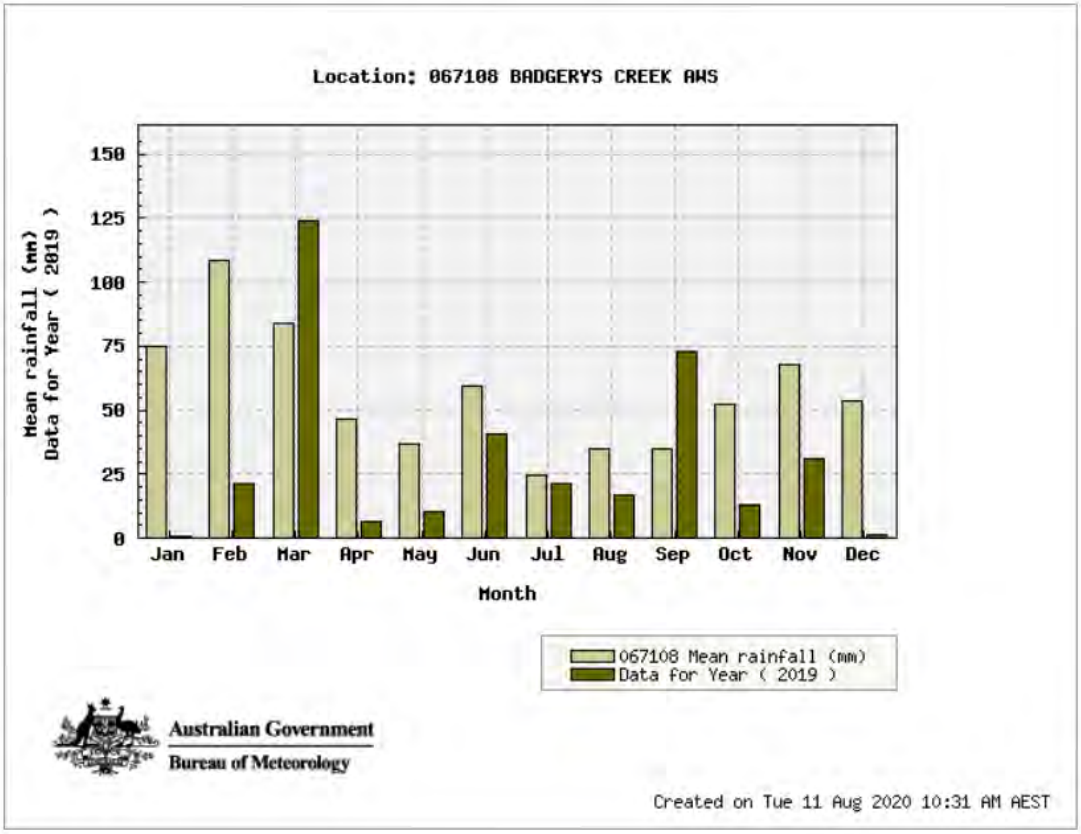


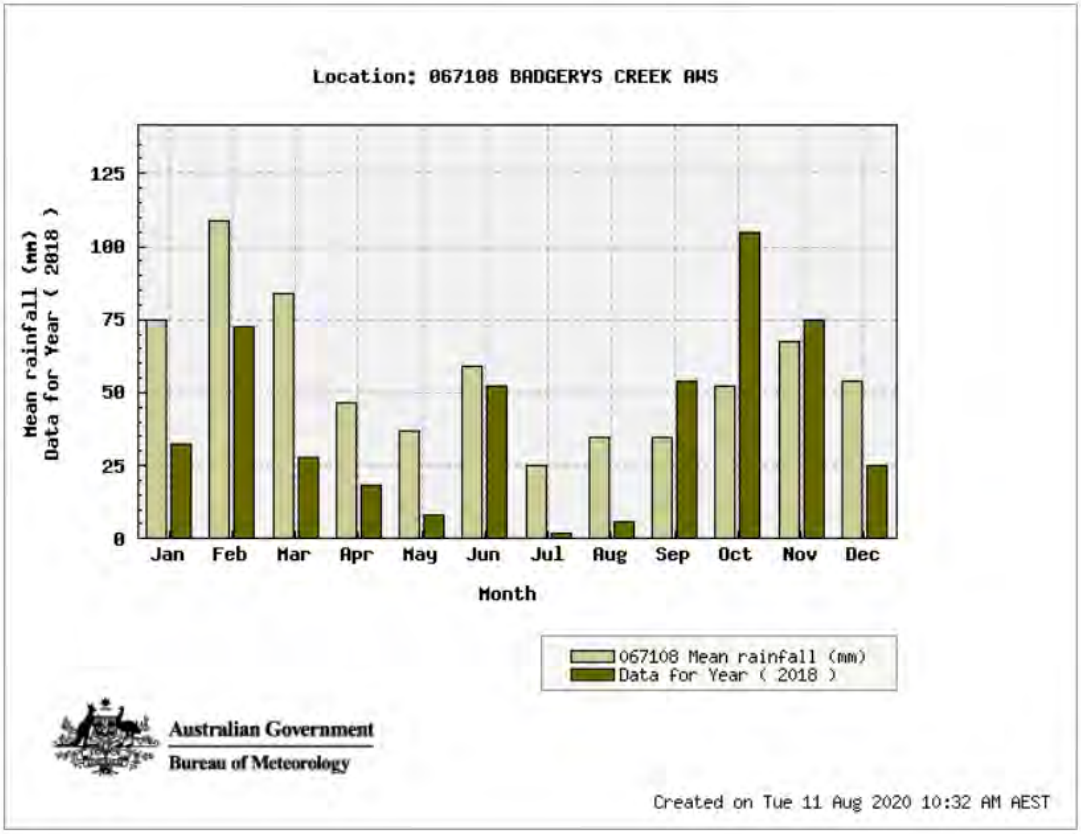


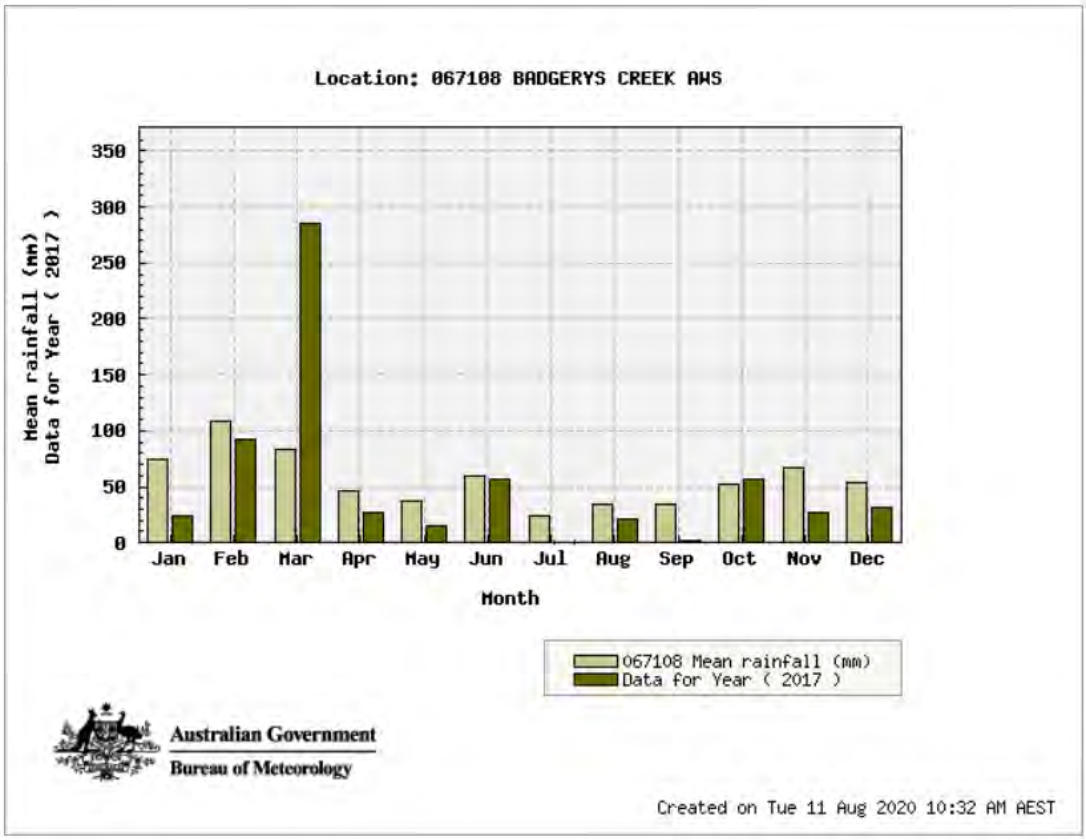


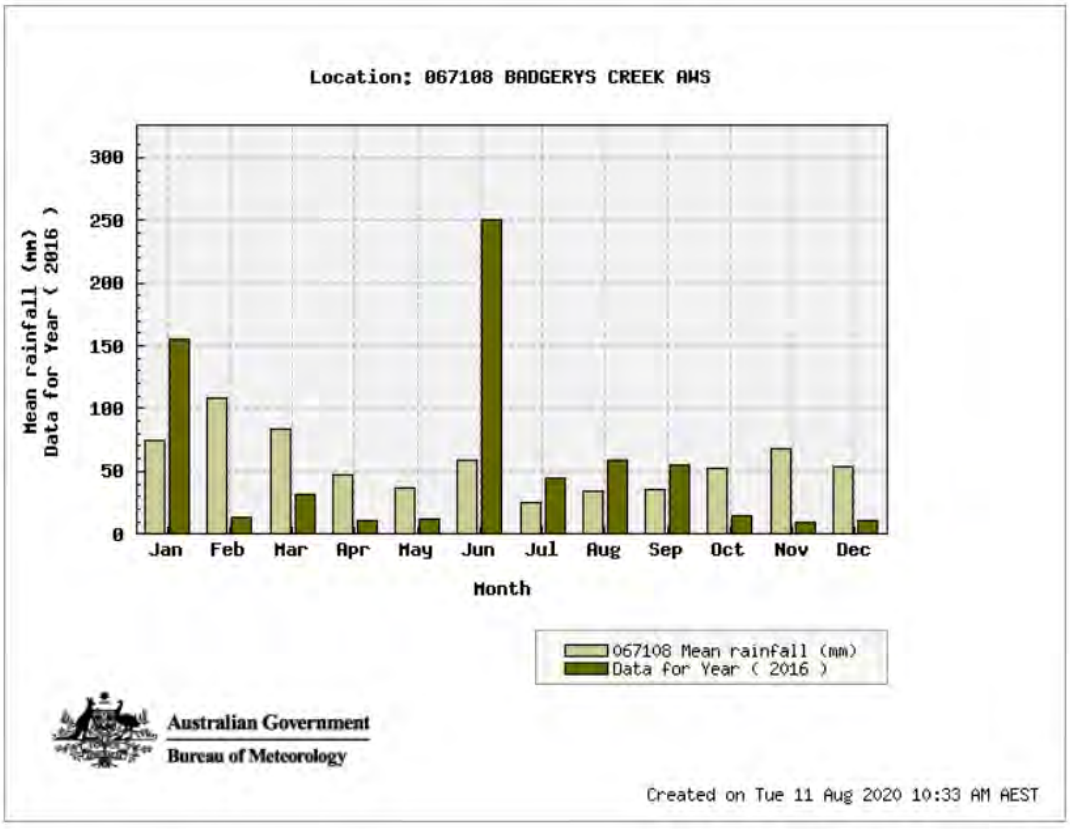


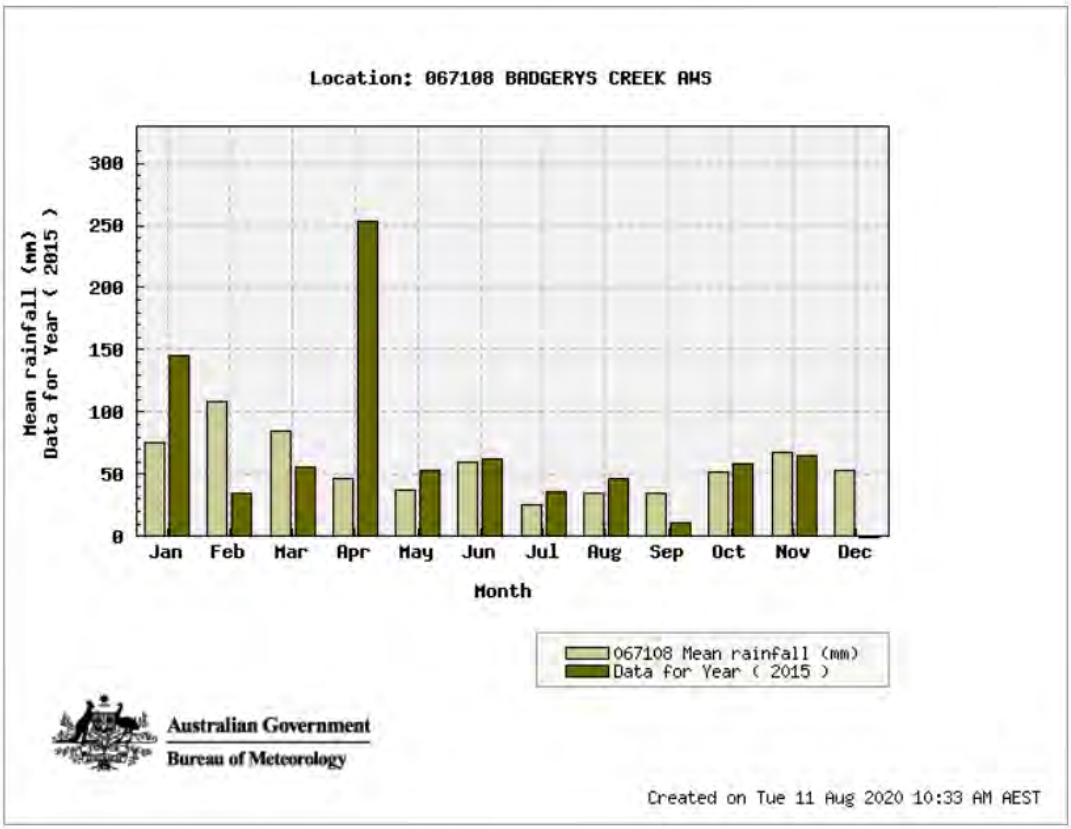












EIS Appendix 10: Limited Phase II Environmental Site Assessment & Additional Sampling and Testing Report

LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT
PREPARED FOR
344 PARK ROAD, WALLACIA NSW 2745

Prepared for: Ellie Barikhan, Site Owner
Carlo Ranieri, Carlo Ranieri and Associates Pty Ltd

Prepared by: Matthew Taylor, Environmental Scientist
R T Benbow, Principal Consultant

Report No: 191318_Phase II_Rev3
May 2020
(Released: 7 May 2020)

Benbow ENVIRONMENTAL

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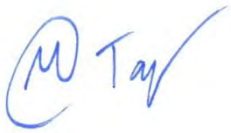
Matthew Taylor	Environmental Scientist		07 May 2020
Reviewed by:	**Position:**	**Signature:**	**Date:**
Emma Hansma	Senior Engineer		07 May 2020
Linda Zanotto	Senior Environmental Engineer		07 May 2020
Approved by:	**Position:**	**Signature:**	**Date:**
R T Benbow	Principal Consultant		07 May 2020

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2	25-3-2020	Rev2	L Zanotto/E Hansma	R T Benbow
3	7-5-2020	Rev3	L Zanotto/E Hansma	R T Benbow

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1	18-3-2020	Ellie Barikhan, Site Owner Carlo Ranieri	Benbow Environmental
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3	7-5-2020	Ellie Barikhan, Site Owner Carlo Ranieri	Benbow Environmental

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EXECUTIVE SUMMARY

This report presents a Limited Phase II Environmental Site Assessment (ESA) for the site located at 344 Park Road, Wallacia NSW 2745.

The assessment is in support of an Environmental Impact Statement (EIS) being undertaken for the installation and operation of a resource recovery facility on site. This report has been prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (OEH August 2011).

The NEPM Assessment of Site Contamination (NEPC, 1999) amended 2013, was also referenced for the undertaking of the assessment as it constitutes the most updated tool for consultants in undertaking assessments on contaminated lands.

A review of all available relevant, current and historical documents has been carried out in order to gain a comprehensive understanding of the history of the site.

A conceptual site model has been developed for the site indicating the potential sources of contamination, contaminants of concern, potentially impacted media and exposure pathways for human and environmental receptors.

In addition, waste classification of the stockpiled materials was undertaken to determine whether the material can be classified as Excavated Natural Material (ENM) under the Excavated Natural Material Exemption 2014.

The findings of this Limited Phase II ESA are summarised below:

- Hazardous materials or potentially contaminating substances were not observed during the site visit or soil sampling conducted on 3rd March 2020;
- Inspection of the sites structures, grounds, stockpiles, storage and waterbodies yielded no hazardous material presence;
- Results of seven (7) soil samples conducted on the stockpiled materials (2,000 – 3,000 T) from the eastern perimeter were well under *The Excavated Natural Material Order (2014)* criteria. However, due to the presence of sulfidic ores fractionally above the limit of reporting, these materials cannot be classified as Excavated Natural Material (ENM). This material is likely to comply with the NSW EPA *The Recovered Aggregate Order (2014)*. Additional testing will determine whether the material satisfies the requirements under the recovered aggregate order and can be used for purposes listed under the corresponding exemption; and
- Results of four (4) surface soil samples indicate that all tested analytes and contaminants of concern were below the adopted NEPM criteria for the site.

All results from stockpile material and surface soil samples are well below the adopted criteria, and can be considered uncontaminated. Due to the fractional percentage of sulfides found in two (2) samples of the stockpile materials, this soil cannot be classified as ENM. However, it should be noted that the term “presence” of sulfides in this order does not have a reference limit or criteria limit, and its presence has only been dictated by the limit of reporting in the laboratory analysis (0.020 % S). Based on analysis of contaminants in samples collected, this stockpiled material is not contaminated.

Where possible, stockpiled materials may be subjected to the remaining three (3) attributes in *The Recovered Aggregate Order (2014)* to satisfy this order's criteria. Should all samples comply with this order, it may then be applied to land on site as legally prescribed.

The site does not appear to be contaminated or suspected of previous contamination. Further investigations of the site in regards to a Detailed Phase II Contamination Assessment are not considered warranted.

Matthew Taylor
Environmental Scientist

R T Benbow
Principal Consultant

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1. INTRODUCTION

This report presents a Limited Phase II Environmental Site Assessment (ESA) for the site located at 344 Park Road, Wallacia NSW 2745.

The assessment is in support of an Environmental Impact Statement (EIS) being undertaken for the installation and operation of a resource recovery facility on site. This report has been prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (OEH August 2011).

The NEPM Assessment of Site Contamination (NEPC, 1999) amended 2013, was also referenced for the undertaking of the assessment as it constitutes the most updated tool for consultants in undertaking assessments on contaminated lands.

1.1 SCOPE OF WORK

The scope of this assessment extends to the following.

- Undertake a Phase I Preliminary Site Assessment;
- Undertake a site inspection to identify any potential contaminants and areas impacted by contamination;
- Carry out the following:
  - Examine available site layouts;
  - Determine the potential pathways contaminants may take to reach subsoil and groundwater;
  - Land Titles search;
  - Obtain and examine Council records;
  - Examine historical aerial photographs of the site and surrounding area;
- Identify potential contamination and areas of potential contamination from an interpretation of the currently available information;
- Collect soil samples from the stockpiled material for laboratory analysis and classification in line with the NSW EPA *The Excavated Natural Material Order (2014)*;
- Collect surface soil samples for laboratory analysis for a range of contaminants in line with the *National Environmental Protection (Assessment o Site Contamination) Measure (1999)*; and
- Provide recommendations in relation to additional investigations or actions considered necessary.

1.2 RELEVANT LEGISLATION AND GUIDELINES

The Limited Phase II ESA has been carried out in accordance with the following relevant NSW EPA or NSW EPA recognised guidelines:

- Guidelines for Consultants Reporting on Contaminated Sites (DECCW September 2000);
- Guidelines for the NSW Site Auditor Scheme (3rd Edition) (NSW EPA, October 2017);
- Contaminated Land Management Act 1997;
- NSW EPA The Excavated Natural Material Order (2014);
- NSW EPA Waste Classification Guidelines (2014);
- NSW EPA The Recovered Aggregate Order (2014); and

- NEPM Assessment of Site Contamination (NEPC, 1999) amended 2013.

1.3 ASSESSMENT OF ISSUES

This Limited Phase II ESA provides an assessment of the following issues:

- Hazardous materials (asbestos, lead-based paints, radioactive materials, chemicals/fuels etc);
- Air emissions of pollutants;
- Surface water and/or groundwater pollution;
- Potential for soil contamination;
- Pesticide and herbicide usage and/or contamination;
- Stormwater management;
- Electromagnetic fields;
- Potable water sources;
- Historic land use; and
- On site waste.

1.4 PROPOSED DEVELOPMENT

The proposed development involves the construction of a purpose-built industrial building to house the resource recovery facility and development of internal access driveway, car park, hardstand areas on the already disturbed north eastern portion of the site. The existing dwelling will be converted into a site office and a weighbridge would be provided on a sealed and upgraded access driveway from Park Road. Earth mounds around the perimeter of the facility would be landscaped to provide a visual screen and separate the facility from the undisturbed area of the site. A concept plan of the proposed development is provided in Figure 1-1.

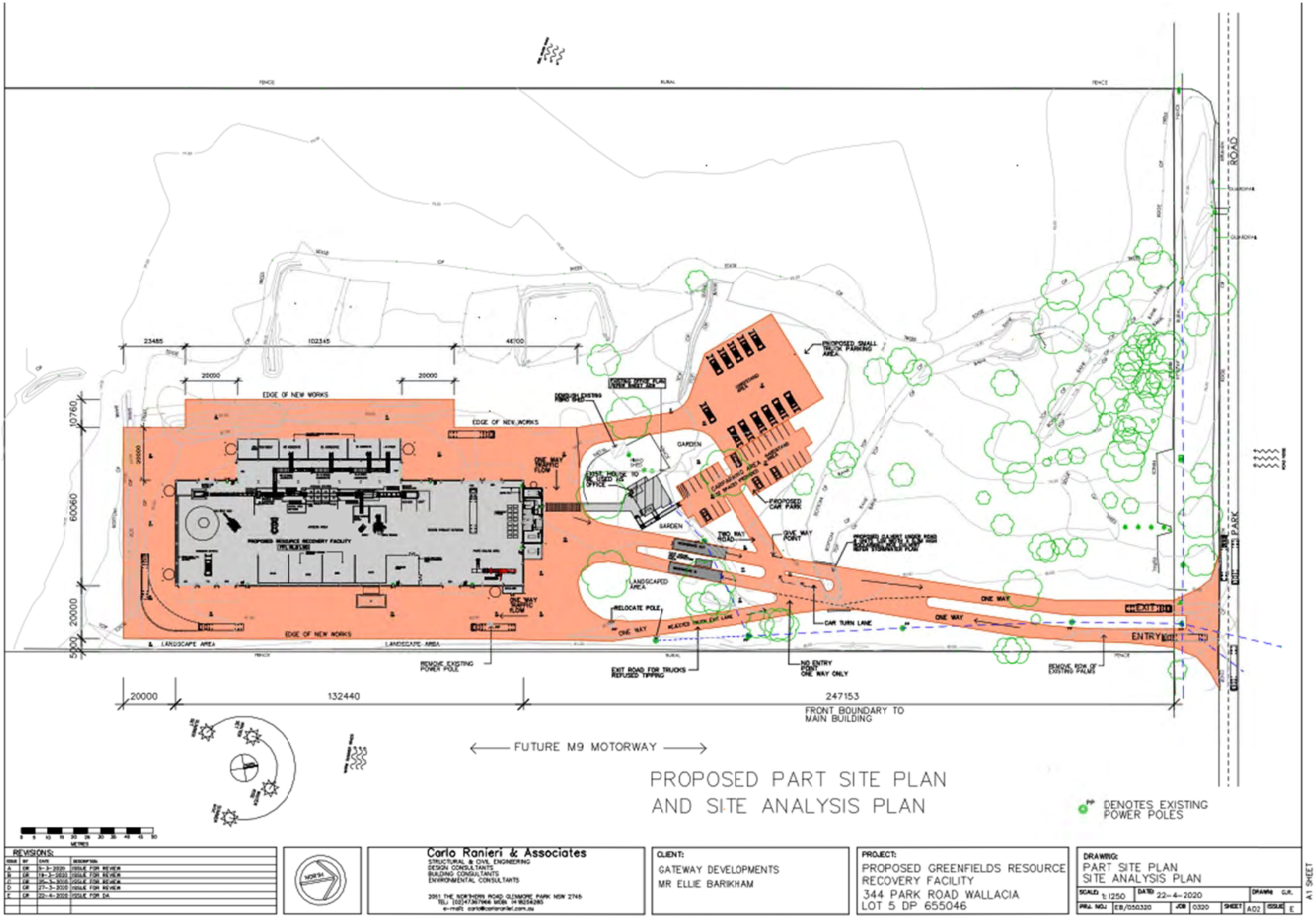
The facility would operate 24 hours 7 days a week and accept up to 95,000 tonnes per year of C&D and C&I waste mainly from the local and Sydney metropolitan area. This waste would be separated to generate a range of materials mainly for use in the construction industry and civil works. Due to the quantity of waste to be processed and stored, the facility will require an Environment Protection Licence.

Resource recovery activities would include the following:

1. The incoming material will be inspection and initially separated.
2. Infeed hopper.
3. Conveyor system with an electrical magnet for the removal of steel.
4. Waste screen to separate small heavy fraction from large light fractions.
5. Picking station to sorting various recyclable materials, Cardboard, Wood, Plastic, Etc.
6. Various other screens for further separation.
7. Air Separation.
8. Baling and storage.
9. Transfer of resource recovered materials.

Previous use of the site has resulted in a stockpile of fill material of unknown origin located within the cleared area of the site. This material is thought to be excavated natural material (ENM) however no certificates accompany this material. Therefore, sampling and testing was performed as part of this assessment to determine whether the material is ENM and if so, this material will be used on site as part of the proposed development for landscaping areas and the sandstone and shale base will be shaped to suit the building and road works.

Figure 1-1: Proposed development concept plan



2. SITE IDENTIFICATION

Site identification information and land use is summarised in the table below.

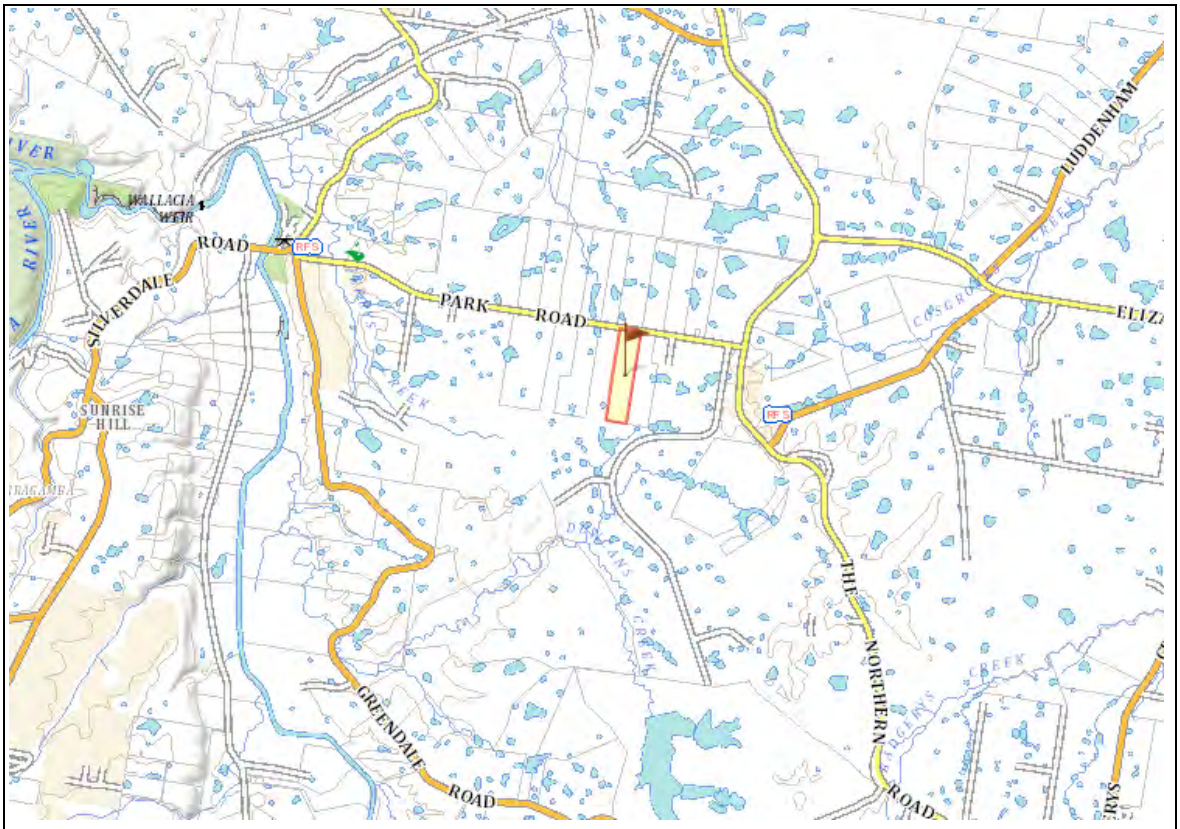
Table 2-1: Site Identification

Lot and DP Numbers (Address)	Lot 5 DP 655046 (344 Park Road, Wallacia NSW 2745)
Approximate Site Area	200,200 m^2
Local Government Area	Penrith City Council
Current Land Zoning	RU1 – Primary Production

The site location is presented as Figure 2-1 and an aerial photograph of the site displaying the lot boundaries is shown as Figure 2-2.

The drawing from Penrith City Council Local Environmental Plan 2010 shows the land use zoning of this area and is presented in Figure 2-3.

Figure 2-1: Site Location



Source: Six Maps 2020

↑N Not to scale	LEGEND: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Aerial Photograph of the Site – Lot Boundaries

Source: SixMaps 2020

↑N Not to scale	LEGEND: Site boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-3: Penrith Local Environmental Plan 2010 Land Zoning Map (extract)

Source: Land Zoning Map - Sheet LZN_008

N

Not to scale

LEGEND:

Site boundaries

Zone

B1	Neighbourhood Centre
B2	Local Centre
B3	Commercial Core
B4	Mixed Use
B5	Business development
B6	Enterprise Corridor
E1	National Parks and Nature Reserves
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
R4	High Density Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU1	Primary Production
RU2	Rural Landscape
RU4	Primary Production Small Lots
RU5	Village
SP1	Special Activities
SP2	Infrastructure
SP3	Tourist
W1	Natural Waterways
W2	Recreational Waterways
DM	Deferred Matter
WSEA	SEPP (Western Sydney Employment Area) 2009
SM	SREP No. 30 - St Marys

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

3. REGIONAL AND LOCAL GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

3.1 SOIL CLASSIFICATION AND GEOLOGY

The 'Penrith 1:100 000 Geological Map Sheet 9030' describes the geological composition of the area as follows:

> *Wianamatta Group, Bringelly Shale (Rwb) – Shale, carbonaceous claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff*

The soil map 'Soil Landscapes of the Penrith 1:100,000 Sheet 9030' shows that the subject site is located in the 'Blacktown' (bt) area and is described as follows:

Blacktown (bt)

> *Landscape – gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes are usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest).*
>
> *Soils – shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, Red and Brown Podzolic Soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to Yellow Podzolic Soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.*
>
> *Limitations – moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.*

3.2 ACID SULFATE SOILS (ASS)

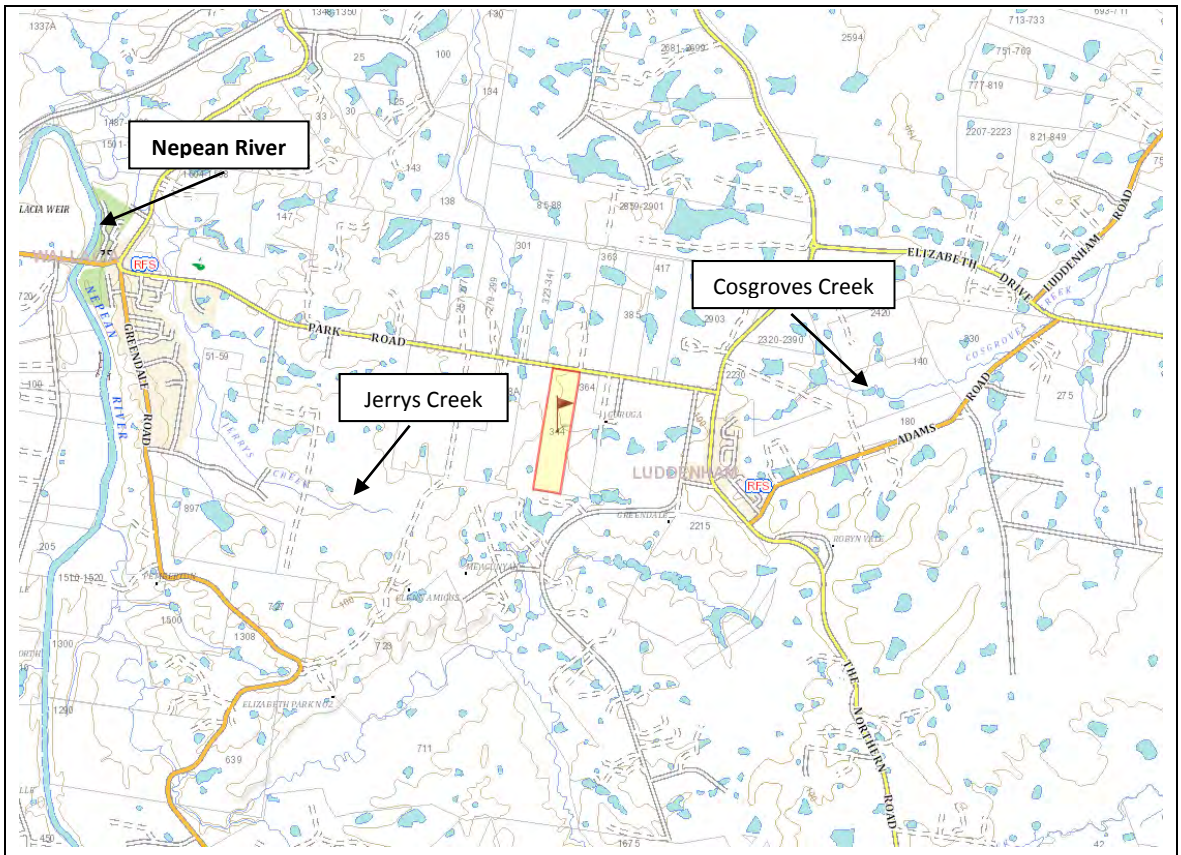
Information on the SEED (Sharing and Enabling Environmental Data) Map Viewer of Acid Sulfate Soils Risk and the NSW Planning Portal show that the subject site is not on any class of acid sulfate soils. ASS are not expected on site.

3.3 SURFACE HYDROLOGY AND LOCAL HYDROGEOLOGY

A small ephemeral watercourse is located south-west of the cleared portion of the site and traverses the site. The nearest water course to the site is Jerrys Creek, approximately 1.13 km west-southwest of the site perimeter. Cosgroves Creek is approximately 1.93 km east. Both creeks are at the extent of their tributaries. Jerrys Creek runs approximately 3.82 km north-west until it joins the Nepean River in Wallacia. Cosgroves Creek runs north-east for approximately 10.36 km before joining South Creek in Luddenham.

Numerous small-medium sized dams occupy neighbouring properties.

Figure 3-1: Nearest waterways to the site



Source: Six Maps 2020

↑N Not to scale	LEGEND: Site Boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

3.3.1 Groundwater Bore Search

A search was undertaken in order to identify registered groundwater bores located within a 1000 metre radius from the site's centre, using the Australian Groundwater Explorer by the Australian Bureau of Meteorology and the groundwater monitoring overview map by the NSW Office of Water.

According to these resources, there is one (1) groundwater monitoring bore within 1000 m of the subject site. A summary of information available for the bore has been provided in Table 3-1.

Table 3-1: Available Data for Groundwater Bores within 1000 m of the subject site

Bore ID	Bore Depth (m)	Purpose	Standing Water Level (m)	Salinity	Location Co-ordinates
GW108933.1.1	268	Irrigation	False	False	-33.880759, 150.68064

4. SITE HISTORY

The objective of the site history review is to ensure that there are no gaps in the information obtained which is relied upon to document the activities conducted at the site.

A review of the site history was carried out and comprised the following:

- Review of current and historical land title search;
- Review of historical aerial photographs;
- Review of NSW EPA records;
- Review of Penrith City Council records including DA history; and
- Review of Section 10.7 planning certificate.

4.1 TITLE SEARCH

A title search was undertaken for the land holdings and these are presented in Attachment 1. Summaries are provided below:

Lot 5 DP 655046

For this land holding there are three (3) notifications:

1. *Reservations and conditions in The Crown Grant(s)*
2. *AK77694 caveat by Lubna Barikhan as regards to the share of George Barikhan*
3. *AP463573 caveat by Sonia Barikhan*

4.2 HISTORICAL TITLE SEARCH

No relevant information was gained from the analysis of the historical land title search transactions.

The Historical Land Title Search documents have been included in Attachment 1.

4.3 AERIAL PHOTOGRAPHS

Aerial photographs obtained from the NSW Department of Lands and Google Earth for the following years, were reviewed to describe the site features and surrounding areas at various timelines:

- 1955;
- 1965;
- 1975;
- 1986;
- 1994;
- 2005; and
- 2020

The historical aerial photographs, Google Earth and SIX Maps captures have been included in Attachment 2. The site boundaries are shown on the photographs.

A summary of the review is presented in Table 4-1.

Table 4-1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Areas
1955	The majority of the site is covered in dense trees, there is a large clearing at the southern extent of the property. A cleared area with 2 small sheds is located in the north-eastern corner, accessible via Park Road.	Properties north, east and south of the site are cleared, with small sheds and dwellings occupying them. Properties west of the site are covered in dense trees and small agricultural areas. Park Road meets The Northern Road to the east. A large circular clearing (what would become Luddenham Showground) can be seen east of the site on Park Road.
1965	The site remains unchanged.	Neighbouring properties are beginning to build dwellings. Agricultural zones and dams are established north and west of the site. Properties are being developed along The Northern Road to the east.
1975	A small group of structures has been built in the north-eastern corner, south of the sheds. The remainder of the site is unchanged.	Large sheds have been constructed on properties east and north-east of the. Surrounding properties have more dwellings and cleared land.
1986	Further clearing in the north and east of the site. Approximately 10 large sheds (assumed to be greenhouses from DA history) have been constructed along the eastern perimeter.	Structures (sheds) have been established in the neighbouring property to the east. Surrounding properties have established agricultural areas. A housing development with numerous residences has been established east of The Northern Road.
1994	Further clearing and more sheds/greenhouses constructed south and west of those established in 1986. The remainder of the site is unchanged.	Surrounding properties have sheds and dwellings on them, with more agricultural space established. The residential area east is established and expanding south. A large dam occupies the property south of the site.
2005	Tree coverage in the north of the property has been reduced. Many of the sheds have been removed, with approximately 5 remaining towards the centre of the property. A large clearing remains. The large clearing in the south now has dense tree coverage.	Further establishment of sheds and agricultural areas on surrounding properties. Residences can be seen in surrounding properties. Dams and waterbodies are spread among properties.

Table 4-1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Areas
2020	Further clearing in the centre of the site. All sheds have been removed from the site. 2 small structures are located near the centre of the site – a house and shed. A large clearing with stockpiles of aggregates occupies the west of the clearing, vehicles are parked across the site. Vehicle tracks are evident across the site.	Surrounding properties are developing agricultural areas and establishing more sheds and structures. Trees have been cleared on properties west of the site. Retail and commercial businesses occupy surrounding properties (kennels, nursery supplies, feed sheds).

4.4 NSW EPA RECORDS

4.4.1 CLM Act 1997

The NSW EPA publishes records of contaminated sites under Section 58 of the Contaminated Land Management (CLM) Act 1997. The notices relate to investigation and/or remediation of site contamination considered to pose a significant risk of harm under the definition in the CLM Act. However, it should be noted that the EPA record of Notices for Contaminated Land does not provide a record of all contaminated land in NSW.

A search of the EPA database revealed that the subject site is not listed.

4.4.2 POEO Register

The NSW EPA publishes records under the Protection of the Environmental Operations (POEO) Act 1997 (as amended 2011). A search of the POEO Register revealed one (1) record for the subject site.

An S.91: Clean Up Notice was issued to the site on 15th of August 2012. This was related to excess waste (wooden pallets, stockpiles etc) being stored without consent on the site.

4.5 PENRITH CITY COUNCIL

4.5.1 Past Consents

Limited information was acquired from Penrith City Council regarding past approved development applications at the site. These are listed below in Table 4-2.

Table 4-2: Summary of Council's Development and Building Application / Consent Records

Year	Number	Description
-	S/1700/73	Residential Dwelling
-	S/1610/76	Glass House
-	S/806/80	Toilets
-	DA13/0897	Secondary Dwelling

4.5.2 Section 10.7 (2 & 5) Certificate

A Planning certificate under section 10.7 (2) and (5) of the EPA & Act 1979 was obtained (Attachment 3) from Penrith City Council for the land holding as detailed below:

- Address: 344 Park Road, Wallacia NSW 2745;
- Description: Lot 5 DP 655046;
- Certificate Number: 20/01065; and
- Issue date: 06 March 2020.

The Planning Certificate states that there are no matters arising under Section 59(2) of the Contaminated Land Management Act 1997. These can be summarised as follows:

a) The land to which the certificate relates has not been declared to be significantly contaminated land at the date when the certificate was issued.
b) The land to which the certificate relates is not subject to a management order at the date when the certificate was issued.
c) The land to which the certificate relates is not the subject of an approved voluntary management proposal at the date when the certificate was issued.
d) The land to which the certificate relates is not subject to an ongoing maintenance order as at the date when the certificate was issued.
e) The land to which the certificate relates is not the subject of a site audit statement provided to the Council.

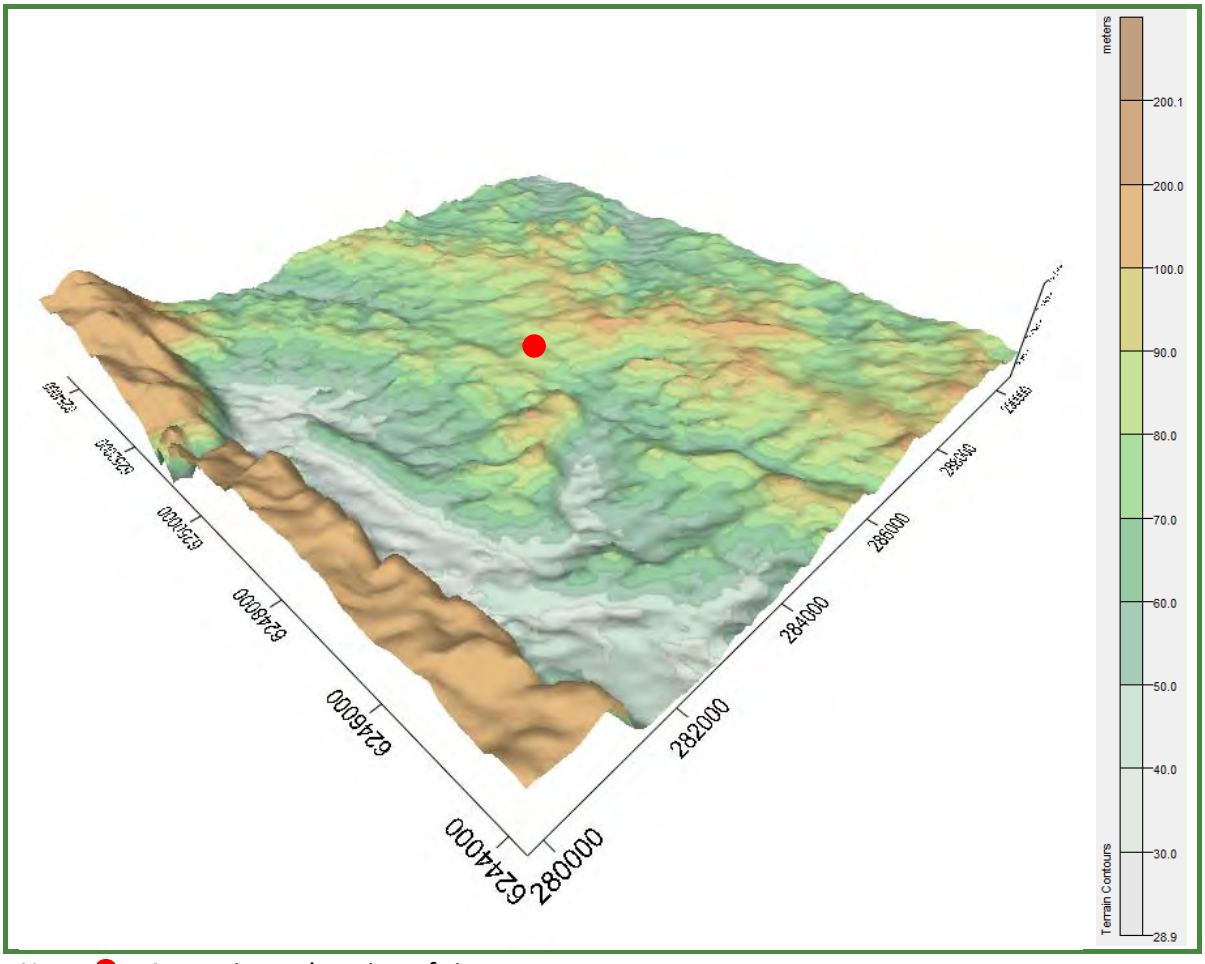
The Planning Certificate is included in the report as Attachment 3.

5. SITE CONDITION AND SURROUNDING ENVIRONMENT

5.1 LOCAL TOPOGRAPHY

A three-dimensional view of the local topography surrounding the site has been provided in Figure 5-1, with the terrain/vertical axis exaggerated by a factor of 10. It should be noted that this figure is an approximation of the actual terrain, based on information that has been digitised from local contour maps.

Figure 5-1: Local topography with vertical exaggeration of 10



Note: ● = Approximate location of site

5.2 SITE WALKOVER – PHOTOGRAPHIC SECTION

A site walkover was carried out on 3rd March 2020 to verify the site's condition, identify potential contamination sources and any discernible evidence of contamination. This section presents the findings of this walkover, accompanied by photographs taken during the site visit.

Photograph 1: Driveway entry into the site from Park Road. Looking south.

Photograph 2: Pond beside driveway showing sediment controls and residence structures in the background. Looking south-west.

Photograph 3: Close up of pond beside entrance driveway. Looking north.

Photograph 4: Cleared area north of the residence structure and associated shed. Looking west.

Photograph 5: Close up of residence structure to remain as on site office building. Looking east.

Photograph 6: Close up of shed structure associated with residence. Looking north.

Photograph 7: Close up shed structure to be demolished. Looking north.

Photograph 8: Close up of septic tank associated with residence. Note water heating system and LPG cylinder attached to residence. Looking east.

Photograph 9: A surface water migration channel was noted beside the residence, heading west across the site. A running tap was noted during the site inspection, this was tightened to stem water flow. Heavy rains in the weeks preceding the site visit were assumed to have created the channel. The channel was being fed by a leaking water tap. Looking south-east.

Photograph 10: Close up of pooling surface water in the water channel. Looking west.

Photograph 11: Cleared extent of site beside residence and shed. Note built up stockpile material on left of photograph. Looking south-east.

Photographs 12-16: Various stockpiled timber, aggregates and concrete plumbing supplies located along the western verge of the clearing.

Photograph 17: Interior of shipping container located in bushland towards the centre of the site.

Photograph 18: Cleared extent of site. Note residence/sheds in centre and built up stockpile material on right of photograph. Looking north.

Photographs 19-21: Close up of stockpiled material located on eastern extent of site.

Photograph 22: View of cleared portion of site from stockpile location. Looking south-west.

Photograph 23: Cleared portion of site south from the large main cleared area. Looking north.

Photograph 24: Cleared portion of site south from the large main cleared area. Looking west.

Photographs 25-30: Grassed bushland portion of the southern extent of the site. Viewed from the meandering track and looping back to the cleared area.

Photographs 30-31: Close up photographs of stockpile fill and surface soil materials.

5.3 POTENTIAL CONTAMINATION ISSUES

A Phase I Environmental Site Assessment involves obtaining a thorough understanding of the site history.

Based on the information collected on the site, an assessment of the potential contamination issues at the site has been carried out. Details are presented in the following sections of this report.

5.3.1 Hazardous Materials

Hazardous materials may be present in site structures, storage areas or fill materials on site, and have the potential to impact human health and the environment. Hazardous materials include heavy metals, asbestos, radioactive materials, fuels/chemicals or other potentially dangerous substances.

Due to the unknown origins and history of the fill materials brought on site, contaminated fill may have been used and hazardous materials may be present in these soils. Stockpile and surface soil samples were collected for laboratory analysis and presence (if any) of contaminants on site.

Inspection of stockpiled timber, mulch and C&D waste yielded no hazardous material presence. Hazardous materials or potentially contaminating substances were not noted during the site visit.

5.3.2 Structures / Storage

There are three (3) structures on site; one (1) brick residence and two (2) small sheds. The residence is currently unoccupied and used for storage of furniture and the shed adjacent to the residence is used for storage of household materials. A small assortment of paint tins were stored within the shed and a small LPG tank was associated with the residence. The existing residence will be utilised as an on-site office and amenities building for the proposed development. There was no evidence of staining or spillage, or potential contaminant presence within the residence or shed.

The remaining small shed is constructed of sheet metal and will be removed. No potential contaminant presence was noted within this shed. A small shipping container is located in adjacent bushland south of the cleared area. Inspection of the container showed stores of furniture and other inert materials. No staining was evident at its base and no potential contaminant presence was noted within the container.

5.3.3 Air Emissions of Pollutants

Not relevant to this site. No VOC or chemical stores are on site.

5.3.4 Soil, Surface Water and/or Groundwater Pollution

The majority of the site is grassed bushland with a meandering dirt track in the southern portion. The north and north-eastern portion of the site has a large cleared area of approximately 4 ha consisting of the three (3) structures, stockpiled materials and cleared land. The cleared area that stockpiles are located upon consists of shale, sand and mixed aggregates.

There are concerns potentially contaminated fill materials of unknown origin are located on site. The fill materials have been brought on site for the purpose of building a berm on the eastern extent of the cleared portion and to level the cleared area of the site. If potentially contaminated fill materials are located on site, they may pose a risk to groundwater and soils.

To alleviate concerns of potential contamination due to these materials, the stockpiled material on the eastern portion of the site was sampled for excavated natural materials (ENM) classification in line with the NSW EPA *The Excavated Natural Material Order (2014)*. Should

these materials not be suitable for ENM classification, they would be classified within a relevant waste class in line with the NSW EPA *Waste Classification Guidelines (2014)*, and disposed of accordingly. Additionally, surface soil samples were collected in the cleared portion of the site for a range of contaminants often associated with contaminated land (heavy metals, hydrocarbons, pesticides etc).

The northern portion of the site is relatively flat and levelled, with a small pond that pools water from a north-eastern tributary. Inspection of the pond yielded no suspected contaminants. The southern portion of the site slops south-west to neighbouring properties that contains a medium sized dam, visible from aerial photographs. The dam was not visible or accessible from the site boundary line, but inspection of the surrounding area showed no potential contaminants or risk of contaminant runoff into the dam.

A surface water migration channel was noted beside the residence structure, heading west across the site. Heavy rains in the weeks preceding the site visit were assumed to have created the channel. The channel was being fed by a leaking water tap associated with the residence. A running tap was noted during the site inspection, this was tightened to stem water flow. Inspection of the extent of surface water migration revealed no contaminant sources in the water flow path, nor potentially contaminating substances in the water.

Penrith Council noted the presence of a watercourse that traverses the site. During the site inspection, a small area of still water was noted south of the cleared portion of the site. A culvert was in place on a path to allow water to pass beneath it. Water appeared stationary on both sides of the culvert and flow was not apparent. The origin and extent of the water body could not be discerned. The water body appeared to be ephemeral in nature and was likely the result of an extensive period of heavy rain collecting water.

5.3.5 Pesticide and Herbicide Usage and/or Contamination

Inspection of DA history and historical aerial photographs showed that the site had a glasshouse approved and appeared to have greenhouse/nursery sheds occupying the north-eastern portion of the site (photographs approximately 1986-1994). Pesticide/herbicide usage during this time could potentially have affected soils. Additionally, if contaminated fill materials were placed on site, they could potentially contain pesticides or herbicides.

Organochlorine pesticides (OCPs) and organophosphorus pesticides (OPPs) analysis was included in the surface soil sampling for this ESA.

5.3.6 Electromagnetic Fields

Not relevant to this site.

5.3.7 Wastewater Treatment System

One (1) in-ground septic tank is located beside the residence in the northern portion of the site. During the site inspection, the tank appeared sealed with no evidence of leakage or damage. This tank is serviced by a licenced contractor as needed.

No other wastewater treatment is undertaken on site.

5.3.8 Potable Water Source

The site is connected to mains water.

5.3.9 Waste Disposal

There is negligible waste on site awaiting disposal. A single skip bin was located beside the residence consisting of various domestic waste (cardboard, packaging, PVC pipes). The bin was branded and serviced by Bingo Industries. Penrith City Council bin collection days are Tuesday and Friday for garbage, Friday for recycling.

Stockpiles of C&D material, timber and mulch are located along the western portion of the cleared area on site. Small sediment control fences were located near some of these stockpiles. These materials are inert and did not appear to have substances leaching or migrating from their stockpiles.

5.3.10 Dams and Ponds

There is a small pond (approximately 300 m^2) located in the northern portion of the site, west of the entry road. A sediment control fence surrounds the pond on its eastern bank. The pond water was clear and inspection of the pond noted no visible foreign or hazardous materials.

6. CONCEPTUAL SITE MODEL

A conceptual site model (CSM) has been prepared in accordance with the National Environment Protection (Assessment of Site Contamination) Measure as amended in 2013.

The CSM is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors.

The CSM is presented in Table 6-1.

Table 6-1: Conceptual Site Model

Known and Potential Primary Sources of Contamination	Primary Release Mechanism	Potentially Impacted Media	Contaminants of Potential Concern	Potential Receptors		Exposure Pathways		Risk of Contamination
				Human	Environment	Human	Environment	
Potentially contaminated fill materials	Placement/disturbance /leaching of contaminated fill materials on and/or off site	Soil, Groundwater, Surface Water	Heavy metals BTEXN PAHs TRHs OCPs/OPPs Asbestos	Workers on site. Neighbouring premises if contamination migrates off-site	Soil, waterways, native habitats	Dermal contact, inhalation of dust and vapours, ingestion	Surface water runoff, soils, groundwater	Medium
Organochlorine and organophosphorus pesticides (OCPs/OPPs)	OCP and OPP leaching from soil	Soil, Groundwater, Surface Water	OCPs/OPPs	Workers on site. Neighbouring premises if contamination migrates off-site	Soil, waterways, native habitats	Dermal contact, inhalation of dust and vapours, ingestion	Surface water runoff, soils, groundwater	Low
Lead-based paints	Disturbance of surfaces where lead-based paint is present	Surface soil	Lead	Workers on site. Neighbouring premises if contamination migrates off-site	Soil, waterways, native habitats	Dermal contact, dust inhalation, ingestion	Soil, surface water runoff	Very Low
Asbestos Containing Materials (ACM)	Disturbance of ACM	Soil	Asbestos	Workers on site. Neighbouring premises if contamination migrates off-site	Soil, waterways, native habitat	Dermal contact, inhalation, ingestion	Surface water runoff	Low
Acid Sulfate Soils (ASS)	Disturbance of ASS	Soil	Acid Sulfate Soils	Workers on site. Neighbouring premises if contamination migrates off-site	Soil	Dermal contact, dust inhalation, ingestion	Surface water runoff, soils	Very Low

BTEXN: Benzene, Toluene, Ethylbenzene, Xylene & Naphthalene

PAHs: Polycyclic Aromatic Hydrocarbons

TRHs: Total Recoverable Hydrocarbons

OCPs/OPPs: Organochlorine and Organophosphate pesticides

7. SOIL SAMPLING AND ANALYSIS

Soil sample collection and analysis was included in this Limited Phase II ESA due to Council concerns that contaminated fill materials may have been brought onto the property. To alleviate concerns, samples from the stockpile and surface soils on site were collected and analysed by NATA accredited laboratory, ALS Environmental.

7.1 SAMPLING RATIONALE

The sampling regime adopted in this soil assessment meets the recommended number of samples specified in NSW EPA *The Excavated Natural Material Order (2014)* for the sampling of stockpile materials of approximately 2,000 – 3,000 tonnes. Sampling was undertaken on 3rd March 2020.

As per the NSW EPA *The Excavated Natural Material Order (2014)* a stockpile of that volume requires seven (7) sampling points. Based on concerns regarding the potential presence of contaminated fill materials within this stockpile, a judgemental sampling grid was adopted where seven (7) sampling points were randomly selected within each gridded area across the stockpile.

At each sampling point, four (4) soil samples were collected to a depth of approximately 0.3 m. Sample container and approximate volumes/weights per sample are listed. Samples collected per location were:

- 1 x foreign material testing sample (large polyethylene bag – 6 kg) and 1 x composite soil sample (small glass jar – 150 mL);
- 1 x discrete soil sample (small glass jar – 150 mL);
- 1 x ASS sample (small polyethylene bag – 500 mL); and
- 1 x asbestos sample (small polyethylene bag – 250 mL).

Additionally, four (4) surface samples were collected from the area of the proposed recycling facility. These were selected in the approximate locations minor earthworks for structural footings are likely to be required. These samples were collected to an approximate depth of 0.3 m and in 150 mL glass jars.

A total of 35 soil samples (including duplicates) were submitted for laboratory analysis.

Figure 7-1 shows an aerial of the stockpile sampling locations and Figure 7-2 shows the surface sample collection locations for the proposed recycling facility.

Figure 7-1: Stockpile material sample locations

Source: Google Earth 2020

↑N Not to scale	**LEGEND** Stockpile perimeter Stockpile sample location	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

Figure 7-2: Surface soil sample collection locations

Source: Google Earth 2020

N Not to scale	**LEGEND** Stockpile perimeter Surface sample location	Benbow Environmental 25-27 Sherwood Street Northmead NSW 2152

7.2 SAMPLING METHODS

7.2.1 Soil Sampling Equipment and Methods

All soil samples were collected via hand instruments (spade, pick, scoop and/or spoon) then placed into 150 mL glass jars for soil analytes or small (250-500 mL) polyethylene bags for ASS and asbestos. Approximately 6 kg of fill material per sample location was placed into large polyethylene bags. The soil was packed tightly into each glass jar/polyethylene bag to eliminate excess air space or voids. All sample containers were supplied by ALS Environmental.

7.2.2 Equipment Decontamination Procedures

Between each sampling event, all sampling equipment was decontaminated to avoid cross contamination. These were scrubbed using a solution of 5% Decon90, rinsed with distilled water, dried with a clean paper towel and rinsed again.

7.2.3 Sample Handling Procedures

Each sample is identified by the following information written on the container label:

- BE job number;
- Sampler name;
- Sample ID (location number); and
- Date and time of sampling.

Samples were placed inside a cooled Esky with ice immediately after collection and transported in this manner to ALS Environmental on the same day. Completed Chain of Custody (COC) forms accompanied the samples. ALS Environmental acknowledged samples were received in a satisfactory condition in relation to transport time and sample temperature. The COC is included in Attachment 5. All samples were analysed within acceptable holding times.

7.2.4 Sample Preservation Methods

Preservation of samples was achieved by keeping samples chilled with ice. No chemical preservatives were added to sample jars or bags.

7.3 LABORATORY ANALYSIS

7.3.1 Analytes

The selection of analytes is based on the NSW EPA *The Excavated Natural Material Order (2014)* for classification of ENM materials. As per the order, ENM does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.

Selected analytes for testing included the following:

- Heavy metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn);
- pH and EC;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Total Petroleum Hydrocarbons (TPHs);
- Benzo(a)pyrene, Benzene, Toluene, Ethyl-benzene and Xylene;
- Presence of rubber, plastic, bitumen, paper, cloth, paint and/or wood;
- Asbestos Containing Materials (ACM); and
- Acid Sulfate Soils (ASS).

The four (4) surface samples collected were subjected to a thorough suite of analytes typically found in contaminated soils. These include:

- Heavy metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn);
- Total Recoverable Hydrocarbons (TRHs);
- Benzene, Toluene, Ethyl-benzene, Xylene, Naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Phenols;
- Organochlorine Pesticides and Organophosphorus Pesticides (OCPs and OPPs); and
- Polychlorinated Biphenyls (PCB).

7.3.2 Testing Methods

All collected samples were analysed by ALS Environmental. ALS Environmental is a NATA accredited laboratory with testing methods conforming to international and Australian Standards and the NEPM (2013) guideline. ALS Environmental comply with the NSW EPA *The Excavated Natural Material Order (2014)* regulatory guidelines.

7.4 QA/QC EVALUATION

Quality Assurance and Quality Control applied to this project were in accordance with AS 4482.1-2005 in regard to the followings:

- **Precision** – measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** – measures the bias in a measurement system. The accuracy of the laboratory data that is generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** – expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the

site, and by using an adequate number of sample locations to characterise the site to the required accuracy.

- **Comparability** – expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

7.4.1 Laboratory QA/QC

The NATA accredited laboratory, ALS Environmental, was used to analyse all collected samples. Quality Control reports and QA/QC Compliance Assessments for all requested analyses provided by ALS Environmental are included in Attachment 6.

7.4.2 QA/QC Data Evaluation

Quality assurance and quality control for the soil sampling program part of the investigation can be summarised as follows:

- No method blank value outliers occur;
- No duplicate outliers occur; and
- No laboratory control outliers occur;
- No matrix spike outliers occur;
- For all regular sample matrices, no surrogate recovery outliers occur;
- One (1) analysis holding time outlier exists; and
- No quality control sample frequency outliers exist.

The laboratory analysis holding time outlier relates to the pH testing of soils for ENM classification. These were two (2) days overdue due to a delay in laboratory extraction and laboratory analysis. The results for this analysis are considered robust and valid.

7.4.3 Duplicate Results

A total of three (3) duplicate soil samples were collected to assess the accuracy of sampling practices. These were selected at random during sample collection.

Analytical data reported by ALS Environmental was judged to have met the essential criteria for data quality for analysis of the samples. The data assessment examined laboratory results, COC documentation, and laboratory QA/QC, provided in Attachments 4, 5 and 6.

8. SOIL ASSESSMENT CRITERIA

The following outlines the Soil Assessment Criteria (SAC) used in this assessment.

8.1 NATIONAL ENVIRONMENTAL PROTECTION (ASSESSMENT OF SITE CONTAMINATION) MEASURE (1999)

Laboratory results associated with surface soil materials have been assessed against the investigation and screening levels in Schedule B1 of National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM). These guidelines have been endorsed by the NSW EPA under the *Contaminated Land Management* (CLM) *Act*, 1997. The ASC NEPM provides soil investigation and screening levels for commonly encountered contaminants which are applicable to four generic land use settings and include consideration of the soil type and the depth of contamination, where relevant.

These soil investigation and screening levels are described as follows:

- **Health Investigation Level (HIL)**
  Health investigation levels (HILs) are generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. HILs are generic to all soil types and generally apply to the top 3 m of soil.

- **Health Screening Level (HSL)**
  Health Screening Levels (HSLs) have been derived for BTEX, naphthalene and four carbon chain fractions, as adopted in NEPC (2013). HSLs have been calculated to account for depth (from below surface to >4 m), soil textures (sand, silt and clay) and the land use settings.

- **Ecological Investigation Level (EIL)**
  Ecological Investigation Levels (EILs) have been developed for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems. EILs depend on land use scenarios and specific soil physiochemical properties, such as pH, cation exchange capacity (CEC), iron and carbon content, etc. They generally apply to the top 2 m of soil.

- **Ecological Screening Level (ESL)**
  Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon (TPH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 3 m of soil.

- **Management Limits**
  Petroleum hydrocarbon management limits ('management limits') are only applicable to petroleum hydrocarbon compounds. They are valid as screening levels following evaluation of human health and ecological risks, and risks to groundwater resources. Management limits apply to all soil depth, based on site-specific considerations for land use and soil type.

The four generic land use settings include:

- HIL A – residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry) also includes children's day care centres, preschools and primary schools;
- HIL B – residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
- HIL C – public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate; and
- **HIL D – commercial/industrial such as shops, offices, factories and industrial sites.**

For the purposes of this assessment, land use scenario Commercial/industrial (D) has been adopted.

Table 8-1 displays the soil classification for health screening levels. The ASC NEPM 2013 considers three different soil textures and derives HSLs for each different soil classification as per AS 1726. The soil type on site was described as a fine sandy loam, brown-grey in colour with no odour. The soil was consistent at all sample locations.

Table 8-1: HSL soil classification

Type	Description
Sand	Coarse-grained soil
Silt	**Fine-grained soil - silts and clays (liquid limit <50 %)**
Clay	Fine-grained soil - silts and clays (liquid limit >50 %)

The summarised investigation and screening limits for land use scenario 'Commercial (D)' and soil Texture and grain size 'Silt – Fine-grained soil – silts and clays' that are used as the Soil Assessment Criteria (SAC) are shown below in Table 8-2.

Table 8-2: Soil Assessment Criteria (SAC) for soil contaminants (mg/kg)

Chemical	HIL-D	ESL-D (fine)	EIL-D (Generic)
Metals and Inorganics			
Arsenic	3,000		160
Cadmium	900		
Chromium (VI)	3,600		
Copper	240,000		
Lead	1,500		
Mercury (inorganic)	730		
Nickel	6,000		
Zinc	400,000		
Polycyclic Aromatic Hydrocarbons (PAHs)			
Benzo(a)pyrene		0.7	
Benzo(a)pyrene TEQ	40		
Total PAHs	4,000		

Table 8-2: Soil Assessment Criteria (SAC) for soil contaminants (mg/kg)

Chemical	HIL-D	ESL-D (fine)	EIL-D (Generic)
Phenols			
Phenol	240,000		
Pentachlorophenol	660		
Other Organics			
PCB	7		
Organochlorine Pesticides (OCPs)			
DDT+DDE+DDD	3,600		
Aldrin and dieldrin	45		
Chlordane	530		
Endosulfan	2,000		
Endrin	100		
Heptachlor	50		
HCB	80		
Methoxychlor	2,500		
Organophosphorus Pesticides (OPPs)			
Chlorpyrifos	2,000		
Total Recoverable Hydrocarbons			
C6 - C10 Fraction			
C6 – C10 Fraction minus BTEX (F1)		215	
>C10 - C16 Fraction		170	
>C16 - C34 Fraction		2500	
>C34 - C40 Fraction		6600	
BTEXN			
Benzene		95	
Toluene		135	
Ethylbenzene		185	
Total Xylenes		95	
Naphthalene			370

Note: Criteria left blank where none applies.

8.2 Acid Sulfate Soil Manual (1998)

The assessment criteria for ASS is provided in the ASS Manual (ASSMAC 1998) and is based on the percentage of oxidisable sulfur (S_{POS}) or equivalent titratable actual acidity (TAA), total potential acidity (TPA), or total sulfidic acidity (TSA).

Table 8-3 shows the sites soil classification as per the NSW ASS Assessment Guidelines Criteria. The texture of the excavated soils is characterised as “Medium Texture – Sandy loams to light clays”.

Table 8-3: NSW Acid Sulfate Soils Assessment Guidelines Criteria

Type of Material		Action Criteria	
Texture	Approx. Clay Content	Sulfur trail S_{TOS} or S_{Pos} (%S)	Acid trail TAA/TPA/TSA (mole H^+/t)
Coarse Texture – Sands to loamy sands	≤5	0.03	18
Medium Texture – Sandy loams to light clays	**5–40**	**0.06**	**36**
Fine Texture – Medium to heavy clays and silty clays	≥40	0.1	62

Whilst ASS are not anticipated on site, in order to satisfy the NSW EPA *The Excavated Natural Material Order (2014)*, soil samples must be analysed for the presence/absence of sulfidic ores, ASS or PASS.

As per the ENM order, where the pH in materials is <5, or sulfidic ores, ASS or PASS are present, the material cannot be classified ENM.

8.3 NSW EPA Excavated Natural Material Order (2014)

The assessment criteria for ENM classification is outlined in Table 8-4. Where any chemical or attribute exceedance occurs, materials cannot be classified ENM. Likewise, should ACM, sulfidic ores, ASS or PASS be present, materials cannot be classified ENM.

Where exceedances in chemicals or other attributes noted in Table 8-4 are found, materials may be assessed as a waste class in line with the NSW EPA *Waste Classification Guidelines (2014)* criteria and disposed of accordingly.

Table 8-4: ENM classification criteria

Chemicals and other attributes	Maximum average concentration for characterisation*	Absolute maximum concentration*
1. Mercury	0.5	1
2. Cadmium	0.5	1
3. Lead	50	100
4. Arsenic	20	40
5. Chromium (total)	75	150
6. Copper	100	200
7. Nickel	30	60
8. Zinc	150	300
9. Electrical Conductivity	1.5 dS/m	3 dS/m
10. pH	5 to 9	4.5 to 10

Table 8-4: ENM classification criteria

Chemicals and other attributes	Maximum average concentration for characterisation*	Absolute maximum concentration*
11. Total Polycyclic Aromatic Hydrocarbons (PAHs)	20	40
12. Benzo(a)pyrene	0.5	1
13. Benzene	NA	0.5
14. Toluene	NA	65
15. Ethyl-benzene	NA	25
16. Xylene	NA	15
17. Total Petroleum Hydrocarbons (TPHs) C10 - C36	250	500
18. Rubber, plastic, bitumen, paper, cloth, paint and wood	0.05 %	0.10 %

* mg/kg 'dry weight' unless otherwise specified

8.4 NSW EPA The Recovered Aggregate Order (2014)

The assessment criteria for recovered aggregate classification is outlined in Table 8-5.

Table 8-5: Recovered aggregate order criteria

Chemicals and other attributes	Maximum average concentration for characterisation*	Maximum average concentration for routine testing*	Absolute maximum concentration*
1. Mercury	0.5	Not required	1
2. Cadmium	0.5	0.5	1.5
3. Lead	75	75	150
4. Arsenic	20	Not required	40
5. Chromium (total)	60	60	120
6. Copper	60	60	150
7. Nickel	40	Not required	80
8. Zinc	200	200	350
9. Electrical Conductivity	1.5 dS/m	1.5 dS/m	3 dS/m
10. Metal	1 %	1 %	2 %
11. Plaster	0.25 %	0.25 %	0.5 %
12. Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	0.2 %	0.2 %	0.3 %

* mg/kg 'dry weight' unless otherwise specified

9. SOIL ANALYSIS RESULTS

The laboratory results for analytical testing of all soil samples collected by BE are provided in the ALS Environmental COA (see Attachment 5). A summary of the findings are detailed below.

9.1 STOCKPILED MATERIALS

Soil samples from stockpiled materials were collected from seven (7) locations and analysed in accordance with the NSW EPA *The Excavated Natural Material Order (2014)* analytes (Table 8-4).

The results of the stockpile soil sampling and subsequent ENM classification are summarised below:

Heavy metals: Results of analysis were all below adopted criteria.
pH and EC: Results of analysis were all below adopted criteria.
PAHs: Results of analysis were all below adopted criteria.
TPHs: Results of analysis were all below adopted criteria.
BTEXN: Results of analysis were all below adopted criteria.
Rubber, plastic, bitumen, paper, cloth, paint and wood: Results of analysis were all below adopted criteria.

Where asbestos, ASS, PASS or sulfidic ores are present, materials cannot be classified ENM. The results of stockpile soil sampling for these substances are summarised below:

Asbestos: Not present in any sample.
ASS/PASS: Results of analysis were all below adopted criteria.
Sulfidic ores: Miniscule traces of sulfidic materials were present in samples ASS-3 and ASS-7 (limit of reporting: 0.020 % S) as evidenced by the sulfur trail in SPOCAS (Suspension Peroxide Oxidation Combined Acidity and Sulphur) testing. SPOCAS is a combined test method that allows a rapid reaction with concentrated peroxide to fast-forwards the breakdown of sulfides, providing an indication of potential acid that could be released from soil. The results of the sulfur trail for ASS-3 and ASS-7 were 0.002 and 0.009 % S above the limit of reporting for sulfides respectively.

Due to the fractional percentage of sulfides found in two samples, sulfidic ores are present in the stockpiled material and it cannot be classified as ENM.

Results of stockpile soil sampling verify that these materials cannot be classified as Excavated Natural Material (ENM) in accordance with the NSW EPA *The Excavated Natural Material Order (2014)* criteria. However, the material is likely to comply with the NSW EPA *The Recovered Aggregate Order (2014)*. Additional testing will determine whether the material satisfies the order and can be used for purposes listed under the corresponding exemption.

Table 9-1 shows the results of stockpile material analysis compared to their respective NSW EPA orders for maximum average concentration for characterisation. To satisfy *The Recovered Aggregate Order (2014)*, samples must be subjected to further analysis for metal (%), plaster (%) and Rubber, plastic, paper, cloth, paint, wood and other vegetable matter (%).

9.2 SURFACE SOILS

Surface soil samples were collected from four (4) locations along the eastern extent of the cleared area, where the planned recycling centre is to be established. Locations were selected based on approximate locations minor excavations for structural footings are to occur. Analyte selection and criteria limits were adopted from Schedule B1 of National Environment Protection (Assessment of Site Contamination) Measure (1999). The results of surface soil sampling is summarised below:

Heavy metals: Results of analysis were all below adopted criteria.
TRHs: Results of analysis were all below adopted criteria.
BTEXN: Results of analysis were all below adopted criteria.
PAHs: Results of analysis were all below adopted criteria.
Phenols: Results of analysis were all below adopted criteria.
OCPs/OPPs: Results of analysis were all below adopted criteria.
PCBs: Results of analysis were all below adopted criteria.

Results of surface soil sampling indicate that all tested analytes and contaminants of concern were either absent or below the adopted NEPM criteria for the site.

Table 9-1: Results of stockpile material analysis compared to their respective NSW EPA orders for maximum average concentration for characterisation

Chemicals and other attributes	ENM Order (2014)	Recovered Aggregate Order (2014)
Mercury	Y	Y
Cadmium	Y	Y
Lead	Y	Y
Arsenic	Y	Y
Chromium (total)	Y	Y
Copper	Y	Y
Nickel	Y	Y
Zinc	Y	Y
Electrical Conductivity	Y	Y
pH	Y	N/A
Total Polycyclic Aromatic Hydrocarbons (PAHs)	Y	N/A
Total Petroleum Hydrocarbons (TPHs) C6 - C9	N/A	N/A
Total Petroleum Hydrocarbons (TPHs) C10 - C36	Y	N/A
ASS/PASS	Y	N/A
Sulfidic ores	N	N/A
Individual Chlorinated Hydrocarbons	N/A	N/A
Individual Organochlorine Pesticides	N/A	N/A
Individual Polychlorinated Biphenyls (PCBs)	N/A	N/A
Benzo(a)pyrene	Y	N/A
Benzene	Y	N/A
Toluene	Y	N/A
Ethyl-benzene	Y	N/A
Xylene	Y	N/A
Asbestos	Y	N/A
Total Organic Carbon	N/A	N/A
Glass, metal and rigid plastics	N/A	N/A
Plastics - light flexible film	N/A	N/A
Metal	N/A	**?**
Plaster	N/A	**?**
Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	N/A	**?**
Rubber, plastic, bitumen, paper, cloth, paint and wood	Y	N/A
Proportion (by weight) retained on a 0.425 mm sieve	N/A	N/A
Proportion (by weight) retained on a 9.5 mm sieve	N/A	N/A
Proportion (by weight) retained on a 26.5 mm sieve	N/A	N/A

Y: Complies with order
N: Does not comply with order
N/A: Not applicable to order
?: To be tested

10. CONCLUSION AND RECOMMENDATIONS

A Limited Phase II Environmental Site Assessment (ESA) report was prepared for the site located at 344 Park Road, Wallacia NSW 2745. The assessment is in support of an Environmental Impact Statement (EIS) being undertaken for the installation and operation of a resource recovery facility.

The findings of this Limited Phase II ESA are summarised below:

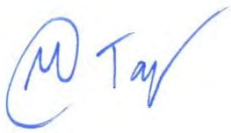
- Hazardous materials or potentially contaminating substances were not observed during the site visit or soil sampling conducted on 3rd March 2020;
- Inspection of the sites structures, grounds, stockpiles, storage and waterbodies yielded no hazardous material presence;
- Results of seven (7) soil samples conducted on the stockpiled materials (2,000 – 3,000 t) from the eastern perimeter were well under *The Excavated Natural Material Order (2014)* criteria. However, due to the presence of sulfidic ores fractionally above the limit of reporting, these materials cannot be classified as Excavated Natural Material (ENM). This material is likely to comply with the NSW EPA *The Recovered Aggregate Order (2014)*. Additional testing will determine whether the material satisfies the requirements under the recovered aggregate order and can be used for purposes listed under the corresponding exemption; and
- Results of four (4) surface soil samples indicate that all tested analytes and contaminants of concern were below the adopted NEPM criteria for the site.

All results from stockpile material and surface soil samples are well below the adopted criteria, and can be considered uncontaminated. Due to the fractional percentage of sulfides found in two (2) samples of the stockpile materials, this soil cannot be classified as ENM. However, it should be noted that the term “presence” of sulfides in this order does not have a reference limit or criteria limit, and its presence has only been dictated by the limit of reporting in the laboratory analysis (0.020 % S). Based on analysis of contaminants in samples collected, this stockpiled material is not contaminated.

Where possible, stockpiled materials may be subjected to the remaining three (3) attributes in *The Recovered Aggregate Order (2014)* to satisfy this order’s criteria. Should all samples comply with this order, it may then be applied to land on site as legally prescribed.

The site does not appear to be contaminated or suspected of previous contamination. Further investigations of the site in regards to a Detailed Phase II Contamination Assessment are not considered warranted.

This concludes the report.



Matthew Taylor
Environmental Scientist

R T Benbow
Principal Consultant

11. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Ellie Barikhan, Site Owner
Carlo Ranieri, as per our agreement for providing environmental services. Only Ellie Barikhan, Site Owner
Carlo Ranieri is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Ellie Barikhan, Site Owner
Carlo Ranieri for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Land & Historic Titles

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 5/655046

SEARCH DATE	TIME	EDITION NO	DATE
5/2/2020	1:11 PM	7	7/8/2019

LAND

LOT 5 IN DEPOSITED PLAN 655046
LOCAL GOVERNMENT AREA PENRITH
PARISH OF BRINGELLY COUNTY OF CUMBERLAND
TITLE DIAGRAM DP655046

FIRST SCHEDULE

ELLIE ABRAHAM BARIKHAN
SALIM BARIKHAN
ABRAHAM BRIAN BARIKHAN
GEORGE BARIKHAN
AS TENANTS IN COMMON IN EQUAL SHARES (T 8939423)

SECOND SCHEDULE (3 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
* 2 AK77694 CAVEAT BY LUBNA BARIKHAN AS REGARDS TO THE SHARE OF GEORGE BARIKHAN
* 3 AP463573 CAVEAT BY SONIA BARIKHAN

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

191318 PRINTED ON 5/2/2020

Received: 05/02/2020 13:11:02

Historical Title

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
5/2/2020 1:11PM

FOLIO: 5/655046

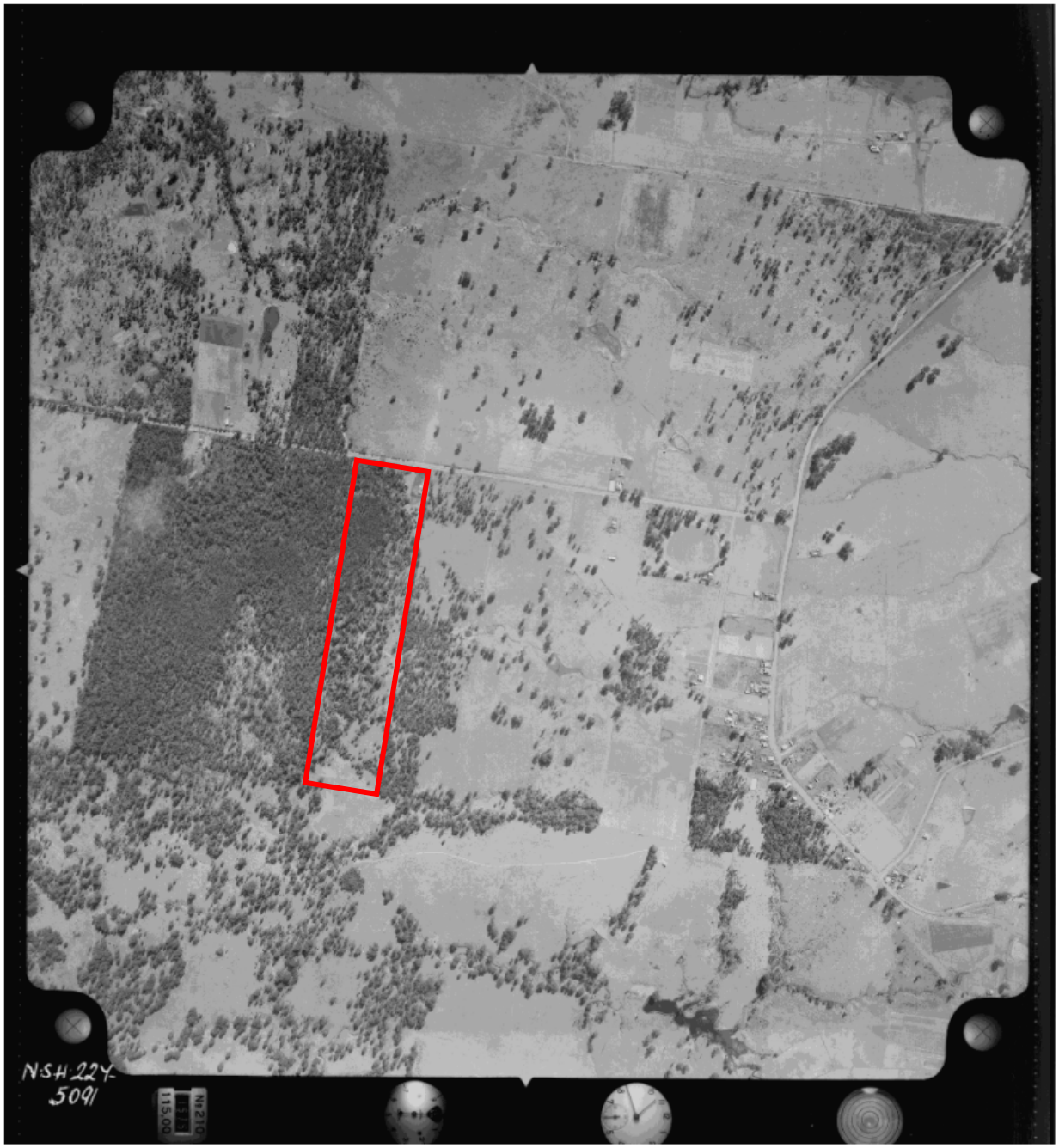
First Title(s): OLD SYSTEM
Prior Title(s): VOL 12144 FOL 234

Recorded	Number	Type of Instrument	C.T. Issue
13/12/1994		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
14/1/1998	3727166	DISCHARGE OF MORTGAGE	
14/1/1998	3727167	MORTGAGE	EDITION 1
10/9/2002	8939422	DISCHARGE OF MORTGAGE	
10/9/2002	8939423	TRANSFER	
10/9/2002	8939424	MORTGAGE	EDITION 2
4/5/2005	AB454867	DISCHARGE OF MORTGAGE	
4/5/2005	AB454868	MORTGAGE	EDITION 3
12/6/2008	AE15458	DISCHARGE OF MORTGAGE	
12/6/2008	AE15459	MORTGAGE	EDITION 4
26/8/2014	AI830525	REQUEST	
4/6/2015	AJ537200	CAVEAT	
18/12/2015	AK77694	CAVEAT	
5/1/2016	AK102921	WITHDRAWAL OF CAVEAT	
22/9/2018	AN730170	DEPARTMENTAL DEALING	EDITION 5 CORD ISSUED
2/8/2019	AP377809	REQUEST	EDITION 6 CORD ISSUED
7/8/2019	AP447059	DISCHARGE OF MORTGAGE	EDITION 7
15/8/2019	AP463573	CAVEAT	

*** END OF SEARCH ***

Attachment 2: Historical Aerial Photographs

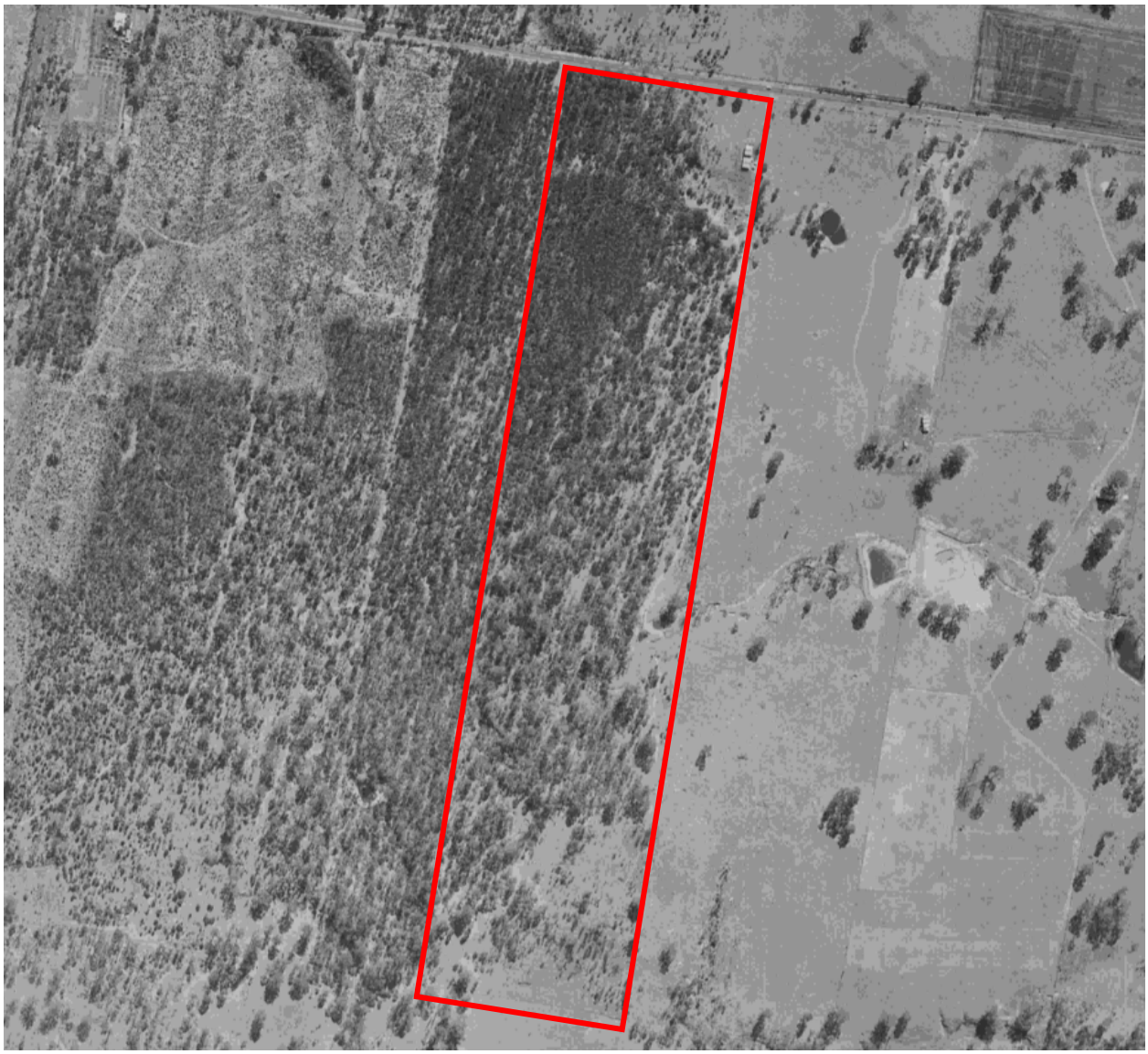
1955



1955 close up

1965

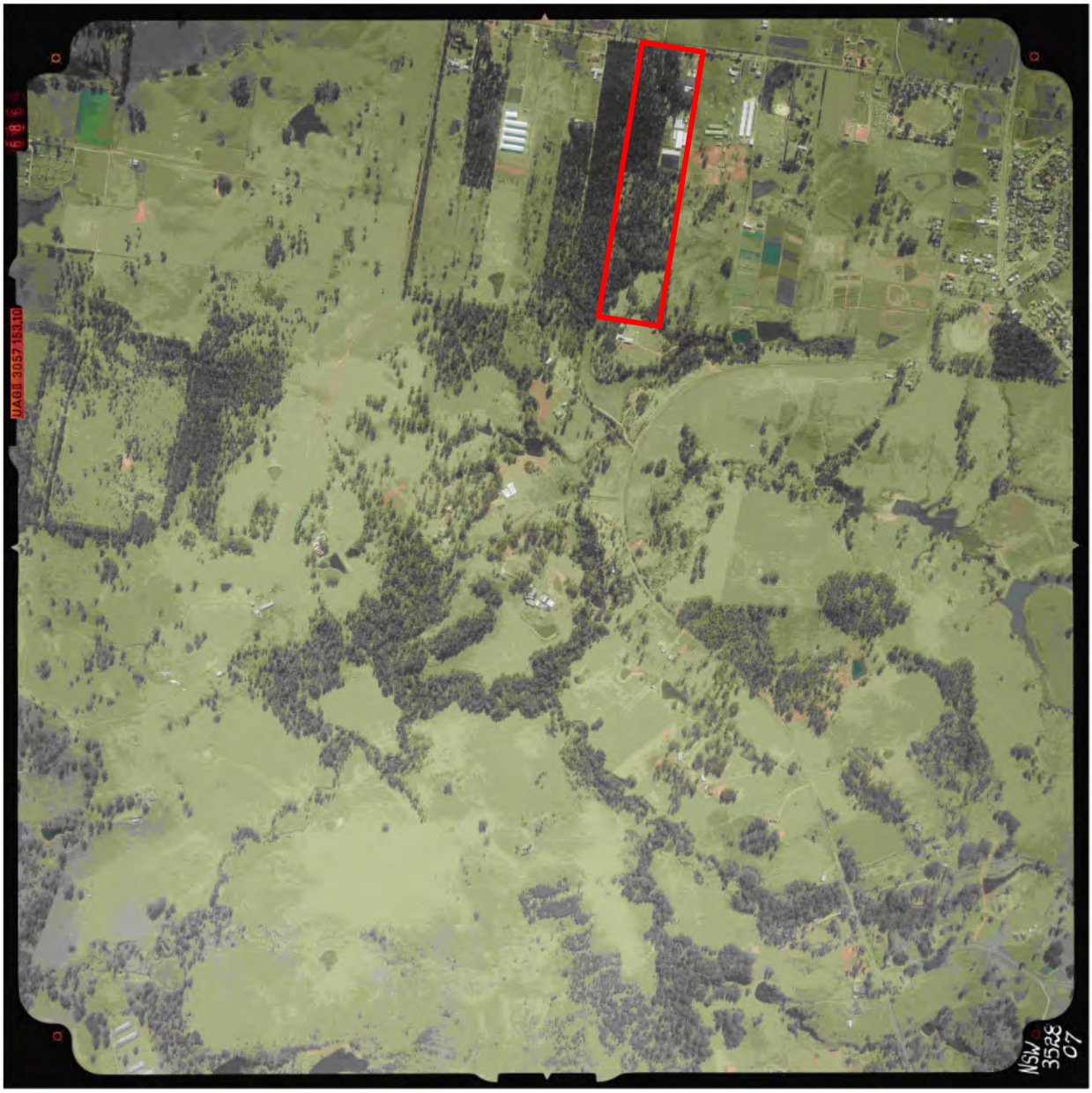
1965 close up



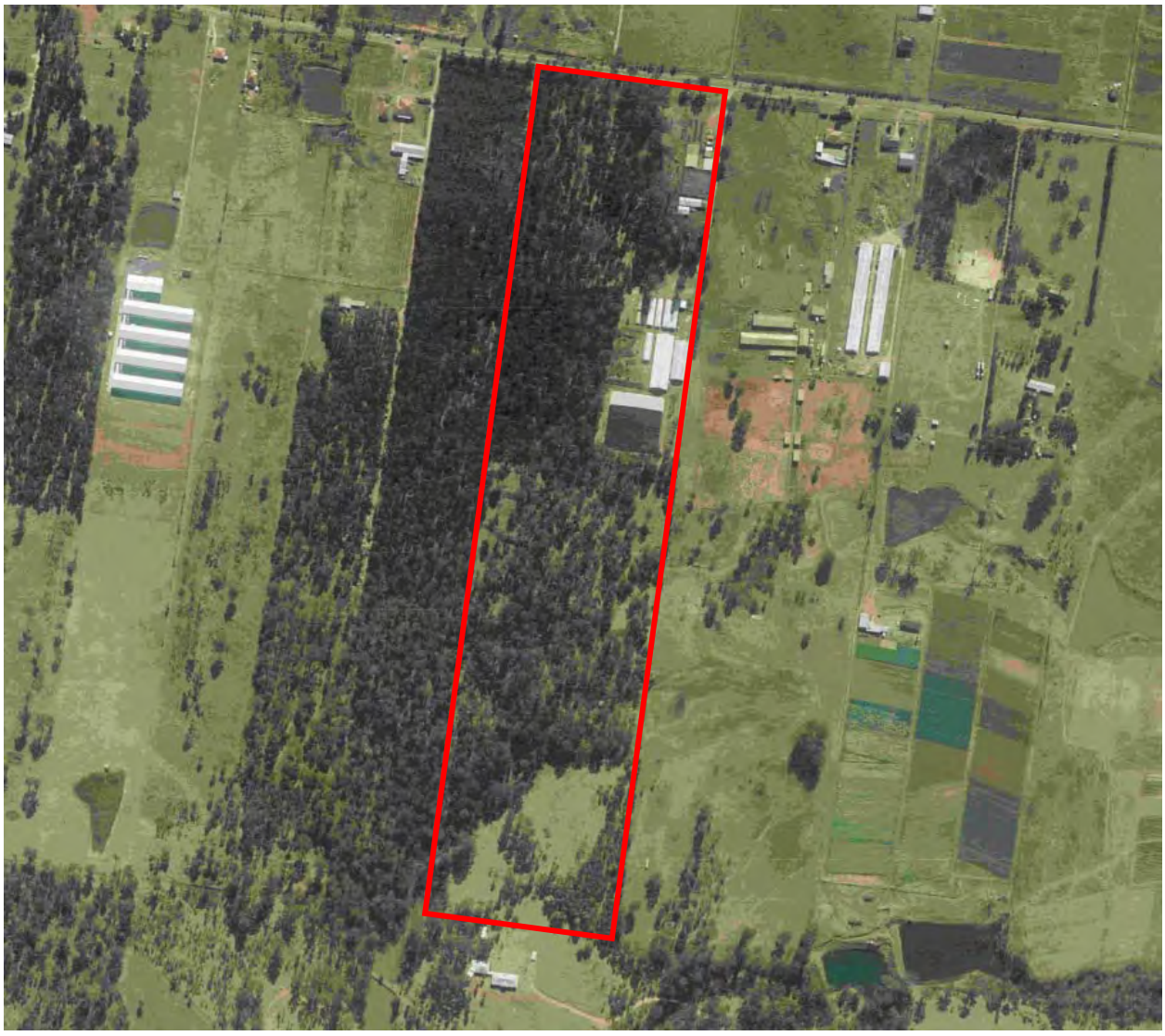
1975

1975 close up

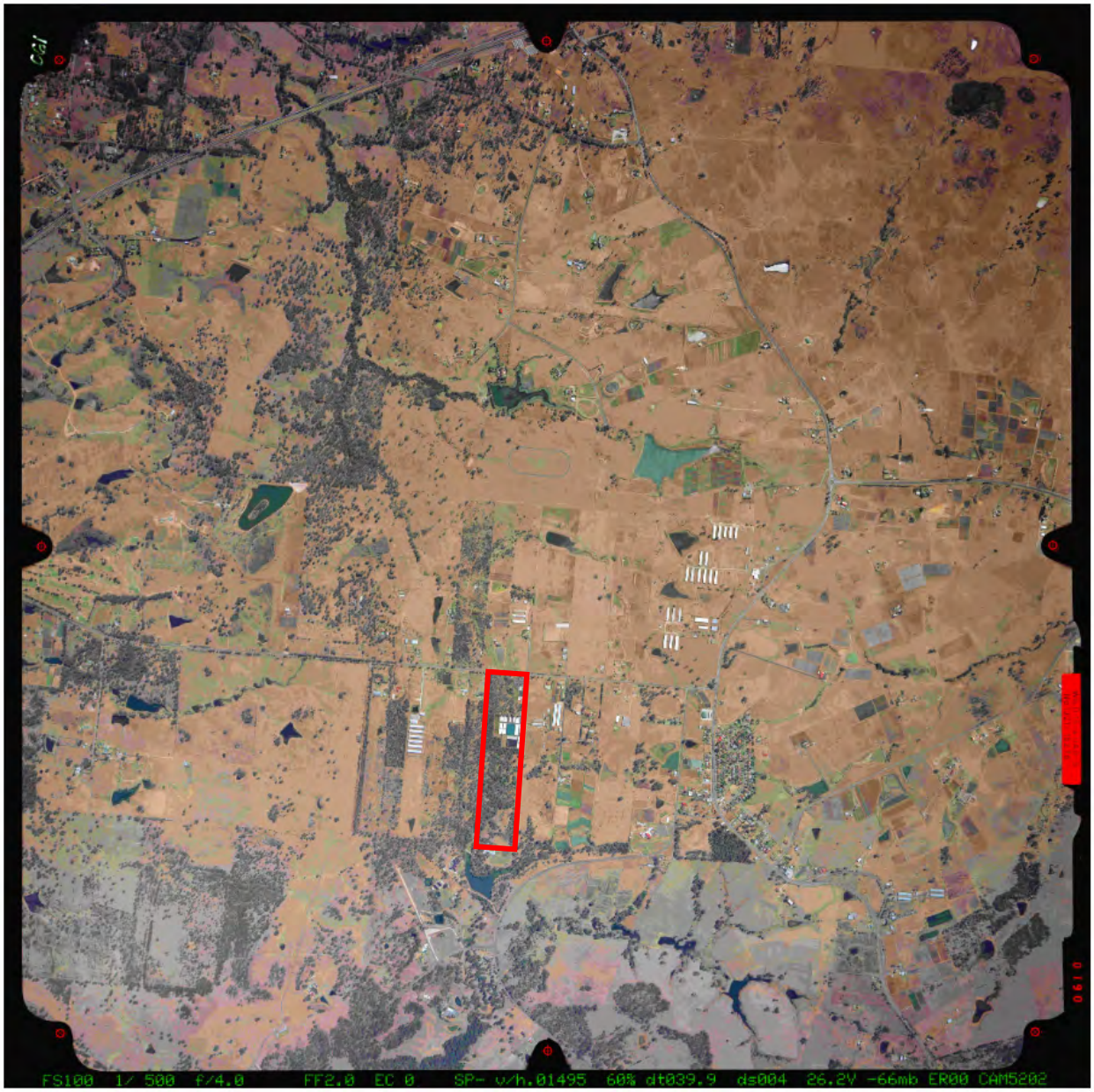
1986



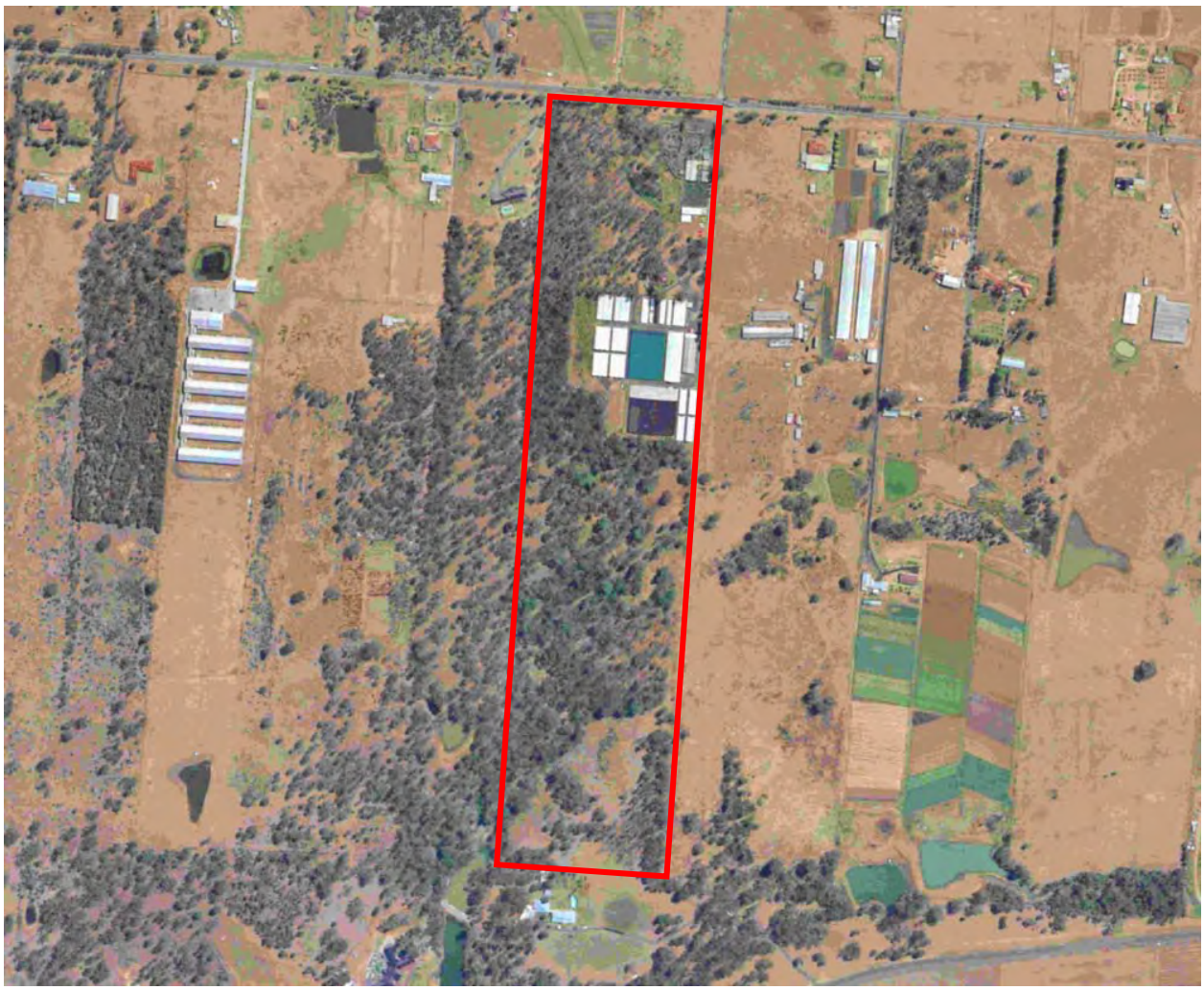
1986 close up



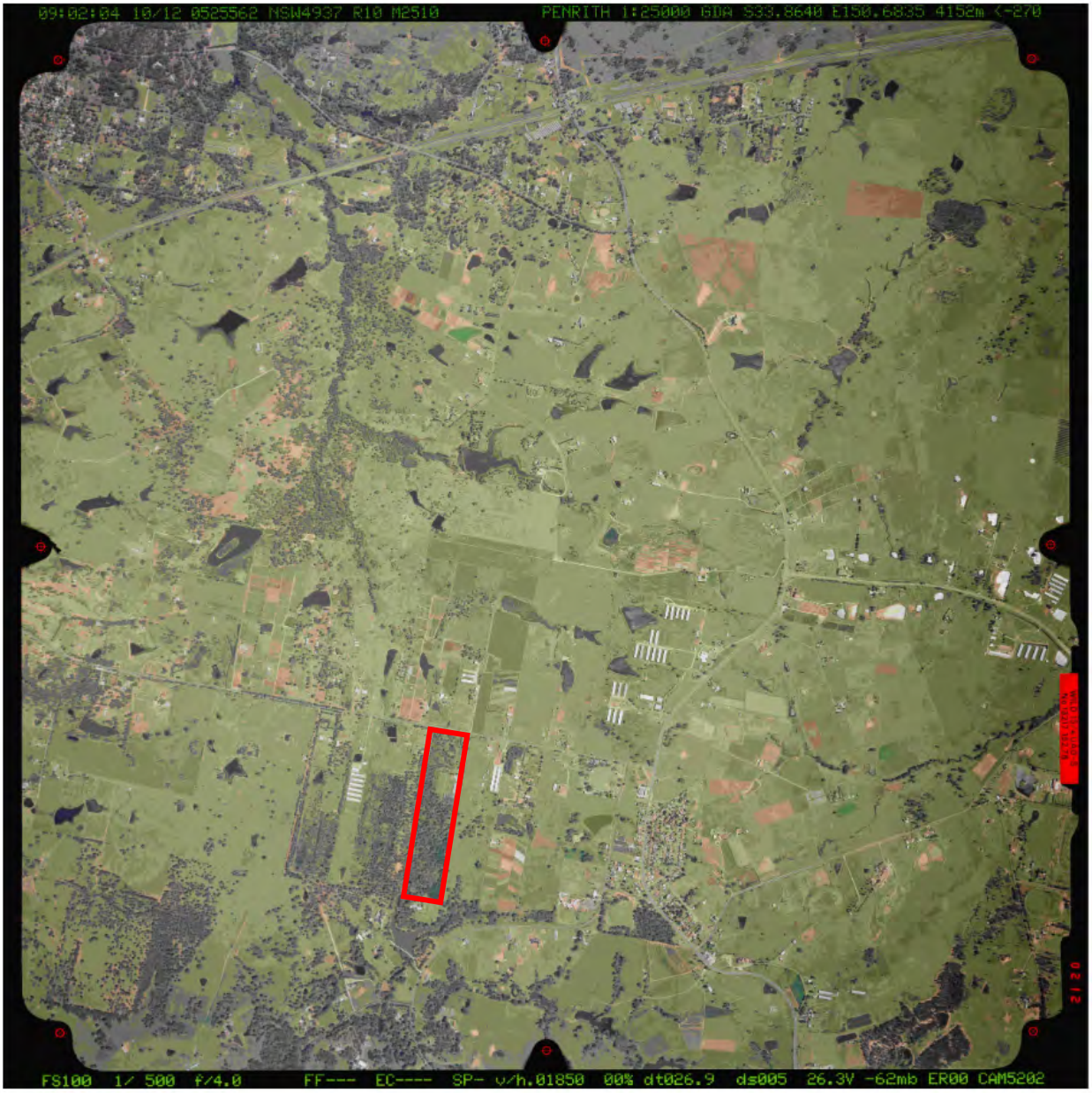
1994



1994 close up



2005



2005 close up

2020

2020 close up

Attachment 3: Section 10.7 (2&5) Certificate

PENRITH CITY COUNCIL

Civic Centre
601 High Street, Penrith

PO Box 60 Penrith NSW 2751

Telephone: 02 4732 7777
Facsimile: 02 4732 7958

Email: pencit@penrithcity.nsw.gov.au

PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Property No: 464107
Your Reference: Park Road Wallacia
Contact No:

Issue Date: 06 March 2020
Certificate No: 20/01065

Issued to: Ms L Claron Consulting
PO Box 542
LINDFIELD NSW 2070

PRECINCT 2010

DESCRIPTION OF LAND

County: CUMBERLAND **Parish: BRINGELLY**

Location: 344 Park Road WALLACIA NSW 2745
Land Description: Lot 5 DP 655046

- PART 1 PRESCRIBED MATTERS –

In accordance with the provisions of Section 10.7(2) of the Act the following information is furnished in respect of the abovementioned land:

1 NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPs

1(1) The name of each environmental planning instrument that applies to the carrying out of development on the land:

Penrith Local Environmental Plan 2010, published 22nd September 2010, as amended, applies to the land.

Sydney Regional Environmental Plan No.9 - Extractive Industry (No.2), gazetted 15 September 1995, as amended, applies to the local government area of Penrith.

Sydney Regional Environmental Plan No. 20 - Hawkesbury-Nepean River (No. 2 - 1997), gazetted 7 November 1997, as amended, applies to the local government area of Penrith (except land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies).

The following State environmental planning policies apply to the land (subject to the exclusions noted below):

State Environmental Planning Policy No.19 - Bushland in Urban Areas. (Note: This policy does not apply to certain land referred to in the National Parks and Wildlife Act 1974 and the Forestry Act 1916.)
State Environmental Planning Policy No.21 - Caravan Parks.
State Environmental Planning Policy No.33 - Hazardous and Offensive Development.
State Environmental Planning Policy No.50 - Canal Estate Development. (Note: This policy does not apply to the land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies.
State Environmental Planning Policy No.55 - Remediation of Land.
State Environmental Planning Policy No.64 - Advertising and Signage.

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State Environmental Planning Policy No.65 - Design Quality of Residential Apartment Development.
State Environmental Planning Policy No.70 - Affordable Housing (Revised Schemes).
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 (Note: This policy applies to land within New South Wales that is land zoned primarily for urban purposes or land that adjoins land zoned primarily for urban purposes, but only as detailed in clause 4 of the policy.)
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004.
State Environmental Planning Policy (State Significant Precincts) 2005.
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2013.
State Environmental Planning Policy (Infrastructure) 2007.
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
State Environmental Planning Policy (Affordable Rental Housing) 2009.
State Environmental Planning Policy (State and Regional Development) 2011.
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
State Environmental Planning Policy (Education Establishments and Child Care Centre Facilities) 2017.
State Environmental Planning Policy (Primary Production and Rural Development) 2019.

1(2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act:

(Information is provided in this section only if a proposed environmental planning instrument that is or has been the subject of community consultation or on public exhibition under the Act will apply to the carrying out of development on the land.)

Draft State Environmental Planning Policy (Western Sydney Corridors) may apply to the land. Further information is available here: https://www.transport.nsw.gov.au/corridors.

On 22 June 2018, the NSW Government announced changes to the recommended alignments for the Western Sydney corridors, including continuing with the previously gazetted 1951 corridor for the Bells Line of Road Castlereagh Connection.

Draft State Environmental Planning Policy (Environment) applies to the land.

Draft State Environmental Planning Policy (Remediation of Land) applies to the land.

Draft State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 applies to the land.

Draft State Environmental Planning Policy (Infrastructure) 2007 applies to the land.

Draft State Environmental Planning Policy (State and Regional Development) 2011 applies to the land.

1(3) The name of each development control plan that applies to the carrying out of development on the land:

Penrith Development Control Plan 2014 applies to the land.

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2 ZONING AND LAND USE UNDER RELEVANT LEPs

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

2(a)-(d) the identity of the zone; the purposes that may be carried out without development consent; the purposes that may not be carried out except with development consent; and the purposes that are prohibited within the zone. Any zone(s) applying to the land is/are listed below and/or in annexures.

(Note: If no zoning appears in this section see section 1(1) for zoning and land use details (under the Sydney Regional Environmental Plan or State Environmental Planning Policy that zones this property).)

Zone RU1 Primary Production
(Penrith Local Environmental Plan 2010)

1 Objectives of zone

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To protect and enhance the existing agricultural landscape character of the land.
- To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.
- To preserve and improve natural resources through appropriate land management practices.

2 Permitted without consent

Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent

Agricultural produce industries; Agriculture; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cellar door premises; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Open cut mining; Roads; Roadside stalls; Rural supplies; Secondary dwellings; Stock and sale yards

4 Prohibited

Any other development not specified in item 2 or 3

Flood planning

All or part of the subject land is identified in Penrith Local Environmental Plan 2010 (PLEP 2010) Clause 7.2 Flood Planning. Development consent is required for any development on land to which Clause 7.2 of PLEP 2010 applies.

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Rural subdivision

Under the terms of Clause 4.2 of Penrith Local Environmental Plan 2010 land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU4 Primary Production Small Lots or Zone RU6 Transition may, with development consent, be subdivided for the purpose of primary production to create a lot of a size that is less than the minimum size shown on the Penrith Local Environmental Plan 2010 Lot Size Map in relation to that land. Such a lot cannot be created if an existing dwelling would, as a result of the subdivision, be situated on the lot; and a dwelling cannot be erected on such a lot.

Residential development and subdivision prohibited in certain rural, residential and environment protection zones

Under the terms of Clause 4.2A of Penrith Local Environmental Plan 2010 (PLEP 2010) on land within Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU4 Primary Production Small Lots, Zone RU5 Village, Zone R5 Large Lot Residential, Zone E3 Environmental Management or Zone E4 Environmental Living development consent must not be granted for the erection of a dwelling house on a lot resulting from the closure of part or all of a road, whether before or after the commencement of this Plan. This requirement does not apply to a lot created by the consolidation of a lot resulting from a road closure with an adjoining lot that did not result from a road closure.

Additional information relating to Penrith Local Environmental Plan 2010

Note 1: Under the terms of Clause 2.4 of Penrith Local Environmental Plan 2010 development may be carried out on unzoned land only with development consent.

Note 2: Under the terms of Clause 2.6 of Penrith Local Environmental Plan 2010 land may be subdivided but only with development consent, except for the exclusions detailed in the clause.

Note 3: Under the terms of Clause 2.7 of Penrith Local Environmental Plan 2010 the demolition of a building or work may be carried out only with development consent.

Note 4: A temporary use may be permitted with development consent subject to the requirements of Clause 2.8 of Penrith Local Environmental Plan 2010.

Note 5: Under the terms of Clause 4.1A of Penrith Local Environmental Plan 2010, despite any other provision of this plan, development consent must not be granted for dual occupancy on an internal lot in Zone R2 Low Density Residential.

Note 6: Under the terms of Clause 5.1 of Penrith Local Environmental Plan 2010 development on land acquired by an authority of the State under the owner-initiated acquisition provisions may, before it is used for the purpose for which it is reserved, be carried out, with development consent, for any purpose.

Note 7: Under the terms of Clause 5.3 of Penrith Local Environmental Plan 2010 development consent may be granted to development of certain land for any purpose that may be carried out in an adjoining zone.

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Note 8: Clause 5.10 of Penrith Local Environmental Plan 2010 details when development consent is required/not required in relation to heritage conservation.

Note 9: Under the terms of Clause 5.11 of Penrith Local Environmental Plan 2010 bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.

Note 10: Under the terms of Clause 7.1 of Penrith Local Environmental Plan 2010 (PLEP 2010) development consent is required for earthworks unless the work is exempt development under PLEP 2010 or another applicable environmental planning instrument, or the work is ancillary to other development for which development consent has been given.

Note 11: Sex services premises and restricted premises may only be permitted subject to the requirements of Clause 7.23 of Penrith Local Environmental Plan 2010.

2(e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed:

(Information is provided in this section only if any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed.)

2(f) whether the land includes or comprises critical habitat:

(Information is provided in this section only if the land includes or comprises critical habitat.)

2(g) whether the land is in a conservation area (however described):

(Information is provided in this section only if the land is in a conservation area (however described).)

2(h) whether an item of environmental heritage (however described) is situated on the land:

(Information is provided in this section only if an item of environmental heritage (however described) is situated on the land.)

2A ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

(Information is provided in this section only if the land is within any zone under State Environmental Planning Policy (Sydney Region Growth Centres) 2006.)

3 COMPLYING DEVELOPMENT

HOUSING CODE

(The Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

RURAL HOUSING CODE

(The Rural Housing Code only applies if the land is within Zones RU1, RU2, RU3, RU4, RU6 or R5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Rural Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

LOW RISE MEDIUM DENSITY HOUSING CODE

(The Low Rise Medium Density Housing Code only applies if the land is within Zones R1, R2, R3 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Low Rise Medium Density Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

Please note that Council has been deferred from the application of Part 3B of the Low Rise Medium Density Housing Code until 1 July 2020. That Part will not apply to Penrith Local Government Area during this time.

GREENFIELD HOUSING CODE

(The Greenfield Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.)

Complying development under the Greenfield Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.

HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code **may** be carried out on the land.

GENERAL DEVELOPMENT CODE

Complying development under the General Development Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL ALTERATIONS CODE

Complying development under the Commercial and Industrial Alterations Code **may** be carried out on the land.

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SUBDIVISIONS CODE

Complying development under the Subdivisions Code **may** be carried out on the land.

DEMOLITION CODE

Complying development under the Demolition Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL (NEW BUILDINGS AND ADDITIONS) CODE

(The Commercial and Industrial (New Buildings and Additions) Code only applies if the land is within Zones B1, B2, B3, B4, B5, B6, B7, B8, IN1, IN2, IN3, IN4 or SP3 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Commercial and Industrial (New Buildings and Alterations) Code **may** be carried out on the land if the land is within one of the abovementioned zones.

FIRE SAFETY CODE

Complying development under the Fire Safety Code **may** be carried out on the land.

(NOTE: (1) Council has relied on Planning and Infrastructure Circulars and Fact Sheets in the preparation of this information. Applicants should seek their own legal advice in relation to this matter with particular reference to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
(2) Penrith Local Environmental Plan 2010 (if it applies to the land) contains additional complying development not specified in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.)

4 COASTAL PROTECTION

The land is not affected by the operation of sections 38 or 39 of the Coastal Protection Act 1979, to the extent that council has been so notified by the Department of Public Works.

5 MINE SUBSIDENCE

The land is not proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

6 ROAD WIDENING AND ROAD REALIGNMENT

The land is not affected by any road widening or road realignment under:
(a) Division 2 of Part 3 of the Roads Act 1993, or
(b) an environmental planning instrument, or
(c) a resolution of council.

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7 COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

(a) Council Policies

The land is affected by the Asbestos Policy adopted by Council.
The land is not affected by any other policy adopted by the council that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

(b) Other Public Authority Policies

The Bush Fire Co-ordinating Committee has adopted a Bush Fire Risk Management Plan that covers the local government area of Penrith City Council, and includes public, private and Commonwealth lands.
The land is not affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council, that restricts the development of the land because of the likelihood of land slip, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

7A FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

(1) Development on the land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) (if such uses are permissible on the land) is subject to flood related development controls.

(2) Development on the land or part of the land for industrial or commercial purposes (if such uses are permissible on the land) is subject to flood related development controls.
Development on the land or part of the land for purposes other than industrial or commercial, or for purposes other than those referred to in (1) above, will be considered on a merits based approach and flood related development controls may apply.

Note: The land is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. On application and payment of the prescribed fee Council may be able to provide in writing a range of advice in regard to the extent of flooding affecting the property.

8 LAND RESERVED FOR ACQUISITION

No environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 3.15 of the Act.

9 CONTRIBUTIONS PLANS

The Cultural Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith.

The Penrith City Local Open Space Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, excluding industrial areas and the release areas

identified in Appendix B of the Plan (Penrith Lakes, Cranebrook, Sydney Regional Environmental Plan No. 30 - St Marys, Waterside, Thornton, the WELL Precinct, Glenmore Park and Erskine Park).

The Penrith City District Open Space Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, with the exclusion of industrial lands and the Penrith Lakes development site.

9A BIODIVERSITY CERTIFIED LAND

(Information is provided in this section only if the land is biodiversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*.)

10 BIODIVERSITY STEWARDSHIP SITES

(Information is provided in this section only if Council has been notified by the Chief Executive of the Office of Environment and Heritage that the land is land to which a biobanking stewardship agreement under Part 5 of the *Biodiversity Conservation Act 2016* relates.)

10A NATIVE VEGETATION CLEARING SET ASIDES

(Information is provided in this section only if Council has been notified of the existence of a set aside area by Local Land Services or it is registered in the public register under which section 60ZC of the *Local Land Services Act 2013* relates).

11 BUSH FIRE PRONE LAND

All of the land is identified as bush fire prone land according to Council records. Guidance as to restrictions that may be placed on the land as a result of the land being bush fire prone can be obtained by contacting Council. Such advice would be subject to further requirements of the NSW Rural Fire Services.

12 PROPERTY VEGETATION PLANS

(Information is provided in this section only if Council has been notified that the land is land to which a property vegetation plan approved under the *Native Vegetation Act 2003* applies and continues in force.)

13 ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

(Information is provided in this section only if Council has been notified that an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.)

14 DIRECTIONS UNDER PART 3A

(Information is provided in this section only if there is a direction by the Minister in force under section 75P(2)(c1) of the Act (repealed on 1st October 2011) that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect.)

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15 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS AFFECTING SENIORS HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (seniors housing), of which the council is aware, issued under State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 18(2) of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.)

16 SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

(Information is provided in this section only if there is a valid site compatibility certificate (infrastructure), of which council is aware, in respect of proposed development on the land.)

17 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (affordable rental housing), of which the council is aware, in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 have been imposed as a condition of consent to a development application in respect of the land.)

18 PAPER SUBDIVISION INFORMATION

(Information is provided in this section only if a development plan adopted by a relevant authority applies to the land or is proposed to be subject to a consent ballot, or a subdivision order applies to the land.)

19 SITE VERIFICATION CERTIFICATES

(Information is provided in this section only if there is a current site verification certificate, of which council is aware, in respect of the land.)

NOTE: The following matters are prescribed by section 59(2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate

(a) (Information is provided in this section only if, as at the date of this certificate, the land (or part of the land) is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997.)

(b) (Information is provided in this section only if, as at the date of this certificate, the land is subject to a management order within the meaning of the Contaminated Land Management Act 1997.)

(c) (Information is provided in this section only if, as at the date of this certificate, the land is the subject of an approved voluntary management proposal within the meaning of the Contaminated Land Management Act 1997.)

(d) (Information is provided in this section only if, at the date of this certificate, the land subject to an ongoing maintenance order within the meaning of the Contaminated Land Management Act 1997.)

(e) (Information is provided in this section only if the land is the subject of a site audit statement within the meaning of the Contaminated Land Management Act 1997 - a copy of which has been provided to Council.)

Note: Section 10.7(5) information for this property may contain additional information regarding contamination issues.

20 LOOSE FILL ASBESTOS INSULATION

(Information is provided in this section only if there is a residential premises listed on the register of residential premises that contain or have contained loose-fill asbestos insulation (as required by Division 1A of Part 8 of the Home Building Act 1989))

21 AFFECTED BUILDING NOTICES AND BUILDING PRODUCT RECTIFICATION ORDERS

(Information is provided in this section only if Council is aware of any "affected building notice" and/or a "building product rectification order" in force for the land).

Note: The Environmental Planning and Assessment Amendment Act 2017 commenced operation on the 1 March 2018. As a consequence of this Act the information contained in this certificate needs to be read in conjunction with the provisions of the Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017, and Environmental Planning and Assessment Regulation 2000.

Information is provided only to the extent that Council has been notified by relevant government departments.

10.7(5) Certificate
This Certificate is directed to the following
relevant matters affecting the land

When information pursuant to section 10.7(5) is requested the Council is under no obligation to furnish any of the information supplied herein pursuant to that section. Council draws your attention to section 10.7(6) which states that a council shall not incur any liability in respect of any advice provided in good faith pursuant to sub-section (5). The absence of any reference to any matter affecting the land shall not imply that the land is not affected by any matter not referred to in this certificate.

Note:

- Council's 10.7(5) information does not include development consent or easement information. Details of development consents may be obtained by making enquiries with Council's Development Services Department pursuant to section 12 of the Local Government Act 1993 or (for development applications lodged after January

2007) by viewing the Online Services area at www.penrithcity.nsw.gov.au . Details of any easements may be obtained from a Title Search at Land and Property Information New South Wales.

- This certificate does not contain information relating to Complying Development Certificates.
- This certificate may not provide full details of development rights over the land.

* Biodiversity Conservation Act 2016

When considering any development application Council must have regard to the Biodiversity Conservation Act 2016. Please note that this legislation may have application to any land throughout the city. Interested persons should make their own enquiries in regard to the impact that this legislation could have on this land.

* Agricultural Activities Within Rural Areas

This property is located in a rural area and there may be certain agricultural activities occurring that some people may find offensive (for example noise, dust and odours). This should be considered if you purchase the subject property or build a dwelling thereon.
If you do purchase the subject property or build a dwelling, the potential impact that your activities (for example pets, inadequate fencing, drainage, litter and poor weed control) might have on the agricultural activities in the area should also be considered.

* Scenic and Landscape Values

The land is identified as "Land with Scenic and Landscape Values" on the Penrith Local Environmental Plan 2010 Scenic and Landscape Values Map. See Clause 7.5 of Penrith Local Environmental Plan 2010 and Chapter C1 Site Planning and Design of Penrith Development Control Plan 2014.

* Preservation of Trees and Vegetation

See Chapter C2 of Penrith Development Control Plan 2014 for specific controls relating to the preservation of trees and vegetation.

* Dual Occupancy and Secondary Dwellings Controls

See Clause 7.10 of Penrith Local Environmental Plan 2010 for specific controls relating to dual occupancy and secondary dwellings in Zones RU1, RU2, RU4, E3 and E4.

* Development Control Plan General Information

Penrith Development Control Plan 2014 which applies to the land, sets out requirements for a range of issues that apply across the Penrith Local Government Area, including:

- Site Planning and Design Principles
- Vegetation Management
- Water Management
- Land Management
- Waste Management
- Landscape Design
- Culture and Heritage
- Public Domain
- Advertising and Signage
- Transport, Access and Parking
- Subdivision
- Noise and Vibration, and

- Infrastructure and Services.

The Development Control Plan also specifies requirements relating to various types of land uses including:

- Rural Land Uses
- Residential Development
- Commercial and Retail Development, and
- Industrial Development

as well as for a number of specific activities, including child care centres; health consulting rooms; educational establishments; parent friendly amenities; places of public worship; vehicle repair stations; cemeteries, crematoria and funeral homes; extractive industries; and telecommunication facilities.

The Development Control Plan also details requirements relating to key precincts within the Penrith Local Government Area, including:

- Caddens
- Claremont Meadows Stage 2
- Cranebrook
- Emu Heights
- Emu Plains
- Erskine Business Park
- Glenmore Park
- Kingswood
- Mulgoa Valley
- Orchard Hills
- Penrith
- Penrith Health and Education Precinct
- Riverlink Precinct
- St Clair,
- St Marys / St Marys North, and
- Sydney Science Park.

Penrith Development Control Plan 2014 may be accessed at https://www.penrithcity.nsw.gov.au/Building-and-Development/Planning-and-Zoning/Planning-Controls/Development-Control-Plans/

Warwick Winn
General Manager

PER

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Environmental Planning and Assessment Act, 1979

Please note:

Certain amendments to the Environmental Planning and Assessment Act 1979 No 203 (Act) commenced on 1 March 2018.

The Environmental Planning and Assessment (Amendment) Act 2017 No 60 makes structural changes to the Act and, as a consequence, the Act has been renumbered in a decimal format. For example, Section 149 Planning Certificates have become Section 10.7 Certificates. Some of the information in this certificate may refer to the previous version of the Act.

Council is committed to updating all relevant documents in a timely manner. This will include planning instruments, applications, approvals, orders, certificates, forms and other associated documents in both printed and electronic versions. Council is required to implement these changes and regrets any inconvenience caused to the local business, industry and the community.

Attachment 4: Certificate of Analysis (COA)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2007339**	Page	: 1 of 22
Client	: **BENBOW ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Taylor	Contact	: Customer Services ES
Address	: 25-27 SHERWOOD STREET NORTHMEAD NSW, AUSTRALIA 2152	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 191318	Date Samples Received	: 03-Mar-2020 14:20
Order number	: 191318	Date Analysis Commenced	: 04-Mar-2020
C-O-C number	: ----	Issue Date	: 17-Mar-2020 09:33
Sampler	: Matthew Taylor		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 35		
No. of samples analysed	: 35		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- ASS: EA029 (SPOCAS): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA029 (SPOCAS): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ENM-C1+FMT-1	ENM-C2+FMT-2	ENM-C3+FMT-3	ENM-C4+FMT-4	ENM-C5+FMT-5
			Client sampling date / time	03-Mar-2020 10:33	03-Mar-2020 10:44	03-Mar-2020 11:13	03-Mar-2020 11:31	03-Mar-2020 11:49
Compound	CAS Number	LOR	Unit	ES2007339-001	ES2007339-002	ES2007339-003	ES2007339-004	ES2007339-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.8	7.6	7.5	8.8	7.3
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	53	28	74	106	50
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	2.8	3.2	3.9	6.6	7.0
EA155: Foreign Material - Type III								
Rubber	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Plastic	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Bitumen	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Paint	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Paper	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Cloth	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
Wood	----	0.05	%	<0.05	<0.05	<0.05	<0.05	<0.05
EG005(ED093)T-MW: Total Metals by nitric acid microwave digestion / ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	5
Cadmium	7440-43-9	0.4	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	7440-47-3	2	mg/kg	5	6	5	12	9
Copper	7440-50-8	5	mg/kg	<5	<5	<5	21	51
Lead	7439-92-1	5	mg/kg	12	10	11	21	23
Nickel	7440-02-0	2	mg/kg	<2	<2	3	9	5
Zinc	7440-66-6	5	mg/kg	37	36	28	37	25
EG035T-MW: Total Recoverable Mercury by nitric acid microwave digestion / FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ENM-C6+FMT-6	ENM-C7+FMT-7	ENM-D1	ENM-D2	ENM-D3
			Client sampling date / time	03-Mar-2020 11:57	03-Mar-2020 12:17	03-Mar-2020 10:34	03-Mar-2020 10:45	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit	ES2007339-006	ES2007339-007	ES2007339-008	ES2007339-009	ES2007339-010
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**8.6**	**7.4**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**143**	**120**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**10.6**	**11.3**	**3.2**	**3.3**	**6.5**
EA155: Foreign Material - Type III								
Rubber	----	0.05	%	<0.05	<0.05	----	----	----
Plastic	----	0.05	%	<0.05	<0.05	----	----	----
Bitumen	----	0.05	%	<0.05	<0.05	----	----	----
Paint	----	0.05	%	<0.05	<0.05	----	----	----
Paper	----	0.05	%	<0.05	<0.05	----	----	----
Cloth	----	0.05	%	<0.05	<0.05	----	----	----
Wood	----	0.05	%	<0.05	<0.05	----	----	----
EG005(ED093)T-MW: Total Metals by nitric acid microwave digestion / ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**5**	<5	----	----	----
Cadmium	7440-43-9	0.4	mg/kg	<0.4	<0.4	----	----	----
Chromium	7440-47-3	2	mg/kg	**11**	**8**	----	----	----
Copper	7440-50-8	5	mg/kg	**26**	**22**	----	----	----
Lead	7439-92-1	5	mg/kg	**35**	**20**	----	----	----
Nickel	7440-02-0	2	mg/kg	**14**	**8**	----	----	----
Zinc	7440-66-6	5	mg/kg	**54**	**32**	----	----	----
EG035T-MW: Total Recoverable Mercury by nitric acid microwave digestion / FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	----	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ENM-C6+FMT-6	ENM-C7+FMT-7	ENM-D1	ENM-D2	ENM-D3
				Client sampling date / time	03-Mar-2020 11:57	03-Mar-2020 12:17	03-Mar-2020 10:34	03-Mar-2020 10:45	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit		ES2007339-006	ES2007339-007	ES2007339-008	ES2007339-009	ES2007339-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	----	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	----	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C10 - C14 Fraction	----	50	mg/kg		----	----	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		----	----	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		----	----	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		----	----	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		----	----	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		----	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	----	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		----	----	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Total Xylenes	----	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		----	----	<0.2	<0.2	<0.2
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	----	**82.2**	**80.9**	**83.3**
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	**87.4**	**87.0**	**89.5**
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	**72.4**	**70.4**	**76.0**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	**94.6**	**94.1**	**96.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ENM-C6+FMT-6	ENM-C7+FMT-7	ENM-D1	ENM-D2	ENM-D3
				Client sampling date / time	03-Mar-2020 11:57	03-Mar-2020 12:17	03-Mar-2020 10:34	03-Mar-2020 10:45	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit		ES2007339-006	ES2007339-007	ES2007339-008	ES2007339-009	ES2007339-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	0.5	%		----	----	**87.2**	**85.7**	**88.6**
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	**98.9**	**98.6**	**99.0**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	----	**107**	**105**	**112**
Toluene-D8	2037-26-5	0.2	%		----	----	**108**	**106**	**109**
4-Bromofluorobenzene	460-00-4	0.2	%		----	----	**99.0**	**96.7**	**96.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ENM-D4	ENM-D5	ENM-D6	ENM-D7	ASS-1
			Client sampling date / time	03-Mar-2020 11:32	03-Mar-2020 11:48	03-Mar-2020 11:58	03-Mar-2020 12:18	03-Mar-2020 10:35
Compound	CAS Number	LOR	Unit	ES2007339-011	ES2007339-012	ES2007339-013	ES2007339-014	ES2007339-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	**8.6**
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	**6.9**
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	----	----	----	----	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	----	----	----	----	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	----	----	----	----	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	----	----	----	----	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	----	----	----	----	<0.020
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	----	----	----	----	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	----	----	----	----	**0.211**
Peroxide Calcium (23Wh)	----	0.020	% Ca	----	----	----	----	**0.250**
Acid Reacted Calcium (23X)	----	0.020	% Ca	----	----	----	----	**0.039**
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	**19**
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	----	----	----	----	**0.031**
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	----	----	----	----	<0.020
Peroxide Magnesium (23Tm)	----	0.020	% Mg	----	----	----	----	<0.020
Acid Reacted Magnesium (23U)	----	0.020	% Mg	----	----	----	----	<0.020
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	<10
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	----	----	----	----	<0.020
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	----	----	----	----	**0.547**
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	----	----	----	----	**109**
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	----	----	----	----	**0.175**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ENM-D4	ENM-D5	ENM-D6	ENM-D7	ASS-1
			Client sampling date / time	03-Mar-2020 11:32	03-Mar-2020 11:48	03-Mar-2020 11:58	03-Mar-2020 12:18	03-Mar-2020 10:35
Compound	CAS Number	LOR	Unit	ES2007339-011	ES2007339-012	ES2007339-013	ES2007339-014	ES2007339-015
				Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued								
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	----	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	<10
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	----	----	----	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	----	----	----	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	----	----	----	<1
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**5.9**	**7.0**	**9.0**	**10.0**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	**0.6**	**0.8**	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	**0.5**	**0.6**	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	**1.1**	**2.0**	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ENM-D4	ENM-D5	ENM-D6	ENM-D7	ASS-1
				Client sampling date / time	03-Mar-2020 11:32	03-Mar-2020 11:48	03-Mar-2020 11:58	03-Mar-2020 12:18	03-Mar-2020 10:35
Compound	CAS Number	LOR	Unit		ES2007339-011	ES2007339-012	ES2007339-013	ES2007339-014	ES2007339-015
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		82.5	77.6	75.0	74.1	----
2-Chlorophenol-D4	93951-73-6	0.5	%		88.3	83.2	81.0	80.2	----
2.4.6-Tribromophenol	118-79-6	0.5	%		71.6	71.0	69.9	69.4	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		95.4	90.1	87.1	87.2	----
Anthracene-d10	1719-06-8	0.5	%		86.1	81.9	79.3	79.6	----
4-Terphenyl-d14	1718-51-0	0.5	%		97.5	92.6	88.5	88.2	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		114	107	103	104	----
Toluene-D8	2037-26-5	0.2	%		114	106	100	104	----
4-Bromofluorobenzene	460-00-4	0.2	%		105	96.5	92.1	94.3	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ASS-2	ASS-3	ASS-4	ASS-5	ASS-6
			Client sampling date / time	03-Mar-2020 10:46	03-Mar-2020 11:15	03-Mar-2020 11:33	03-Mar-2020 11:51	03-Mar-2020 11:59
Compound	CAS Number	LOR	Unit	ES2007339-016	ES2007339-017	ES2007339-018	ES2007339-019	ES2007339-020
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	8.9	9.0	8.6	6.4	8.6
pH OX (23B)	----	0.1	pH Unit	7.3	7.3	8.4	6.3	8.0
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	<2	<2	<2	<2
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	<0.020	<0.020	<0.020	<0.020
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	<0.020	<0.020	<0.020	<0.020
Peroxide Sulfur (23De)	----	0.020	% S	<0.020	0.022	<0.020	<0.020	<0.020
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	<0.020	0.022	<0.020	<0.020	<0.020
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	14	<10	<10	<10
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	0.287	0.254	0.297	0.261	0.358
Peroxide Calcium (23Wh)	----	0.020	% Ca	0.416	0.388	0.411	0.266	0.457
Acid Reacted Calcium (23X)	----	0.020	% Ca	0.129	0.134	0.114	<0.020	0.099
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	64	67	57	<10	49
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	0.103	0.107	0.092	<0.020	0.079
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	<0.020	<0.020	0.040	0.044	0.048
Peroxide Magnesium (23Tm)	----	0.020	% Mg	0.026	0.049	0.084	0.044	0.091
Acid Reacted Magnesium (23U)	----	0.020	% Mg	0.026	0.049	0.044	<0.020	0.043
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	22	40	36	<10	36
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	0.035	0.064	0.058	<0.020	0.057
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	0.861	0.590	0.885	----	0.725
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	172	118	177	----	145
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	0.276	0.189	0.283	----	0.232

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ASS-2	ASS-3	ASS-4	ASS-5	ASS-6
				Client sampling date / time	03-Mar-2020 10:46	03-Mar-2020 11:15	03-Mar-2020 11:33	03-Mar-2020 11:51	03-Mar-2020 11:59
Compound	CAS Number	LOR	Unit		ES2007339-016	ES2007339-017	ES2007339-018	ES2007339-019	ES2007339-020
					Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued									
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t		<1	<1	<1	<1	<1
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		<0.02	**0.02**	<0.02	<0.02	<0.02
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		<10	**14**	<10	<10	<10
Liming Rate excluding ANC	----	1	kg CaCO3/t		<1	**1**	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ASS-7	AB-1	AB-2	AB-3	AB-4
			Client sampling date / time	03-Mar-2020 12:19	03-Mar-2020 10:36	03-Mar-2020 10:47	03-Mar-2020 11:16	03-Mar-2020 11:34
Compound	CAS Number	LOR	Unit	ES2007339-021	ES2007339-022	ES2007339-023	ES2007339-024	ES2007339-025
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**6.5**	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	**6.8**	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S	<0.020	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S	<0.020	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.020	% S	<0.020	----	----	----	----
Peroxide Sulfur (23De)	----	0.020	% S	**0.029**	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S	**0.029**	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	**18**	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.020	% Ca	**0.251**	----	----	----	----
Peroxide Calcium (23Wh)	----	0.020	% Ca	**0.255**	----	----	----	----
Acid Reacted Calcium (23X)	----	0.020	% Ca	<0.020	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg	**0.052**	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg	**0.077**	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg	**0.025**	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	**21**	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S	**0.033**	----	----	----	----
EA029-F: Excess Acid Neutralising Capacity								
Excess Acid Neutralising Capacity (23Q)	----	0.020	% CaCO3	**0.265**	----	----	----	----
acidity - Excess Acid Neutralising Capacity (a-23Q)	----	10	mole H+ / t	**53**	----	----	----	----
sulfidic - Excess Acid Neutralising Capacity (s-23Q)	----	0.020	% S	**0.085**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ASS-7	AB-1	AB-2	AB-3	AB-4
				Client sampling date / time	03-Mar-2020 12:19	03-Mar-2020 10:36	03-Mar-2020 10:47	03-Mar-2020 11:16	03-Mar-2020 11:34
Compound	CAS Number	LOR	Unit		ES2007339-021	ES2007339-022	ES2007339-023	ES2007339-024	ES2007339-025
					Result	Result	Result	Result	Result
EA029-F: Excess Acid Neutralising Capacity - Continued									
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t		<1	----	----	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		**0.03**	----	----	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		**18**	----	----	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		**1**	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	**No**	**No**	**No**	**No**
Asbestos (Trace)	1332-21-4	5	Fibres		----	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--		----	**-**	**-**	**-**	**-**
Synthetic Mineral Fibre	----	0.1	g/kg		----	**No**	**No**	**No**	**No**
Organic Fibre	----	0.1	g/kg		----	**No**	**No**	**No**	**No**
Sample weight (dry)	----	0.01	g		----	**354**	**383**	**397**	**434**
APPROVED IDENTIFIER:	----	-	--		----	**A. SMYLIE**	**A. SMYLIE**	**A. SMYLIE**	**A. SMYLIE**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-5	AB-6	AB-7	ASS-2D	ENM-D3D
				Client sampling date / time	03-Mar-2020 11:50	03-Mar-2020 12:00	03-Mar-2020 12:20	03-Mar-2020 10:46	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit		ES2007339-026	ES2007339-027	ES2007339-028	ES2007339-029	ES2007339-030
					Result	Result	Result	Result	Result
EA029-A: pH Measurements									
pH KCl (23A)	----	0.1	pH Unit		----	----	----	**7.0**	----
pH OX (23B)	----	0.1	pH Unit		----	----	----	**6.5**	----
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)	----	2	mole H+ / t		----	----	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t		----	----	----	<2	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t		----	----	----	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.020	% pyrite S		----	----	----	<0.020	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.020	% pyrite S		----	----	----	<0.020	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.020	% pyrite S		----	----	----	<0.020	----
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)	----	0.020	% S		----	----	----	<0.020	----
Peroxide Sulfur (23De)	----	0.020	% S		----	----	----	<0.020	----
Peroxide Oxidisable Sulfur (23E)	----	0.020	% S		----	----	----	<0.020	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t		----	----	----	<10	----
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)	----	0.020	% Ca		----	----	----	**0.152**	----
Peroxide Calcium (23Wh)	----	0.020	% Ca		----	----	----	**0.155**	----
Acid Reacted Calcium (23X)	----	0.020	% Ca		----	----	----	<0.020	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t		----	----	----	<10	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.020	% S		----	----	----	<0.020	----
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)	----	0.020	% Mg		----	----	----	<0.020	----
Peroxide Magnesium (23Tm)	----	0.020	% Mg		----	----	----	<0.020	----
Acid Reacted Magnesium (23U)	----	0.020	% Mg		----	----	----	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t		----	----	----	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.020	% S		----	----	----	<0.020	----
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	----	----	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S		----	----	----	<0.02	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	----	----	<10	----
Liming Rate	----	1	kg CaCO3/t		----	----	----	<1	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-5	AB-6	AB-7	ASS-2D	ENM-D3D
				Client sampling date / time	03-Mar-2020 11:50	03-Mar-2020 12:00	03-Mar-2020 12:20	03-Mar-2020 10:46	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit		ES2007339-026	ES2007339-027	ES2007339-028	ES2007339-029	ES2007339-030
					Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting - Continued									
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		----	----	----	<0.02	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		----	----	----	<10	----
Liming Rate excluding ANC	----	1	kg CaCO3/t		----	----	----	<1	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		----	----	----	----	5.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	----	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	----	----
Asbestos Type	1332-21-4	-	--		-	-	-	----	----
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	----	----
Organic Fibre	----	0.1	g/kg		No	No	No	----	----
Sample weight (dry)	----	0.01	g		424	335	499	----	----
APPROVED IDENTIFIER:	----	-	--		A. SMYLIE	A. SMYLIE	A. SMYLIE	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		----	----	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		----	----	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		----	----	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg		----	----	----	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		----	----	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg		----	----	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		----	----	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg		----	----	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		----	----	----	----	<0.5
Chrysene	218-01-9	0.5	mg/kg		----	----	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	----	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	----	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	----	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	----	----	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	----	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	----	----	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	----	----	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	----	----	----	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	----	----	----	1.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-5	AB-6	AB-7	ASS-2D	ENM-D3D
				Client sampling date / time	03-Mar-2020 11:50	03-Mar-2020 12:00	03-Mar-2020 12:20	03-Mar-2020 10:46	03-Mar-2020 11:14
Compound	CAS Number	LOR	Unit		ES2007339-026	ES2007339-027	ES2007339-028	ES2007339-029	ES2007339-030
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons									
C10 - C14 Fraction	----	50	mg/kg		----	----	----	----	<50
C15 - C28 Fraction	----	100	mg/kg		----	----	----	----	<100
C29 - C36 Fraction	----	100	mg/kg		----	----	----	----	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	----	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
>C10 - C16 Fraction	----	50	mg/kg		----	----	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg		----	----	----	----	<100
>C34 - C40 Fraction	----	100	mg/kg		----	----	----	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	----	----	----	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		----	----	----	----	<0.2
Toluene	108-88-3	0.5	mg/kg		----	----	----	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	----	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	----	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	----	----	<0.5
^ Total Xylenes	----	0.5	mg/kg		----	----	----	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg		----	----	----	----	<0.2
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	----	----	----	**81.2**
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	----	----	**87.6**
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	----	----	**72.0**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	----	----	**95.9**
Anthracene-d10	1719-06-8	0.5	%		----	----	----	----	**87.5**
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	----	----	**97.4**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	----	----	----	**112**
Toluene-D8	2037-26-5	0.2	%		----	----	----	----	**114**
4-Bromofluorobenzene	460-00-4	0.2	%		----	----	----	----	**101**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	AB-6D	S-1	S-2	S-3	S-4
			Client sampling date / time	03-Mar-2020 12:05	03-Mar-2020 12:35	03-Mar-2020 12:40	03-Mar-2020 12:45	03-Mar-2020 12:50
Compound	CAS Number	LOR	Unit	ES2007339-031	ES2007339-032	ES2007339-033	ES2007339-034	ES2007339-035
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	----	8.6	8.7	8.9	8.8
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	116	255	145	112
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	----	3.9	3.7	9.2	3.6
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	----	----
Asbestos Type	1332-21-4	-	--	-	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	----	----	----
Organic Fibre	----	0.1	g/kg	No	----	----	----	----
Sample weight (dry)	----	0.01	g	295	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	6	6	<5	<5
Cadmium	7440-43-9	1	mg/kg	----	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	----	32	12	10	7
Copper	7440-50-8	5	mg/kg	----	34	21	12	8
Lead	7439-92-1	5	mg/kg	----	20	18	16	13
Nickel	7440-02-0	2	mg/kg	----	28	11	6	3
Zinc	7440-66-6	5	mg/kg	----	92	38	36	20
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-6D	S-1	S-2	S-3	S-4
				Client sampling date / time	03-Mar-2020 12:05	03-Mar-2020 12:35	03-Mar-2020 12:40	03-Mar-2020 12:45	03-Mar-2020 12:50
Compound	CAS Number	LOR	Unit		ES2007339-031	ES2007339-032	ES2007339-033	ES2007339-034	ES2007339-035
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-6D	S-1	S-2	S-3	S-4
				Client sampling date / time	03-Mar-2020 12:05	03-Mar-2020 12:35	03-Mar-2020 12:40	03-Mar-2020 12:45	03-Mar-2020 12:50
Compound	CAS Number	LOR	Unit		ES2007339-031	ES2007339-032	ES2007339-033	ES2007339-034	ES2007339-035
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Ethion	563-12-2	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg		----	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg		----	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		----	**0.7**	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		----	<0.5	**0.5**	<0.5	**0.5**
Pyrene	129-00-0	0.5	mg/kg		----	<0.5	**0.6**	<0.5	**0.5**
Benz(a)anthracene	56-55-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	**0.7**	**1.1**	<0.5	**1.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-6D	S-1	S-2	S-3	S-4
				Client sampling date / time	03-Mar-2020 12:05	03-Mar-2020 12:35	03-Mar-2020 12:40	03-Mar-2020 12:45	03-Mar-2020 12:50
Compound	CAS Number	LOR	Unit		ES2007339-031	ES2007339-032	ES2007339-033	ES2007339-034	ES2007339-035
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		----	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		----	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		----	**170**	**330**	<100	<100
C29 - C36 Fraction	----	100	mg/kg		----	**310**	**480**	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	**480**	**810**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		----	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		----	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		----	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		----	**400**	**660**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		----	**230**	**410**	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	**630**	**1070**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		----	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
^ Total Xylenes	----	0.5	mg/kg		----	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		----	<0.2	<0.2	<0.2	<0.2
Naphthalene	91-20-3	1	mg/kg		----	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	**84.2**	**70.6**	**81.8**	**76.5**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	**81.1**	**77.6**	**87.4**	**83.8**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	**81.5**	**88.0**	**76.4**	**74.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	AB-6D	S-1	S-2	S-3	S-4
				Client sampling date / time	03-Mar-2020 12:05	03-Mar-2020 12:35	03-Mar-2020 12:40	03-Mar-2020 12:45	03-Mar-2020 12:50
Compound	CAS Number	LOR	Unit		ES2007339-031	ES2007339-032	ES2007339-033	ES2007339-034	ES2007339-035
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		----	85.7	79.2	81.0	77.2
2-Chlorophenol-D4	93951-73-6	0.5	%		----	92.0	85.9	87.5	83.4
2.4.6-Tribromophenol	118-79-6	0.5	%		----	78.0	74.2	73.1	66.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		----	100	92.2	93.8	89.8
Anthracene-d10	1719-06-8	0.5	%		----	89.2	85.1	86.8	84.3
4-Terphenyl-d14	1718-51-0	0.5	%		----	102	93.9	97.1	92.8
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	104	121	108	115
Toluene-D8	2037-26-5	0.2	%		----	106	122	111	114
4-Bromofluorobenzene	460-00-4	0.2	%		----	94.5	108	99.0	104

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	AB-1 - 03-Mar-2020 10:36	Mid brown soil.
EA200: Description	AB-2 - 03-Mar-2020 10:47	Mid brown soil.
EA200: Description	AB-3 - 03-Mar-2020 11:16	Mid brown soil.
EA200: Description	AB-4 - 03-Mar-2020 11:34	Mid brown soil.
EA200: Description	AB-5 - 03-Mar-2020 11:50	Mid brown soil.
EA200: Description	AB-6 - 03-Mar-2020 12:00	Mid brown soil.
EA200: Description	AB-7 - 03-Mar-2020 12:20	Mid brown soil.
EA200: Description	AB-6D - 03-Mar-2020 12:05	Mid brown soil.

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Attachment 5: Chain of Custody (COC)

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ALS Environmental

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

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MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

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GOLDCOAST 46 Callingham Circle Hope Island QLD 4212 Ph: 07 5644 7222 E: goldcoast@alsglobal.com

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NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4421 0333 E: nowra@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7555 E: samples.perth@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Benbow Environmental	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 25 Sherwood Street Northmead, NSW, 2152		☐ Non Standard or urgent TAT (List due date):	Security Seal Intact? Yes No N/A
PROJECT: 191318	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 191318		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 2.9 °C
PROJECT MANAGER: Matthew Taylor	CONTACT PH: 02 9896 0399	OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Matthew Taylor	SAMPLER MOBILE: 0438 588 749		
COC emailed to ALS? NO	EDD FORMAT (or default):		
Email Reports to: mtaylor@benbowenviro.com.au, admin@benbowenviro.com.au			
Email Invoice to: accountsreceivable@benbowenviro.com.au			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Matthew Taylor (MT)	Sonya Mio SM		
DATE/TIME: 03/03/2020 14:00	DATE/TIME: 3/3/20 1420	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	P-18/1 COMP	P-18/1 DISCRETE	EA029 SPOCAS suite complete	EA200 asbestos					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	ENM-C1 + FMT-1	3/03/2020 10:33	S		2	✓								
2	ENM-C2 + FMT-2	3/03/2020 10:44	S		2	✓								
3	ENM-C3 + FMT-3	3/03/2020 11:13	S		2	✓								
4	ENM-C4 + FMT-4	3/03/2020 11:31	S		2	✓								Bag + Jar
5	ENM-C5 + FMT-5	3/03/2020 11:49	S		2	✓								
6	ENM-C6 + FMT-6	3/03/2020 11:57	S		2	✓								
7	ENM-C7 + FMT-7	3/03/2020 12:17	S		2	✓								
8	ENM-D1	3/03/2020 10:34	S		1		✓							
9	ENM-D2	3/03/2020 10:45	S		1		✓							
10	ENM-D3	3/03/2020 11:14	S		1		✓							
11	ENM-D4	3/03/2020 11:32	S		1		✓							Jar
12	ENM-D5	3/03/2020 11:48	S		1		✓							
13	ENM-D6	3/03/2020 11:58	S		1		✓							
14	ENM-D7	3/03/2020 12:18	S		1		✓							
15	ASS-1	3/03/2020 10:35	S		1			✓						
16	ASS-2	3/03/2020 10:46	S		1			✓						
17	ASS-3	3/03/2020 11:15	S		1			✓						
18	ASS-4	3/03/2020 11:33	S		1			✓						Bag
19	ASS-5	3/03/2020 11:51	S		1			✓						
20	ASS-6	3/03/2020 11:59	S		1			✓						
21	ASS-7	3/03/2020 12:19	S		1			✓						
22	AB-1	3/03/2020 10:36	S		1				✓					
23	AB-2	3/03/2020 10:47	S		1				✓					
24	AB-3	3/03/2020 11:16	S		1				✓					
25	AB-4	3/03/2020 11:34	S		1				✓					Bag
26	AB-5	3/03/2020 11:50	S		1				✓					
27	AB-6	3/03/2020 12:00	S		1				✓					
28	AB-7	3/03/2020 12:20	S		1				✓					
29	ASS-2D	3/03/2020 10:46	S		1			1						BAG
30	ENM-D3D	3/03/2020 11:14	S		1		1							~~BAG~~ JAR
31	AB-6D	3/03/2020 12:00	S		1				1					~~BAG~~ BAG
				TOTAL	38									~~BAG~~

Suitcase / Forward Lab / Spill WO

Lab / Analysis: SPOCAS → Brisbane

Organised By / Date: Asbestos →

Relinquished By / Date: Newcastle

Connote / Courier:

WO No:

Attach By PO / Internal Sheet:

Environmental Division Sydney

Work Order Reference

ES2007339

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand St Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 4971 9900 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5/585 Maitland Rd Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
NOWRA 4/15 Derry Place North Nowra NSW 2541 Ph: (02)4123 2002 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: Benbow Environmental	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☒ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 25 Sherwood Street Northmead, NSW, 2152		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: 191318	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 191318		COC: 1 (2) 3 4 5 6 7	Random Sample Temperature on Receipt: 2.9 °C
PROJECT MANAGER: Matthew Taylor	CONTACT PH: 02 9896 0399	OF: 1 (2) 3 4 5 6 7	Other comment:
SAMPLER: Matthew Taylor	SAMPLER MOBILE: 0438 588 749	RELINQUISHED BY: Matthew Taylor (NT-2)	RECEIVED BY: 508 44 1120
COC emailed to ALS? NO	EDD FORMAT (or default):	DATE/TIME: 03/03/2020 14:00	DATE/TIME: 3/3/20 1420
Email Reports to: mtaylor@benbowenviro.com.au, admin@benbowenviro.com.au		RELINQUISHED BY:	RECEIVED BY:
Email Invoice to: accountsreceivable@benbowenviro.com.au		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	S-19 Suite	IN-45 pH and EC							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
32	S-1	3/03/2020 12:35	S		1	1	1							
33	S-2	3/03/2020 12:40	S		1	1	1							
34	S-3	3/03/2020 12:45	S		1	1	1							
35	S-4	3/03/2020 12:50	S		1	1	1							
				TOTAL	4									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;

Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Attachment 6: Quality Assurance/Quality Control Certificate (QA/QC)

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2007339**	Page	: 1 of 10
Client	: **BENBOW ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Taylor	Telephone	: +61-2-8784 8555
Project	: 191318	Date Samples Received	: 03-Mar-2020
Site	: ----	Issue Date	: 17-Mar-2020
Sampler	: Matthew Taylor	No. of samples received	: 35
Order number	: 191318	No. of samples analysed	: 35

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)						
Soil Glass Jar - Unpreserved						
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7, S-1, S-2, S-3, S-4	----	----	----	09-Mar-2020	07-Mar-2020	**2**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7, S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	10-Mar-2020	✓	**09-Mar-2020**	07-Mar-2020	×
EA010: Conductivity (1:5)							
Soil Glass Jar - Unpreserved (EA010)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7, S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	10-Mar-2020	✓	**09-Mar-2020**	03-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-A: pH Measurements							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-B: Acidity Trail							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-C: Sulfur Trail							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-D: Calcium Values							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-E: Magnesium Values							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-F: Excess Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA029-G: Retained Acidity							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-H: Acid Base Accounting							
Snap Lock Bag - frozen (EA029)							
ASS-1, ASS-2, ASS-3, ASS-4, ASS-5, ASS-6, ASS-7, ASS-2D	**03-Mar-2020**	**11-Mar-2020**	27-Nov-2022	✓	**11-Mar-2020**	09-Jun-2020	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**----**	----	----	**04-Mar-2020**	17-Mar-2020	✓
Soil Glass Jar - Unpreserved (EA055)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7	**03-Mar-2020**	**----**	----	----	**06-Mar-2020**	17-Mar-2020	✓
Soil Glass Jar - Unpreserved (EA055)							
ENM-D1, ENM-D2, ENM-D3, ENM-D4, ENM-D5, ENM-D6, ENM-D7, ENM-D3D	**03-Mar-2020**	**----**	----	----	**10-Mar-2020**	17-Mar-2020	✓
EA155: Foreign Material - Type III							
Snap Lock Bag (EA155)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7	**03-Mar-2020**	**----**	----	----	**16-Mar-2020**	30-Aug-2020	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200)							
AB-1, AB-2, AB-3, AB-4, AB-5, AB-6, AB-7, AB-6D	**03-Mar-2020**	**----**	----	----	**05-Mar-2020**	30-Aug-2020	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**04-Mar-2020**	30-Aug-2020	✓	**04-Mar-2020**	30-Aug-2020	✓
EG005(ED093)T-MW: Total Metals by nitric acid microwave digestion / ICP-AES							
Soil Glass Jar - Unpreserved (EG005T-MW)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7	**03-Mar-2020**	**05-Mar-2020**	30-Aug-2020	✓	**05-Mar-2020**	30-Aug-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**04-Mar-2020**	31-Mar-2020	✓	**05-Mar-2020**	31-Mar-2020	✓
EG035T-MW: Total Recoverable Mercury by nitric acid microwave digestion / FIMS							
Soil Glass Jar - Unpreserved (EG035T-MW)							
ENM-C1+FMT-1, ENM-C2+FMT-2, ENM-C3+FMT-3, ENM-C4+FMT-4, ENM-C5+FMT-5, ENM-C6+FMT-6, ENM-C7+FMT-7	**03-Mar-2020**	**05-Mar-2020**	30-Aug-2020	✓	**05-Mar-2020**	30-Aug-2020	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM))							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**09-Mar-2020**	15-Apr-2020	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
ENM-D1, ENM-D2, ENM-D3, ENM-D4, ENM-D5, ENM-D6, ENM-D7, ENM-D3D, S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**09-Mar-2020**	15-Apr-2020	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**04-Mar-2020**	17-Mar-2020	✓	**04-Mar-2020**	17-Mar-2020	✓
Soil Glass Jar - Unpreserved (EP071)							
ENM-D1, ENM-D2, ENM-D3, ENM-D4, ENM-D5, ENM-D6, ENM-D7, ENM-D3D, S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**10-Mar-2020**	15-Apr-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
S-1, S-2, S-3, S-4	**03-Mar-2020**	**04-Mar-2020**	17-Mar-2020	✓	**04-Mar-2020**	17-Mar-2020	✓
Soil Glass Jar - Unpreserved (EP071)							
ENM-D1, ENM-D2, ENM-D3, ENM-D4, ENM-D5, ENM-D6, ENM-D7, ENM-D3D, S-1, S-2, S-3, S-4	**03-Mar-2020**	**06-Mar-2020**	17-Mar-2020	✓	**10-Mar-2020**	15-Apr-2020	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
ENM-D1, ENM-D2, ENM-D3, ENM-D4, ENM-D5, ENM-D6, ENM-D7, ENM-D3D, S-1, S-2, S-3, S-4	**03-Mar-2020**	**04-Mar-2020**	17-Mar-2020	✓	**04-Mar-2020**	17-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	6	48	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Microwave Digestion)	EG035T-MW	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICPAES (Microwave Digestion)	EG005T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Microwave Digestion)	EG035T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICPAES (Microwave Digestion)	EG005T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Microwave Digestion)	EG035T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICPAES (Microwave Digestion)	EG005T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS (Microwave Digestion)	EG035T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICPAES (Microwave Digestion)	EG005T-MW	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 6.1 and Table 1 (14 day holding time).
Foreign Material Content	EA155	SOIL	In house: Referenced to RTA T276. Foreign Material Content
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICPAES (Microwave Digestion)	EG005T-MW	SOIL	In house: Referenced to USEPA SW846 - 3051 (Microware Digestion); APHA 3120; USEPA SW846 - 6010. Metals in solids are determined following a microware digestion. The ICPAES technique ionizes selected elements. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass / charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS (Microwave Digestion)	EG035T-MW	SOIL	In house: Referenced to USEPA SW846 - 3051 (Microware Digestion); AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following a microware digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)

Analytical Methods	Method	Matrix	Method Descriptions
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Microwave Digest for Metals in Soils, Sediments and Sludges	EN31	SOIL	In house: Referenced to USEPA SW 846 - 3051. Microwave Assisted Nitric Acid Digestion 1.0g of sample is mixed with 10 mL conc. Nitric acid in a closed, high pressure vessel, and heated using a specific program. Digest is appropriate for selected metals analysis in sludge, sediments, soils and oils. This method is compliant with NEPM (2013) Schedule B(3) (Method 203)
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

DETAILED SITE INVESTIGATION
PREPARED FOR
GREENFIELDS RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA NSW 2745

Prepared for: Greenfields Resource Recovery Facility
Ellie Barikhan
Carlo Ranieri and Associates

Prepared by: Matthew Taylor, Environmental Scientist
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Report No: 191318-03_DSI_Rev2
August 2021
(Released: 6 August 2021)

Benbow
ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

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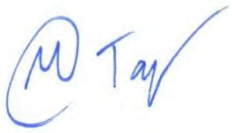
Matthew Taylor	Environmental Scientist		06 August 2021
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EXECUTIVE SUMMARY

Benbow Environmental (BE) was engaged by Carlo Ranieri and Associates, on behalf of Greenfields Resource Recovery Facility, to undertake a Detailed Site Investigation (DSI) for the site located at 344 Park Road, Wallacia NSW 2745.

Concerns have been raised by Penrith City Council (Council) on the contamination status of three (3) areas of concern on site. These areas of concern include:

Area of Concern #1: the shale covered car parking area north of the residence;

Area of Concern #2: The area where the stockpiles of material were previously located on the western portion of the site; and

Area of Concern #3: The small shed and surrounds at the eastern portion of the site.

Previous activities of concern taking place on the Site included the importation of potentially contaminated fill materials, the stockpiling of potentially contaminated materials and the use of the Site for truck and vehicle maintenance activities.

To alleviate concerns from these activities, soil sample collection and chemical analysis was undertaken within the areas of concern to determine the contamination status (if any) of the soils. Samples were analysed for the following contaminants of concern, as per the Limited Phase II Environmental Site Assessment (ESA) (Ref: 191318_Phase II) site-specific Conceptual Site Model (CSM):

- Heavy metals (including Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn));
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs);
- Polychlorinated Biphenyls (PCBs); and
- Asbestos Containing Materials (ACM).

A total of 28 surface soil samples were collected from the three (3) identified areas of concern by BE consultants on 25 June 2021. Samples were analysed by NATA accredited ALS Environmental in accordance with the ASC NEPM and results were compared to the SAC for contaminants of concern detailed in Table 5-2.

The 95% Upper Confidence Level (UCL) was calculated for all laboratory results of identified contaminants of concern, utilising Procedure D and Procedure G of the NSW EPA *Sampling Design Guidelines* (1995). The statistical analysis indicates that there is a 95% probability that the calculated average concentration of the contaminant will not exceed the criteria value.

The 95% UCL was calculated for each of the three (3) individual areas of concern.

All statistical analysis for all areas indicated that there is a 95% probability that the calculated average concentration of each contaminant of concern will not exceed the SAC value. The full

laboratory results for analytical testing of soil samples collected by BE are provided in the ALS Environmental Certificate of Analysis (COA) (Attachment 1).

The results of the soil sampling and analysis of samples collected from the three (3) areas of concern are summarised below.

Heavy metals: Results of analysis were all below adopted SAC.
TRH: Results of analysis were all below adopted SAC.
BTEXN: Results of analysis were all below adopted SAC.
PAHs: Results of analysis were all below adopted SAC.
OCPs and OPPs: Results of analysis were all below adopted SAC.
PCBs: Results of analysis were all below adopted SAC.
ACM: Results of analysis were all below adopted SAC.

In accordance with the ASC NEPM and the specific contaminant of concern limits defined in the SAC, results from analysis demonstrates that soils in the three (3) areas of concern are not contaminated. This confirms the site is suitable for the proposed use as a resource recovery facility.

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Tables

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ACRONYMS USED IN THIS REPORT

ADI - Allowable Daily Intake
AEC – Area of Environmental Concern
BTEXN - Benzene, Toluene, Ethyl Benzene, Xylene, Naphthalene
COC – Chain of Custody
CSM – Conceptual Site Model
DQO – Data Quality Objectives
DSI – Detailed Site Investigation
EIL – Environmental Investigation Level
EPA – Environmental Protection Authority
ESL – Environmental Screening Level
HIL – Health Investigation Level
HSL – Health Screening Level
LOR – Limit of Reporting
NATA – National Association of Testing Authorities
NEPM – National Environmental Protection Measure
PID – Photo Ionisation Detector
QA/QC - Quality Assurance and Quality Control
RPD - Relative Percent Difference
SAC – Site Adopted Criteria
STEL - Short-Term Exposure Limit
TPH - Total Petroleum Hydrocarbons
TRH – Total Recoverable Hydrocarbons
TWA - Time Weighted Average
UCL – Upper Confidence Level
VOC – Volatile Organic Compound

SPELLING AND ABBREVIATIONS USED IN THIS REPORT

Spelling in this document follows Australian standard English except when referring to chemical names and abbreviations, where the International Union of Pure and Applied Chemistry (IUPAC) spelling is adopted (such as “sulfur” instead of “sulphur”).

1. INTRODUCTION

Benbow Environmental (BE) was engaged by Carlo Ranieri and Associates, on behalf of Greenfields Resource Recovery Facility, to undertake a Detailed Site Investigation (DSI) for the site located at 344 Park Road, Wallacia NSW 2745 (the Site).

Concerns have been raised by Penrith City Council (Council) on the contamination status of three (3) areas of concern on site. A sampling and testing approach was approved by Council on 8 June 2021 and included:

Area of Concern #1: the shale covered car parking area north of the residence;

Area of Concern #2: The area where the stockpiles of material were previously located on the western portion of the site; and

Area of Concern #3: The small shed and surrounds at the eastern portion of the site.

Previous activities of concern taking place on the Site included the importation of potentially contaminated fill materials, the stockpiling of potentially contaminated materials and the use of the Site for truck and vehicle maintenance activities.

To alleviate concerns from these activities, soil sample collection and chemical analysis was undertaken within the areas of concern to determine the contamination status (if any) of the soils. Contaminants of concern were selected and guided as per the Limited Phase II Environmental Site Assessment (ESA) (Ref: 191318_Phase II) site-specific Conceptual Site Model (CSM):

- Heavy metals (including Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn));
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs);
- Polychlorinated Biphenyls (PCBs); and
- Asbestos Containing Materials (ACM).

A total of 28 sampling points have been included in the DSI assessment. The number of sampling points was informed by NSW EPA *NSW Sampling Design Guidelines* (1995). Soil samples were collected from the surface (approximately 0.1-0.2 m deep) using hand instruments (i.e. mattock, metal trowel, spoon and/or gloved hand).

This report is compiled in accordance with the NSW EPA *Sampling Design Guidelines* (1995), NSW EPA *Consultants Reporting on Contaminated Land – Contaminated Land Guidelines* (2020) and National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999) amended 2013.

1.1 SCOPE OF WORK

The scope of works is provided below:

- Provide a brief outline of the site history, location, geology and hydrology;

- Identify the potential contaminants of concern, as approved by Council and the site-specific CSM;
- Verify the presence, type, and extent of contamination (if any) to the local environment;
- Compare contaminant levels to the appropriate criteria, including the current risk levels posed to human health and environment;
- Provide laboratory analysis results and sampling methodology;
- Provide a statement and report on the contamination status, detailing the above.

1.2 OBJECTIVE

The principal purpose of this DSI is to provide a detailed assessment and statement on the contamination status of the three (3) identified areas of concern.

Concerns have been raised by Council on the contamination status of these areas. To alleviate concerns from previous activities, soil sample collection and chemical analysis was undertaken within the areas of concern to determine the contamination status (if any) of the soils.

2. SITE IDENTIFICATION AND LOCATION

2.1 SITE LOCATION

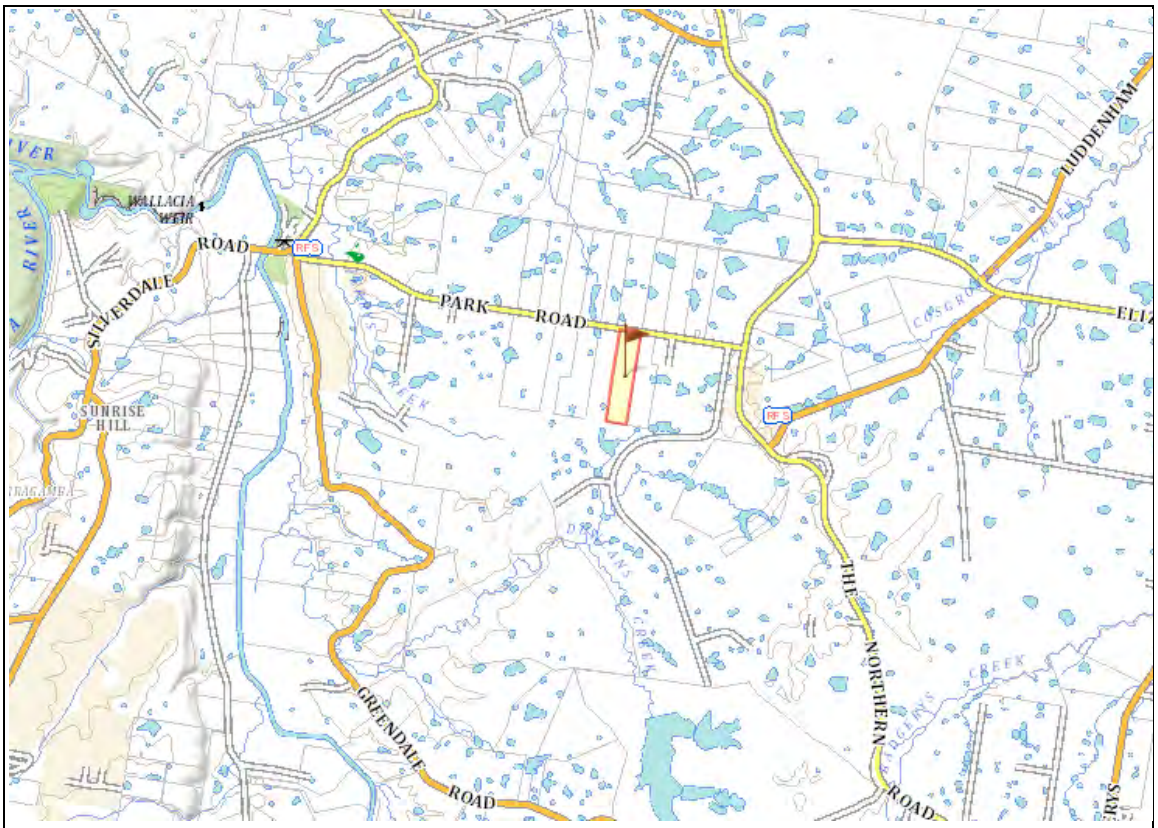
Site identification details are summarised in Table 2-1.

The Sites location in a regional setting, aerial view and land zoning are displayed in Figure 2-1, Figure 2-2 and Figure 2-3 respectively.

Table 2-1: Site Identification Details

Address	344 Park Road, Wallacia NSW 2745
Lot and DP Numbers	Lot 5 DP 655046
Coordinates	-33.875084° Lat., 150.676880° Long
Investigation Area	5,120 m^2 (total of three areas of concern)
Local Government Area	Penrith City Council
Current Land Zoning	RU1 – Primary Production

Figure 2-1: Site Location (Regional Setting)



Source: Six Maps 2021

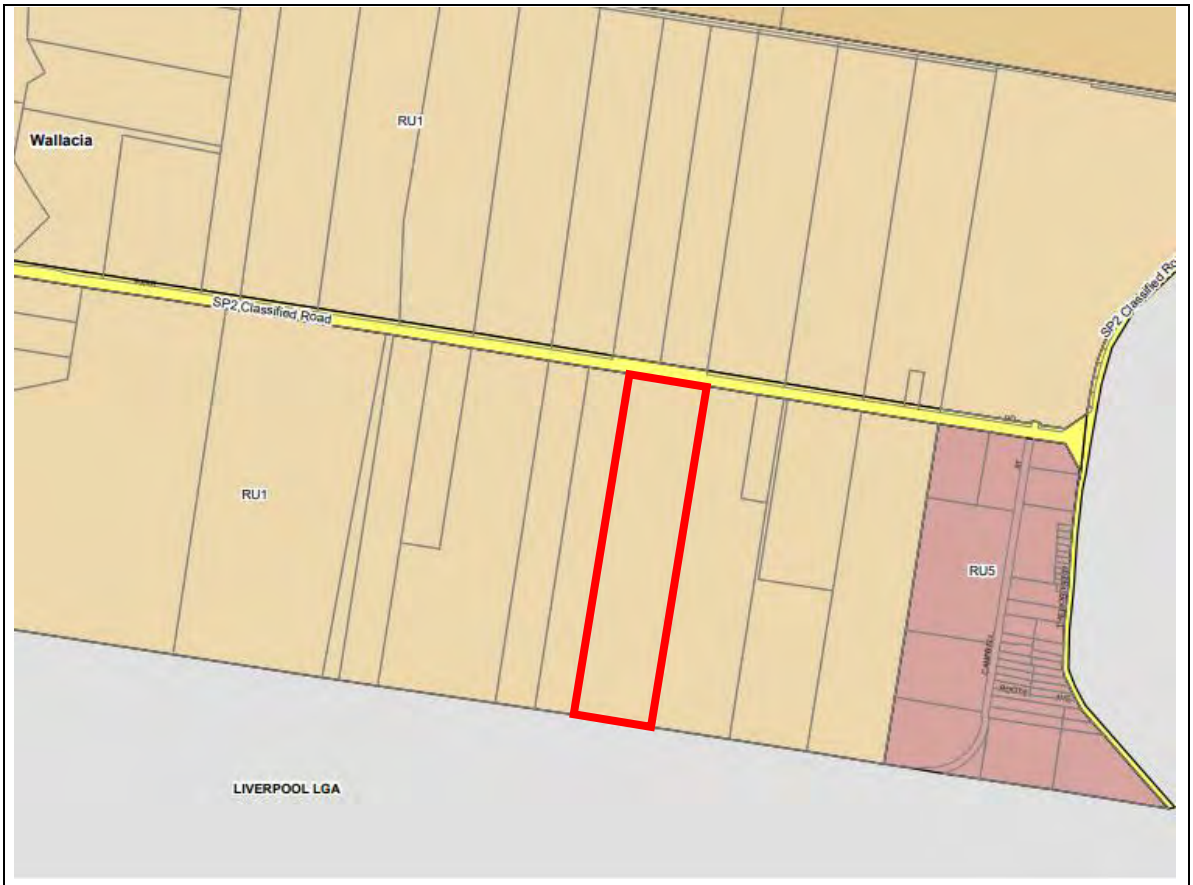
↑N Not to scale	LEGEND: Site Boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Site Location (Aerial Photograph)

Source: Six Maps 2021

↑N Not to scale	LEGEND: Site Boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-3: Land Zoning Map (Extract)



Source: Penrith LEP 2010 Land Zoning Map - Sheet LZN_008

N

Not to scale

LEGEND:

Site Boundary

Zone

B1	Neighbourhood Centre	RE1	Public Recreation
B2	Local Centre	RE2	Private Recreation
B5	Business Development	RU1	Primary Production
B6	Enterprise Corridor	RU2	Rural Landscape
E1	National Parks and Nature Reserves	RU4	Primary Production Small Lots
E2	Environmental Conservation	RU5	Village
E3	Environmental Management	SP1	Special Activities
E4	Environmental Living	SP2	Infrastructure
IN1	General Industrial	W1	Natural Waterways
IN2	Light Industrial	W2	Recreational Waterways
R1	General Residential		
R2	Low Density Residential		
R3	Medium Density Residential		
R5	Large Lot Residential		

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25-27 Sherwood Street,
Northmead NSW 2152

2.2 SITE CONDITION AND SURROUNDING ENVIRONMENT

The Site is currently not being used. An unsealed driveway provides access to the site from Park Road and runs along the eastern boundary, providing access to a small dwelling and cleared area. Part of the land at the north-eastern area of the site has previously been cleared and now contains scattered established trees and grassed areas.

The small dwelling is located approximately 200 m to the south of Park Road and was being used as an office for tenants that were previously leasing the site and is now vacant. An existing pond is located north of the dwelling. A large cleared area of land to the south of the dwelling has been disturbed and various stockpiles of untreated timber materials are stored in this area.

The remaining area of the site is densely vegetated. An ephemeral watercourse traverses the site approximately 100 m south of the cleared area. Some unsealed tracks criss-cross through the southern area of the site.

2.3 AREAS OF CONCERN

Concerns have been raised by Council on the contamination status of three (3) areas on site (areas of concern). These areas of concern are identified in Table 5-3 and displayed in Figure 2-4, and include:

Area of Concern #1: the shale covered car parking area north of the residence;

Area of Concern #2: the area where the stockpiles of material were previously located on the western portion of the site; and

Area of Concern #3: the small shed and surrounds at the eastern portion of the site.

Figure 2-4: Identified Areas of Concern on Site

Source: Google Earth 2021

↑N Not to scale	LEGEND: Area of Concern Boundary Area of Concern ID	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

3. GEOLOGY & HYDROGEOLOGY

3.1 SOIL CLASSIFICATION AND GEOLOGY

The 'Penrith 1:100,000 Geological Map Sheet 9030' describes the geological composition of the area as follows:

> *Wianamatta Group, Bringelly Shale (Rwb) – Shale, carbonaceous claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff*

The soil map 'Soil Landscapes of the Penrith 1:100,000 Sheet 9030' shows that the subject site is located in the 'Blacktown' (bt) area and is described as follows:

Blacktown (bt)

> *Landscape – gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes are usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest).*
>
> *Soils – shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, Red and Brown Podzolic Soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to Yellow Podzolic Soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.*
>
> *Limitations – moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.*

3.2 ACID SULFATE SOILS (ASS)

Information on the SEED (Sharing and Enabling Environmental Data) Map Viewer of Acid Sulfate Soils Risk and the NSW Planning Portal show that the subject site is not on any class of Acid Sulfate Soils (ASS). ASS are not expected on site and analysis of soil samples has not been undertaken in the DSI.

3.3 SURFACE HYDROLOGY AND LOCAL HYDROGEOLOGY

A small ephemeral watercourse is located south-west of the cleared portion of the site and traverses the site. The nearest water course to the site is Jerrys Creek, approximately 1.1 km west-southwest of the site perimeter. Cosgroves Creek is approximately 1.9 km east. Both creeks are at the extent of their tributaries. Jerrys Creek runs approximately 3.8 km north-west until it joins the Nepean River in Wallacia. Cosgroves Creek runs north-east for approximately 10.4 km before joining South Creek in Luddenham.

Numerous small-medium sized dams occupy neighbouring properties.

4. CONTAMINANTS OF CONCERN

The selection of contaminants of concern is based on the site-specific conceptual site model from the Limited Phase II ESA (Ref: 191318_Phase II) undertaken in May 2020. Identified contaminants of concern have been identified and include substances typically associated with industrial uses, waste storage and uncontrolled fill materials.

Contaminants of concern selected for this DSI include:

- Heavy metals including; Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn);
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs);
- Polychlorinated Biphenyls (PCBs); and
- Asbestos Containing Materials (ACM).

Each selected contaminant of concern is detailed in the following sub-sections.

4.1 HEAVY METALS

Heavy metals include highly toxic naturally occurring elements that may be present fill materials on site. Industrial uses and improper management of chemicals containing heavy metals may contribute to potential soil contamination on site. Additionally, fuel combustion and agricultural practices may contribute to heightened heavy metal concentrations in the environment.

Due to usage and materials stored, there is a potential for heavy metals to be present on Site in all identified areas of concern. Heavy metals included for analysis in the DSI are Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn).

4.2 TOTAL RECOVERABLE HYDROCARBONS (TRH)

Total Recoverable Hydrocarbons (TRH) refer to the extracted biogenic and petrogenic hydrocarbon components of a sample. TRH compounds are measured in fractions, with each fraction representing one of four carbon groupings (F1, F2, F3 and F4).

TRH fractions are based on the length of the compounds carbon chains. Shorter chained fractions (F1 and F2) are volatile chemicals that vaporise readily and are considered more toxic. Longer chained fractions (F3 and F4) are non-volatile chemicals that do not pose a vapour risk. All TRH fractions pose threats to the environment and health risks to humans including through inhalation of vapours (F1 and F2) or through dermal contact and ingestion (or inhalation) of contaminated soils (F3 and F4).

Specific aromatic carbon compounds (BTEXN), although part of the F1 and F2 TRH fractions, are dealt with separately due to their higher toxicity compared to other TRH compounds.

Historical imagery of the Site showed the small shed at the eastern portion of the site (Area of Concern #3) was utilised as a truck maintenance workshop. Additionally, oils and petroleum

products containing BTEXN may have been stored or utilised in this area, potentially contaminating soils.

4.3 Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN)

Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN) are a group of VOCs that are present in crude oils and are released during fuel combustion. Heavy vehicular traffic is the primary emission source of BTEXN into the environment, however, the storage and handling of oils and petroleum products also contributes to emissions. Leaks and spills of fuels containing BTEXN can potentially impact soil and groundwater.

In addition to TRH, BTEXN may be present in areas of concern where vehicles were stored, maintenance activities were undertaken or oil and/or fuels were stored (Areas of Concern #1 and #3).

4.4 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons (PAHs) are a class of naturally occurring chemicals found in oils and produced during the combustion and semi-combustion of natural materials (e.g. during bushfires) or during fuel combustion (e.g. exhaust fumes from vehicles). Numerous PAHs pose a threat to human health due to carcinogenicity and they are particularly persistent in aquatic habitats, bioaccumulating readily in organisms.

In addition to TRH and BTEXN, PAHs may be present in areas of concern where vehicles were stored, maintenance activities were undertaken or oil and/or fuels were stored (Areas of Concern #1 and #3).

4.5 Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs)

Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs) are persistent, bioaccumulative insecticides that have been widely used in Australian agricultural practices since the 1940's. Due to their persistence in the environment and the toxicity of compounds such as DDT, aldrin and dieldrin, OCPs and OPPs pose a significant threat to the health of many organisms (including potential carcinogenicity in humans) and they bioaccumulate readily in the food chain.

Previously stockpiled organic materials and timber products in Area of Concern #3 have the potential to be contaminated with OCPs and OPPs. Additionally, due to the unknown origins of fill materials used to establish the northern carpark (Area of Concern #1), sample collection and analysis for OCPs and OPPs was undertaken.

4.6 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are chlorinated hydrocarbons widely distributed as chemical insulators and coolants until their ban in the 1970's. PCBs were prevalent in industrial products such as paints and inks, and within electrical transformers and capacitors.

PCBs are a highly toxic and persistent chemical compound that pose a significant threat to the environment and organisms through bioaccumulation.

Use of the shed at the eastern portion of the Site (Area of Concern #3) for truck maintenance activities may have included the use of oils in engines, motors and hydraulic systems that potentially contained PCBs. Additionally, due to the unknown history of chemicals on site, coolants, lubricants and other oils containing PCBs may have been stored or utilised in this area.

4.7 ASBESTOS CONTAINING MATERIALS (ACM)

Asbestos is a naturally occurring silicate material that was heavily used in Australia during the mid-late 20th century. It is a hazardous carcinogen that has severe health implications to those exposed to it.

Industrial uses of asbestos containing materials (ACM) include fibro cement sheets, drain pipes, roofs and gutters. As of 2003, there has been a total ban of new ACM use in Australia, however, ACM is present in many structures and products still in use today. As per NSW EPA *Waste Classification Guidelines* (2014), ACM waste is classed as a "special waste" that must abide strict regulations regarding its transport and disposal.

During demolition of structures constructed of or containing ACM, ACM waste may be wrongfully disposed of as construction and demolition (C&D) waste and circulated within recovered aggregates or recycled materials.

Due to the unknown origins of fill materials used to establish the northern carpark (Area of Concern #1) and potentially contaminated stockpiled materials (Area of Concern #2), sample collection and analysis for ACM was undertaken.

4.8 CONCEPTUAL SITE MODEL (CSM)

A conceptual site model (CSM) has been prepared in accordance with the ASC NEPM (Table 4-1). The CSM is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors.

Table 4-1: Conceptual Site Model

Potential Sources of Contamination	Primary Release Mechanism	Potentially Impacted Media	Contaminants of Potential Concern	Potential Receptors		Exposure Pathways		Risk of Contamination
				Human	Environment	Human	Environment	
Potentially contaminated fill materials	Application/ disturbance/leaching of contaminated fill materials on/off site	Soil Groundwater Surface Water	Heavy metals TRHs BTEXN PAHs OCPs/OPPs PCBs ACM	Workers on site Neighbouring premises if contamination migrates off-site	Soils Waterways Native Habitats	Dermal contact Inhalation of dust and vapours Ingestion	Surface water runoff Soils Groundwater	Low to Medium
Potentially contaminated stockpiled materials	Storage/disturbance/ leaching of contaminated stockpiled materials on/off site	Soil Groundwater Surface Water	Heavy metals BTEXN TRHs PAHs OCPs/OPPs PCBs ACM	Workers on site Neighbouring premises if contamination migrates off-site	Soils Waterways Native Habitats	Dermal contact Inhalation of dust and vapours Ingestion	Surface water runoff Soils Groundwater	Low to Medium
Commercial vehicle maintenance and storage activities	Improper storage and leaking of hazardous materials	Soil Groundwater Surface Water	Heavy metals BTEXN TRHs PAHs PCBs	Workers on site Neighbouring premises if contamination migrates off-site	Soils Waterways Native Habitats	Dermal contact Inhalation of dust and vapours Ingestion	Surface water runoff Soils Groundwater	Low to Medium

TRHs: Total Recoverable Hydrocarbons

BTEXN: Benzene, Toluene, Ethylbenzene, Xylene & Naphthalene

PAHs: Polycyclic Aromatic Hydrocarbons

OCPs/OPPs: Organochlorine Pesticides and Organophosphate Pesticides

PCBs: Polychlorinated Biphenyls

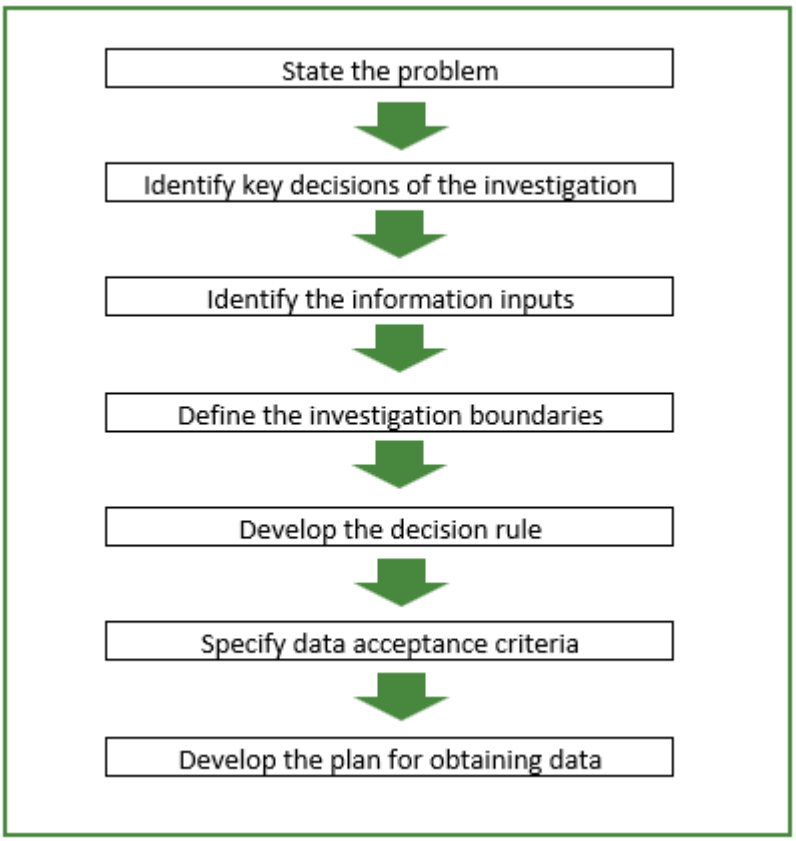
ACM: Asbestos Containing Materials

5. DATA QUALITY OBJECTIVES (DQO)

The data quality objectives (DQO) process is a seven-step iterative planning approach that is used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of a site.

The summary of the process as shown in Figure 5-1 below, is adapted from US EPA (2006a), NSW DEC (2006) and the ASC NEPM.

Figure 5-1: The DQO Process



5.1 STEP 1 – STATE THE PROBLEM

A summation of the site's contamination problem that requires new environmental information and to identify the available resources to resolve this problem. A preliminary Conceptual Site Model (CSM) is needed to complete this step.

- State the objectives of the proposed investigation;
- Provide a brief summary of the site contamination issues to be addressed by the investigation;
- State the reason for the project's purpose;
- What site constraints limit the investigation? (e.g. time, resources, climatic conditions, access restrictions);
- What resources are available for the investigation?;
- What is the timeframe for the investigation's completion?;
- Is there any community concerns or local issues that will influence the design and implementation of the environmental assessment?; and

- Who is the regulatory authority(ies) and the local government area?

- The problem relates to Council concerns on the contamination status of the Site at three (3) areas of concern.
- The principal purpose of this DSI is to chemically assess soil samples and determine the contamination status of three (3) areas of concern, as defined by Council.
- Limited constraints are involved with this DSI; all identified areas of concern are accessible and appropriate resources are available.
- Sample collection and chemical analysis will be undertaken for identified contaminants of concern (outlined in Section 4).
- The timeline for the DSI is to present an assessment report to Council as soon as practicable.
- The Site is located within the Penrith City Council local government area. The proposed development is also assessable by the NSW EPA.

5.2 STEP 2 – IDENTIFY THE KEY DECISIONS OF THE INVESTIGATION

Step two requires identifying the key decisions that need to be taken concerning the site's contamination issue. Such as; is further investigation, remediation or treatment required? What new environmental data is required to make these?

Key decision making requires a full understanding of the site's current contamination status and any unacceptable risk to human health or the environment that it may potentially pose. This step should assist in developing a decision statement linking the principal study objective(s) to the possible actions that will address the problem.

- Determining the contamination status of the identified contaminants of concern (COC) within the identified areas of concern.
- Determining the concentrations of contaminants, and where present, the risks they may pose to human health and the environment.
- Where present, determining the appropriate method to remove/remediate contaminant concentrations to levels that do not pose a risk to human health and the environment.

5.3 STEP 3 – IDENTIFY THE INFORMATION INPUTS

Identify the information/new data that will be required to resolve the key decision statements. Identify where this data is sourced and:

- The media that needs to be collected, (soil, groundwater, sediments, air etc.);
- The parameters to be measured for each media;
- Site criteria for each contaminant of concern;

- The analytical methods required to sufficiently identify any harmful levels of contaminants of concern so that these can be assessed against the SAC;
- The basis for any decisions to be made from field screening and what action is to be taken if a defined concentration is attained; and
- Any additional information needed to make the required decisions.

- Soil samples will be collected to determine contamination status of areas of concern.
- Collected samples will be analysed for the identified contaminants of concern.
- The SAC for this DSI is detailed in Section 5.8.
- All soil samples are submitted to a NATA accredited laboratory for chemicals analysis.

5.4 STEP 4 – DEFINE THE INVESTIGATION BOUNDARIES

The fourth step involves specifying the spatial and temporal aspects of the environmental media that the data must represent to support decision(s). Such as defining:

- The characteristics that define the media of interest;
- The spatial extent (property boundaries, site accessibility constraints, potential exposure areas)
- Time and budget constraints;
- The lateral and vertical extent of the believed distribution of contaminants of concern;
- Scale of the decisions required: site-wide, each lot etc; and
- Identify any practical site constraints.

- The media of interest is the surface soils within the identified areas of concern.
- Areas of concern have been defined and are all within the property boundary.
- Limited constraints are involved with this DSI; all identified areas of concern are accessible and appropriate resources are available.

5.5 STEP 5 – DEVELOP THE DECISION RULE

The fifth step involves defining the parameter of interest, specifying the action level, and integrating information from Steps 1–4 into a single statement that gives a logical basis for choosing between alternative actions. The statistical parameter (the parameter of interest) characterises the population (media of interest).

- The comparison of sample results against the SAC to determine the extent of contamination (if present) and identify any specific areas requiring remediation (if required).
- Make a statement on the contamination status of the three (3) areas of concern in relation to the identified contaminants of concern at a 95% statistical degree of certainty.

5.5.1 Rinsate Blanks

One (1) rinsate blank will be collected and analysed from each sampling day if non-disposable sampling equipment was used on that day. The rinsate blank will be analysed for at least one of the analyses undertaken for collected field samples.

- Dedicated and disposable sampling equipment will be used to collect samples.
- Soil samples will be collected with new gloves at each sampling point.
- Rinsate was collected for any sampling equipment that is reused.

5.5.2 Trip Spikes and Trip Blank Samples

If sampling is required for VOCs, one trip spike and trip blank sample will be used for each day of sampling.

- Soil samples will be analysed for VOCs (BTEXN). No gas or vapour samples will be collected, therefore no trip spike or trip blank samples are required.

5.5.3 Field Duplicates and Field Triplicates

Field duplicate and field triplicates will be collected at a rate of one per twenty (5%) site samples. Collected duplicates and triplicates will be analysed for at least one of the COC the parent sample is also tested for. The relative percent difference (RPD) of concentrations of relevant COC, between the original sample and the duplicate/triplicate will be calculated.

- Two (2) field duplicate samples were collected and included in the laboratory analysis.

5.5.4 If/Then Decision Rules

A statement that defines the conditions that would cause a decision-maker to choose from alternative actions.

- If the selected sampling point within a grid is not available (e.g. surface soils inaccessible), then the nearest accessible sampling point within the grid is selected.

5.6 STEP 6 – SPECIFY DATA ACCEPTANCE CRITERIA

The sixth step involves specifying the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data. Decision errors are

incorrect decisions caused by using data that is not representative of site conditions due to sampling or analytical error. As a result, a decision may be made that site clean-up is not needed when really it is, or vice versa.

There are two types of decision error:

1. **Sampling errors:** when the sample program does not adequately detect a contaminant of concern's spatial variability across the site, meaning the collected samples are not representative of the site conditions; and
2. **Measurement errors:** during sample collection, handling, preparation, analysis and data reduction.

BE will mitigate the risk of decision error by:

- Assigning fieldwork tasks to suitably experienced BE consultants;
- Submitting all samples to a NATA accredited laboratory for analysis; and
- Assigning data interpretation tasks to suitably experienced BE consultants, outsourcing to technical experts where required.

5.7 STEP 7 – DEVELOP THE PLAN FOR OBTAINING DATA

The seventh step involves identifying the most resource-effective sampling and analysis design for generating the necessary data required to satisfy the DQOs.

The (SAQP) has been prepared in accordance with the DER *Contaminated Sites Management Series* guidelines. To maintain data integrity and reliability, the following measures were adopted:

- Strict adherence to sampling QA/QC protocols.
- Use of appropriate laboratory limits of reporting for COC.

5.8 SITE ADOPTED CRITERIA (SAC)

A site assessment determines what present and future risks exist from a contaminated site for human and environmental health and to provide potential remediation or management plans to make a site fit for its intended ongoing use. In order to evaluate the risks from contaminants, site criteria are adopted which are a set of values of the tolerable limit of contaminant that does not pose a threat to human or ecological health. Thus, Site Adopted Criteria (SAC) is applied against a site's contaminant concentrations with the level of risk assessed for the site in question. The following outlines the SAC values used in this assessment.

5.8.1 National Environmental Protection (Assessment of Site Contamination) Measure (1999)

Laboratory results associated with surface soil materials have been assessed against the investigation and screening levels in Schedule B1 of National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM).

These guidelines have been endorsed by the NSW EPA under the *Contaminated Land Management* (CLM) *Act*, 1997. The ASC NEPM provides soil investigation and screening levels for commonly encountered contaminants which are applicable to four (4) generic land use settings and include consideration of the soil type and the depth of contamination, where relevant. Where criteria is absent from the NEPM, other authoritative sources are sought, such as the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care) and the US EPA.

The soil investigation and screening levels are described in the ASC NEPM as follows:

- **Health Investigation Level (HIL)**
  Health investigation levels (HILs) are generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. HILs are generic to all soil types and generally apply to the top 3 m of soil.

- **Health Screening Level (HSL)**
  Health Screening Levels (HSLs) have been derived for BTEX, naphthalene and four carbon chain fractions, as adopted in NEPC (2013). HSLs have been calculated to account for depth (from below surface to >4 m), soil textures (sand, silt and clay) and the land use settings.

- **Ecological Investigation Level (EIL)**
  Ecological Investigation Levels (EILs) have been developed for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems. EILs depend on land use scenarios and specific soil physiochemical properties, such as pH, cation exchange capacity (CEC), iron and carbon content, etc. They generally apply to the top 2 m of soil.

- **Ecological Screening Level (ESL)**
  Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon (TPH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

- **Management Limits**
  Petroleum hydrocarbon management limits ('management limits') are only applicable to petroleum hydrocarbon compounds. They are valid as screening levels following evaluation of human health and ecological risks, and risks to groundwater resources. Management limits apply to all soil depth, based on site-specific considerations for land use and soil type.

The four (4) generic land use settings include:

- HIL A - residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry) and includes; children's day care centres, preschools and primary schools;
- HIL B - residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
- HIL C - public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate; and

- **HIL D - commercial/industrial such as shops, offices, factories and industrial sites.**

For the purposes of this assessment **HIL-D** is relevant. The ASC NEPM considers three (3) different soil textures and derives HSLs for each different soil classification, as per AS 1726. Table 5-1 displays the soil classification for HSL.

Table 5-1: HSL Soil Classification

Soil Type	Description
Sand	Coarse-grained soil
Silt	**Fine-grained soil - silts and clays (liquid limit <50 %)**
Clay	**Fine-grained soil - silts and clays (liquid limit >50 %)**

The summarised investigation and screening limits for land use scenario is HIL-D (commercial/industrial) for soil type silt and clay (fine-grained soil). Field assessment during sample collection revealed surface soils were primarily silty and clay loams. Individual soil classifications per area of concern are described in Section 5.9.1 and soil classification methods are detailed in Section 5.9.6.

The SAC for the appropriate land use scenarios is shown in Table 5-2. Where relevant, the specific soil classification per criteria limit is listed beside the chemical name (e.g. TRH and BTEX).

Table 5-2: SAC for Identified Contaminants of Concern

Chemical	HIL-D (mg/kg)	ESL-D (mg/kg)	EIL-D (mg/kg)	HSL-D (%)
Metals and Inorganics				
Arsenic	3,000		160	
Cadmium	900			
Chromium (VI)	3,600			
Copper	240,000			
Lead	1,500			
Mercury (inorganic)	730			
Nickel	6,000			
Zinc	400,000			
Polycyclic Aromatic Hydrocarbons (PAHs)				
Benzo(a)pyrene		0.7		
Benzo(a)pyrene TEQ	40			
Total PAHs	4,000			
Other Organics				
PCB	7			
Organochlorine Pesticides (OCPs)				
DDT+DDE+DDD	3,600			
Aldrin and dieldrin	45			
Chlordane	530			

Chemical	HIL-D (mg/kg)	ESL-D (mg/kg)	EIL-D (mg/kg)	HSL-D (%)
Endosulfan	2,000			
Endrin	100			
Heptachlor	50			
HCB	80			
Methoxychlor	2,500			
Organophosphorus Pesticides (OPPs)				
Chlorpyrifos	2,000			
Total Recoverable Hydrocarbons (TRH)				
C6 – C10 Fraction (*Coarse/Fine*)		215		
C6 – C10 Fraction minus BTEX (F1) (*Coarse/Fine*)		215		
>C10 - C16 Fraction (*Coarse/Fine*)		170		
>C16 - C34 Fraction (*Fine*)		2,500		
>C34 - C40 Fraction (*Fine*)		6,600		
BTEXN				
Benzene (*Fine*)		95		
Toluene (*Fine*)		135		
Ethylbenzene (*Fine*)		185		
Xylenes (*Fine*)		95		
Naphthalene			370	
Asbestos Containing Material (ACM)				
Bonded Asbestos Containing Material (ACM)				0.05
Fibrous Asbestos (FA) and Asbestos Fines (AF) (friable asbestos)				0.001
All forms of asbestos				No visible asbestos for surface soil.

Note: Criteria left blank where none applies

5.9 SAMPLING METHODOLOGY

5.9.1 Sampling Locations and Methods

A total of 28 surface soil samples were collected amongst the three (3) areas of concern by BE consultants on 25 June 2021, as detailed in Table 5-3. Soil samples were analysed for the contaminants of concern detailed in Section 4.

A systematic sampling pattern was adopted where an equally spaced grid was placed over each area of concern and soil samples were collected from within each square. Where possible, samples were collected from the centre of the grid (except where defined and displayed). The following sub-sections display each area of concern and detail observations and sample collection rational.

Table 5-3: Areas of Concern

Area of Concern #	Approx. Area Size (m^2)	No. of Samples Collected
1	2,500	10
2	2,500	10
3	120	8
TOTAL	**5,120**	**28**

5.9.1.1 Area of Concern #1

Figure 5-2 displays the Area of Concern #1, the shale covered car parking area north of the residence. Ten (10) soil samples were collected from this area. Soils within this area were classified as a silty clay loam, high in shale, and were predominantly dark grey in colour.

The entire area was free of stored materials or vehicles, and all defined grid points and sample locations were accessible. Samples were collected from the surface after the top layer of shale was broken with a mattock.

Figure 5-2: Area of Concern #1

Source: Google Earth 2021

↑N Not to scale	LEGEND: Area of Concern Boundary Sample ID	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

5.9.1.2 Area of Concern #2

Figure 5-3 displays the Area of Concern #2, the area where the stockpiles of material were previously located on the western portion of the site. Ten (10) soil samples (and one (1) duplicate sample) were collected from this area. Soils within this area were classified as a silty loam, and were dark brown, yellow, orange and/or grey in colour. Samples S-15-S18 were waterlogged.

Numerous large (>3 m in height) stockpiles of untreated timber products were stored in this area during the sampling event. Where possible, samples were collected within the centre of each grid area of concern. Where not possible (e.g. access to soils at the centre of the grid was obstructed by stockpiled material), samples were collected on the bare earth closest to the edge of the stockpiled material.

Sample ID's S-11, S-12, S-13, S-14, S-19 and S-20 were collected on bare earth (soils) at the base and beside stockpiled materials. Sample ID's S-15, S-16, S-17 and S-18 (inclusive) were free of stockpiled materials and soil was collected from the centre of each grid.

Figure 5-3: Area of Concern #2

Source: Google Earth 2021

↑N
Not to scale

LEGEND:
Area of Concern Boundary
Sample ID

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

5.9.1.3 Area of Concern #3

Figure 5-4 displays the Area of Concern #3, the small shed and surrounds at the eastern portion of the site. Eight (8) soil samples (and one (1) duplicate sample) were collected from this area. Soils within this area were classified as a sandy loam and were all olive green in colour.

At the time of sampling, the shed and its immediate surrounds was vacant, free of stored vehicles and materials. The floor of the shed consists of a slab of concrete (with minor cracking), and the surrounds consisted of sealed hardstand material, offering limited avenues for potential contaminants to migrate into soils. Minor, scattered staining was observed on the hardstand area. The grade dips south-west in this portion of the site, therefore, it was decided that samples would be collected from the surface area outside of the shed where any potential contaminants (or contaminated soils) might accumulate.

Due to the hardstand being intact, collection of surface samples was restricted to wherever the largest accumulation of soils was present on top of the hardstand within the grid.

Figure 5-4: Area of Concern #3

Source: Google Earth 2021

↑N Not to scale	LEGEND: Area of Concern Boundary Sample ID	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

5.9.2 Sampling Equipment and Methods

All soil samples were collected via hand instruments (trowel, spoon) and by gloved hand. Gloves were changed between each sampling point to avoid cross-contamination. Collected soils were placed into containers supplied by ALS Environmental. Two (2) sample containers were collected at each sampling point, as follows:

1. 1 x 250 mL glass sample jar – heavy metals, TRH, BTEXN, PAH, OCPs/OPPs and PCBs; and
2. 1 x 500 mL polyethylene sample bag – ACM.

5.9.3 Equipment Decontamination Procedures

Between each sampling point, any equipment that was to be re-used was decontaminated to avoid cross-contamination. Equipment was scrubbed with a solution of 5% Decon90, rinsed with distilled water, dried with a clean paper towel and rinsed again.

New gloves were used between each sampling point to avoid cross-contamination.

5.9.4 Sample Handling Procedures

Each sample is identified by the following information, which was written on the container label:

- Project number;
- Sampler;
- Sample ID (location number); and
- Date and time of sampling.

Immediately after collection, samples were placed into an Esky and covered in ice. The Esky was transported directly to ALS Environmental at the end of the sampling day in a chilled state.

An electronic Completed Chain of Custody (COC) document accompanied all samples to the laboratory. Acknowledgement that the samples were received in a satisfactory condition in relation to transport time and chilled condition were recorded on the COC (Attachment 1).

5.9.5 Sample Preservation Methods

Apart from the use of ice for container temperature control, no chemical preservatives were added to the soil sample jars or bags.

5.9.6 Soil Classification Methods

Soil texture is assessed utilising field sampling methods, including the behaviour of moist boluses when manipulated by hand. Bolus texture indicates composition, e.g. stickiness of bolus indicates clay content, bolus smoothness indicates silt content. Soil grain sizes are judged by side-by-side comparison to soil charts with the aid of a hand lens. Description techniques are based on AS 1729-2017.

5.10 PHOTOGRAPHS

Photograph 1: Soils being collected in area of concern #1

Photograph 2: Example of soils present in area of concern #1

Photograph 3: Example of stockpiled materials (timber) stored in area of concern #2

Photograph 4: Area of concern #2 including stormwater infrastructure and stockpiled timber

Photograph 5: Example of soils present in area of concern #2 (beside timber stockpile)

Photograph 6: Example of soils present in area of concern #2 (centre of grid)

Photograph 7: Soils being collected in area of concern #3

Photograph 8: Example of soils present in area of concern #3

5.11 LABORATORY ANALYSIS

5.11.1 Analytes

The selection of analytes is based on the site-specific Conceptual Site Model from the Limited Phase II ESA (Ref: 191318_Phase II) undertaken in May 2020. Identified contaminants of concern include substances typically associated with industrial uses and contaminated wastes.

Selected analytes for chemical analysis include the following:

- Heavy metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn);
- TRH;
- BTEXN;
- PAHs;
- OCPs and OPPs;
- PCBs; and
- Asbestos.

5.11.2 Testing Methods

The soil samples were analysed by ALS Environmental, a National Association of Testing Authorities (NATA) accredited laboratory. The analytical methods used by ALS Environmental are described in the laboratory provided Quality Assurance and Quality Control (QA/QC) reports (Attachment 1).

5.12 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) EVALUATION

Quality Assurance and Quality Control (QA/QC) applied to this project were in accordance with AS 4482.1-2005 in regard to the following:

- **Precision** – measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** – measures the bias in a measurement system. The accuracy of the laboratory data that is generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** – expresses the degree which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** – expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

- Two (2) field duplicate soil samples were collected for QA/QC purposes. Results are discussed in the section below.

- Rinsate water was collected at the conclusion of all sampling events. Collection occurred from deionised water poured over field-cleaned sampling trowels.

Results for QA/QC data evaluation are detailed in Section 5.12.1 and summarised below.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- Laboratory Control outliers exist.
- Matrix Spike outliers exist.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.
- **NO** Analysis Holding Time Outliers exist.
- **NO** Quality Control Sample Frequency Outliers exist.

5.12.1 Duplicate Results

Two (2) field duplicate samples (Sample ID: S-13D and DUP-2) were taken to assess the homogeneity of the sample matrix. Duplicate sample locations are displayed in Figure 5-5.

Figure 5-5: Duplicate Sample Locations

To compare the results between the duplicate to the original sample, the Relative Percent Difference (RPD) is calculated for each analyte that had results above the LOR. The RPD equals:

$$RPD\ (\%) = 100 * \frac{|\ X_A - X_B\ |}{½\ (X_A + X_B)}$$

where X_A and X_B are the analyte levels of original sample A and duplicate sample B, respectively.

The accuracy of RPD values for field duplicate samples are compared to a criterion of <50 % RPD. Exceedances of the RPD were found in two (2) analytes; lead and chromium (yellow highlighted results in Table 5-4). All sample and duplicate results are displayed as mg/kg.

Low concentrations for both analytes may have contributed to the RPD exceedances. The calculated RPD is not expected to affect the integrity of the results as both results remain well below the nominated criteria. No other exceedances were found. Table 5-5 shows the QA/QC data evaluation undertaken for the collected samples and duplicates.

Table 5-4: Duplicate Results RPD % (mg/kg)

Analyte	LOR	S-13	S-13D	RPD %	S-21	DUP-2	RPD %
Heavy Metals							
Arsenic	5	5	5	0	5	5	0
Cadmium	1	1	1	0	1	1	0
Chromium	2	21	25	17	14	30	**73**
Copper	5	34	30	13	27	27	0
Lead	5	29	16	**58**	24	24	0
Mercury	2	22	16	32	17	18	6
Nickel	5	122	80	42	132	163	21
Zinc	0.1	0.1	0.1	0	0.1	0.1	0
TRH							
C6 – C10 Fraction	10	10	10	0	10	10	0
C6 – C10 Fraction minus BTEX (F1)	10	10	10	0	10	10	0
>C10 – C16 Fraction	50	50	50	0	50	50	0
> C16 – C34 Fraction	100	100	100	0	2550	2970	15
> C34 – C40 Fraction	100	100	130	26	1320	1470	11
>C10-C16 Fraction minus Naphth. (F2)	50	50	50	0	50	50	0
BTEXN							
Benzene	0.2	0.2	0.2	0	0.2	0.2	0
Toluene	0.5	0.5	0.5	0	0.5	0.5	0
Ethylbenzene	0.5	0.5	0.5	0	0.5	0.5	0
Total Xylenes	0.5	0.5	0.5	0	0.5	0.5	0
Naphthalene	1	1	1	0	1	1	0
PAH							
Benzo(a)pyrene	0.5	0.5	0.5	0	0.5	0.5	0
Sum polycyclic aromatic hydrocarbons	0.5	0.5	0.5	0	3.4	3.6	6
Benzo(a)pyrene TEQ (zero)	0.5	0.5	0.5	0	0.5	0.6	18
Benzo(a)pyrene TEQ (LOR)	0.5	1.2	1.2	0	1.2	1.2	0
OCPS and OPPs							
HCB (Hexa chloro benzene)	0.05	0.05	0.05	0	0.05	0.05	0
Heptachlor	0.05	0.05	0.05	0	0.05	0.05	0
Total Chlordane (sum)	0.05	0.05	0.05	0	0.05	0.05	0
Endrin	0.05	0.05	0.05	0	0.05	0.05	0
Endosulfan (sum)	0.05	0.05	0.05	0	0.05	0.05	0
Methoxychlor	0.2	0.2	0.2	0	0.2	0.2	0
Sum of DDD + DDE + DDT	0.05	0.05	0.05	0	0.05	0.05	0
Chlorpyrifos	0.05	0.05	0.05	0	0.05	0.05	0
PCBs							
PCB (Poly chlorinated biphenyls)	0.1	0.1	0.1	0	0.1	0.1	0

Table 5-5: QA/QC Data Evaluation

Data Quality Objectives	Frequency	Achieved?	Data Quality Indicator	Achieved?
Precision				
Laboratory Duplicates (DUP)	5 % of total number of samples	Yes	Within DUP recovery limits for each compound	Yes
Accuracy				
Blind field duplicates	5 % of total number of samples	Yes	<50% RPD	No – exceedances for Lead (S-13D) and Chromium (DUP-2)
Laboratory Control Spikes (LCS)	5 % of total number of samples	Yes	Within LCS recovery limits for each compound	No – recovery greater than upper control limit for Pentachlorophenol
Matrix Spikes (MS)	5 % of total number of samples	Yes	Within MS recovery limits for each compound	No – recovery not determined, background level greater than or equal to 4x spike level for Chromium and Zinc
Trip Blanks (TB)	1 per cooler	N/A	Below limits of reporting (LOR)	N/A
Trip Spikes (TS)	1 per cooler	N/A	Within acceptable recovery limits	N/A
Representativeness				
Method Blanks (MB)	5 % of total number of samples	Yes	Variance between sample results and LOR	Yes
Sampling appropriate for media and analytes	All Samples	Yes	No errors in selection of media and analytes	Yes
Sample collected/analysed within holding times	All Samples	Yes	Received and analysed by ALS Environmental within sample holding times	Yes
Comparability				
Standard operating procedures for sample collection and handling	All Samples	Yes	No errors in compliance with procedures	Yes
Standard analytical methods for analytes	All Samples	Yes	No errors in selection of analytical methods	Yes

Table 5-5: QA/QC Data Evaluation

Data Quality Objectives	Frequency	Achieved?	Data Quality Indicator	Achieved?
Consistent field conditions and lab analysis	All Samples	Yes	No variations reported	Yes
Limit of reporting appropriate and consistent	All Samples	Yes	No errors in limit of reporting	Yes
Completeness				
Soil description and COCs properly completed	All Samples	Yes	No errors in COC	Yes
Appropriate documentation	All Samples	Yes	No errors in documentation	Yes
Satisfactory QC sample results	All QA/QC Samples	No	No reported outliers in QC report	No – LCS and MS outliers occurred
Data from critical samples is considered valid	Critical samples	Yes	Consistency within results from critical samples	Yes

5.12.2 Rinsate Results

Rinsate results are displayed in Table 5-6. One (1) rinsate blank (Sample ID: RINSATE) was collected and analysed at the conclusion of the sampling event. Rinsate blank collection is undertaken by collection of deionised water after it is poured over field-cleaned sampling equipment. All non-disposable sampling equipment (e.g. metal trowels and spoons) utilised during sampling was subjected to the rinsate blank analysis for heavy metals, TRH and BTEXN.

Rinsate analysis showed fractional concentrations of the heavy metals (chromium, copper and zinc, highlighted below). TRH and BTEXN were either not present or below their respective LOR. Due to concentrations above each respective analyte LOR – likely attributed to the use of metal sampling equipment – the rinsate blank was considered contaminated.

However, the impact of such miniscule concentrations on collected samples is considered negligible and cross-contamination between samples is unlikely.

Table 5-6: Rinsate Analysis Results

Analyte	LOR (mg/L)*	Rinsate Results (mg/L)*
Heavy Metals		
Arsenic	0.001	<0.001
Cadmium	0.0001	<0.0001
Chromium	0.001	**0.003**
Copper	0.001	**0.001**
Lead	0.001	<0.001
Mercury	0.0001	<0.0001
Nickel	0.001	<0.001
Zinc	0.005	**0.012**
TRH		
C6 – C10 Fraction	0.02	<0.02
C6 – C10 Fraction minus BTEX (F1)	0.02	<0.02
BTEXN		
Benzene	0.001	<0.001
Toluene	0.002	<0.002
Ethylbenzene	0.002	<0.002
Total Xylenes	0.002	<0.002
Naphthalene	0.005	<0.005

* Note: units converted to mg/L for ease of interpretation

5.13 Statistical Analysis of Laboratory Results

The 95% Upper Confidence Level (UCL) was calculated for all laboratory results of identified contaminants of concern, utilising Procedure D of the NSW EPA *Sampling Design Guidelines* (1995). The statistical analysis indicates that there is a 95% probability that the calculated average concentration of the contaminant will not exceed the criteria value.

The 95% UCL was calculated for each of the three (3) individual areas of concern. All statistical analysis for all areas indicated that there is a 95% probability that the calculated average concentration of each contaminant of concern will not exceed the SAC value.

6. RESULTS AND DISCUSSION

A total of 28 surface soil samples were collected from the three (3) identified areas of concern by BE consultants on 25 June 2021. Samples were analysed by NATA accredited ALS Environmental in accordance with the ASC NEPM and results were compared to the SAC for contaminants of concern detailed in Table 5-2.

The full laboratory results for analytical testing of soil samples collected by BE are provided in the ALS Environmental Certificate of Analysis (COA) (Attachment 1).

The results of the soil sampling and analysis of samples collected from the three (3) areas of concern are summarised below.

Heavy metals: Results of analysis were all below adopted SAC.
TRH: Results of analysis were all below adopted SAC.
BTEXN: Results of analysis were all below adopted SAC.
PAHs: Results of analysis were all below adopted SAC.
OCPs and OPPs: Results of analysis were all below adopted SAC.
PCBs: Results of analysis were all below adopted SAC.
ACM: Results of analysis were all below adopted SAC.

6.1 RECOMMENDATIONS

In accordance with the ASC NEPM and the specific contaminant of concern limits defined in the SAC, results from analysis demonstrates that soils in the three (3) areas of concern are not contaminated. Therefore, no recommended actions are required.

7. CONCLUSION

Benbow Environmental (BE) was engaged by Carlo Ranieri and Associates, on behalf of Greenfields Resource Recovery Facility, to undertake a Detailed Site Investigation (DSI) for the site located at 344 Park Road, Wallacia NSW 2745 (the Site).

In accordance with the ASC NEPM and the specific contaminant of concern limits defined in the SAC, results from analysis demonstrates that all samples in the three (3) areas of concern are not contaminated. This confirms the site is suitable for the proposed use as a resource recovery facility.

This concludes the report.

Matthew Taylor	Damien Thomas	R T Benbow
Environmental Scientist	Environmental Scientist	Principal Consultant

8. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Greenfields Resource Recovery Facility, as per our agreement for providing environmental services. Only Greenfields Resource Recovery Facility is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Greenfields Resource Recovery Facilityfor the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Laboratory Analysis and Documentation (ALS Environmental)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2123870**	Page	: 1 of 41
Client	: **BENBOW ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Taylor	Contact	: Customer Services ES
Address	: 25-27 SHERWOOD STREET NORTHMEAD NSW, AUSTRALIA 2152	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 191318-03	Date Samples Received	: 28-Jun-2021 11:35
Order number	: 191318-03	Date Analysis Commenced	: 29-Jun-2021
C-O-C number	: 24510	Issue Date	: 05-Jul-2021 18:39
Sampler	: DAMIEN THOMAS, Matthew Taylor		
Site	: 191318-03		
Quote number	: COMPASS BLANKET QUOTE		
No. of samples received	: 31		
No. of samples analysed	: 31		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG020A-T: Positive results for sample ES2123870 # 031 have been confirmed by redigestion and reanalysis.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	RINSATE	----	----	----	----
				Sampling date / time	25-Jun-2021 17:04	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2123870-031	--------	--------	--------	--------
					Result	----	----	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.003**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.001**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.012**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**118**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**115**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**114**	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	S-12	----	----	----	----
			Sampling date / time	25-Jun-2021 13:37	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2123870-012	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**14.7**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**9**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**7**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**16**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**5**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**21**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	S-12	----	----	----	----
			Sampling date / time	25-Jun-2021 13:37	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2123870-012	--------	--------	--------	--------
				Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	S-12	----	----	----	----
			Sampling date / time	25-Jun-2021 13:37	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2123870-012	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued								
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)			Sample ID	S-12	----	----	----	----
			Sampling date / time	25-Jun-2021 13:37	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2123870-012	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**78.7**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**68.2**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**70.6**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**95.8**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**93.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**84.9**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**104**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**94.9**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**87.4**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**84.9**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**91.3**	----	----	----	----

Analytical Results

Sub-Matrix: **SEDIMENT** (Matrix: **SOIL**)				Sample ID	**S-12**	----	----	----	----
				Sampling date / time	25-Jun-2021 13:37	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES2123870-012**	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**80.7**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-1 shale	S-2 silty clay loam	S-3 silty clay loam	S-4	S-5
			Sampling date / time	25-Jun-2021 10:03	25-Jun-2021 10:18	25-Jun-2021 10:39	25-Jun-2021 10:56	25-Jun-2021 11:12
Compound	CAS Number	LOR	Unit	ES2123870-001	ES2123870-002	ES2123870-003	ES2123870-004	ES2123870-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.1	7.0	6.7	9.6	8.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	549	484	587	614	483
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	5	7	<5	5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	5	7	9	6
Copper	7440-50-8	5	mg/kg	29	26	32	34	36
Lead	7439-92-1	5	mg/kg	18	15	20	19	23
Nickel	7440-02-0	2	mg/kg	27	17	31	25	26
Zinc	7440-66-6	5	mg/kg	84	83	93	86	89
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-1 shale	S-2 silty clay loam	S-3 silty clay loam	S-4	S-5
			Sampling date / time	25-Jun-2021 10:03	25-Jun-2021 10:18	25-Jun-2021 10:39	25-Jun-2021 10:56	25-Jun-2021 11:12
Compound	CAS Number	LOR	Unit	ES2123870-001	ES2123870-002	ES2123870-003	ES2123870-004	ES2123870-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-1 shale	S-2 silty clay loam	S-3 silty clay loam	S-4	S-5
			Sampling date / time	25-Jun-2021 10:03	25-Jun-2021 10:18	25-Jun-2021 10:39	25-Jun-2021 10:56	25-Jun-2021 11:12
Compound	CAS Number	LOR	Unit	ES2123870-001	ES2123870-002	ES2123870-003	ES2123870-004	ES2123870-005
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-1 shale	S-2 silty clay loam	S-3 silty clay loam	S-4	S-5
				Sampling date / time	25-Jun-2021 10:03	25-Jun-2021 10:18	25-Jun-2021 10:39	25-Jun-2021 10:56	25-Jun-2021 11:12
Compound	CAS Number	LOR	Unit		ES2123870-001	ES2123870-002	ES2123870-003	ES2123870-004	ES2123870-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**74.6**	**85.6**	**85.3**	**74.3**	**78.0**
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**69.8**	**83.7**	**86.4**	**71.2**	**77.9**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**78.6**	**88.6**	**92.7**	**77.5**	**86.2**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**97.2**	**96.7**	**101**	**95.0**	**99.4**
2-Chlorophenol-D4	93951-73-6	0.5	%		**94.7**	**94.2**	**98.2**	**91.5**	**96.3**
2.4.6-Tribromophenol	118-79-6	0.5	%		**79.4**	**78.4**	**83.3**	**79.4**	**84.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-1 shale	S-2 silty clay loam	S-3 silty clay loam	S-4	S-5
				Sampling date / time	25-Jun-2021 10:03	25-Jun-2021 10:18	25-Jun-2021 10:39	25-Jun-2021 10:56	25-Jun-2021 11:12
Compound	CAS Number	LOR	Unit		ES2123870-001	ES2123870-002	ES2123870-003	ES2123870-004	ES2123870-005
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**103**	**102**	**107**	**99.1**	**106**
Anthracene-d10	1719-06-8	0.5	%		**95.3**	**93.3**	**98.9**	**92.9**	**99.0**
4-Terphenyl-d14	1718-51-0	0.5	%		**85.7**	**84.1**	**88.9**	**83.4**	**88.6**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**97.9**	**89.1**	**100**	**99.9**	**97.7**
Toluene-D8	2037-26-5	0.2	%		**103**	**98.5**	**109**	**108**	**109**
4-Bromofluorobenzene	460-00-4	0.2	%		**97.8**	**88.7**	**99.7**	**96.3**	**98.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-6	S-7	S-8	S-9	S-10
			Sampling date / time	25-Jun-2021 11:21	25-Jun-2021 11:32	25-Jun-2021 11:40	25-Jun-2021 11:47	25-Jun-2021 11:53
Compound	CAS Number	LOR	Unit	ES2123870-006	ES2123870-007	ES2123870-008	ES2123870-009	ES2123870-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.7	8.7	12.6	8.8	8.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	455	577	376	493	706
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	5	6	<5	7	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	6	7	7	7
Copper	7440-50-8	5	mg/kg	29	40	12	34	21
Lead	7439-92-1	5	mg/kg	18	20	17	21	18
Nickel	7440-02-0	2	mg/kg	22	25	6	33	22
Zinc	7440-66-6	5	mg/kg	81	112	34	95	69
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-6	S-7	S-8	S-9	S-10
			Sampling date / time	25-Jun-2021 11:21	25-Jun-2021 11:32	25-Jun-2021 11:40	25-Jun-2021 11:47	25-Jun-2021 11:53
Compound	CAS Number	LOR	Unit	ES2123870-006	ES2123870-007	ES2123870-008	ES2123870-009	ES2123870-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-6	S-7	S-8	S-9	S-10
			Sampling date / time	25-Jun-2021 11:21	25-Jun-2021 11:32	25-Jun-2021 11:40	25-Jun-2021 11:47	25-Jun-2021 11:53
Compound	CAS Number	LOR	Unit	ES2123870-006	ES2123870-007	ES2123870-008	ES2123870-009	ES2123870-010
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-6	S-7	S-8	S-9	S-10
			Sampling date / time	25-Jun-2021 11:21	25-Jun-2021 11:32	25-Jun-2021 11:40	25-Jun-2021 11:47	25-Jun-2021 11:53
Compound	CAS Number	LOR	Unit	ES2123870-006	ES2123870-007	ES2123870-008	ES2123870-009	ES2123870-010
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**81.6**	**84.2**	**75.6**	**80.9**	**80.5**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**84.1**	**87.4**	**75.3**	**78.7**	**81.4**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**88.6**	**96.3**	**77.0**	**84.5**	**85.8**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**99.0**	**85.8**	**95.8**	**99.9**	**93.8**
2-Chlorophenol-D4	93951-73-6	0.5	%	**95.4**	**88.9**	**91.3**	**96.8**	**90.3**
2.4.6-Tribromophenol	118-79-6	0.5	%	**82.4**	**81.8**	**84.0**	**84.4**	**80.1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-6	S-7	S-8	S-9	S-10
				Sampling date / time	25-Jun-2021 11:21	25-Jun-2021 11:32	25-Jun-2021 11:40	25-Jun-2021 11:47	25-Jun-2021 11:53
Compound	CAS Number	LOR	Unit		ES2123870-006	ES2123870-007	ES2123870-008	ES2123870-009	ES2123870-010
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		105	107	104	106	100
Anthracene-d10	1719-06-8	0.5	%		98.9	99.6	96.0	98.0	94.7
4-Terphenyl-d14	1718-51-0	0.5	%		87.6	87.2	85.8	87.5	84.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		100	95.0	87.4	91.2	88.6
Toluene-D8	2037-26-5	0.2	%		109	103	92.4	103	97.5
4-Bromofluorobenzene	460-00-4	0.2	%		98.7	91.7	85.7	91.3	85.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-11	S-12	S-13	S-14	S-15
			Sampling date / time	25-Jun-2021 13:35	25-Jun-2021 13:37	25-Jun-2021 14:08	25-Jun-2021 14:06	25-Jun-2021 14:30
Compound	CAS Number	LOR	Unit	ES2123870-011	ES2123870-012	ES2123870-013	ES2123870-014	ES2123870-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	8.6	----	36.8	25.1	30.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	440	403	516	492	426
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	<5	8	6
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	9	----	21	18	19
Copper	7440-50-8	5	mg/kg	<5	----	34	<5	12
Lead	7439-92-1	5	mg/kg	13	----	29	25	18
Nickel	7440-02-0	2	mg/kg	4	----	22	8	7
Zinc	7440-66-6	5	mg/kg	16	----	122	8	47
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-11	S-12	S-13	S-14	S-15
			Sampling date / time	25-Jun-2021 13:35	25-Jun-2021 13:37	25-Jun-2021 14:08	25-Jun-2021 14:06	25-Jun-2021 14:30
Compound	CAS Number	LOR	Unit	ES2123870-011	ES2123870-012	ES2123870-013	ES2123870-014	ES2123870-015
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-11	S-12	S-13	S-14	S-15
			Sampling date / time	25-Jun-2021 13:35	25-Jun-2021 13:37	25-Jun-2021 14:08	25-Jun-2021 14:06	25-Jun-2021 14:30
Compound	CAS Number	LOR	Unit	ES2123870-011	ES2123870-012	ES2123870-013	ES2123870-014	ES2123870-015
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-11	S-12	S-13	S-14	S-15
			Sampling date / time	25-Jun-2021 13:35	25-Jun-2021 13:37	25-Jun-2021 14:08	25-Jun-2021 14:06	25-Jun-2021 14:30
Compound	CAS Number	LOR	Unit	ES2123870-011	ES2123870-012	ES2123870-013	ES2123870-014	ES2123870-015
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	----	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**79.6**	----	**80.7**	**80.8**	**76.8**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**76.4**	----	**72.7**	**77.4**	**76.4**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**78.7**	----	**73.7**	**79.9**	**62.3**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**96.3**	----	**93.8**	**97.2**	**100**
2-Chlorophenol-D4	93951-73-6	0.5	%	**93.7**	----	**89.0**	**93.4**	**96.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	**86.2**	----	**83.6**	**83.6**	**81.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-11	S-12	S-13	S-14	S-15
				Sampling date / time	25-Jun-2021 13:35	25-Jun-2021 13:37	25-Jun-2021 14:08	25-Jun-2021 14:06	25-Jun-2021 14:30
Compound	CAS Number	LOR	Unit		ES2123870-011	ES2123870-012	ES2123870-013	ES2123870-014	ES2123870-015
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		103	----	100	103	113
Anthracene-d10	1719-06-8	0.5	%		96.5	----	94.5	95.1	104
4-Terphenyl-d14	1718-51-0	0.5	%		86.8	----	86.4	85.6	91.3
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		92.2	----	85.5	95.6	93.8
Toluene-D8	2037-26-5	0.2	%		100	----	85.2	103	98.4
4-Bromofluorobenzene	460-00-4	0.2	%		89.4	----	82.1	97.1	90.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-16	S-17	S-18	S-19	S-20
			Sampling date / time	25-Jun-2021 14:32	25-Jun-2021 14:48	25-Jun-2021 14:54	25-Jun-2021 15:10	25-Jun-2021 15:15
Compound	CAS Number	LOR	Unit	ES2123870-016	ES2123870-017	ES2123870-018	ES2123870-019	ES2123870-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	17.3	16.4	21.6	38.2	19.3
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	479	443	610	307	532
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	5	<5	6	6	5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	13	9	17	19	11
Copper	7440-50-8	5	mg/kg	8	36	8	16	16
Lead	7439-92-1	5	mg/kg	18	17	16	16	21
Nickel	7440-02-0	2	mg/kg	6	8	5	9	11
Zinc	7440-66-6	5	mg/kg	14	62	16	40	57
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-16	S-17	S-18	S-19	S-20
			Sampling date / time	25-Jun-2021 14:32	25-Jun-2021 14:48	25-Jun-2021 14:54	25-Jun-2021 15:10	25-Jun-2021 15:15
Compound	CAS Number	LOR	Unit	ES2123870-016	ES2123870-017	ES2123870-018	ES2123870-019	ES2123870-020
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-16	S-17	S-18	S-19	S-20
			Sampling date / time	25-Jun-2021 14:32	25-Jun-2021 14:48	25-Jun-2021 14:54	25-Jun-2021 15:10	25-Jun-2021 15:15
Compound	CAS Number	LOR	Unit	ES2123870-016	ES2123870-017	ES2123870-018	ES2123870-019	ES2123870-020
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-16	S-17	S-18	S-19	S-20
			Sampling date / time	25-Jun-2021 14:32	25-Jun-2021 14:48	25-Jun-2021 14:54	25-Jun-2021 15:10	25-Jun-2021 15:15
Compound	CAS Number	LOR	Unit	ES2123870-016	ES2123870-017	ES2123870-018	ES2123870-019	ES2123870-020
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	**140**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	**180**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	**320**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	**240**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	**140**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	**380**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**81.3**	**82.3**	**81.4**	**99.4**	**77.0**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**74.2**	**76.6**	**74.1**	**91.6**	**70.4**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**90.6**	**82.8**	**87.1**	**120**	**110**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**101**	**95.7**	**96.0**	**92.7**	**94.8**
2-Chlorophenol-D4	93951-73-6	0.5	%	**97.6**	**92.3**	**92.6**	**89.0**	**92.2**
2.4.6-Tribromophenol	118-79-6	0.5	%	**86.3**	**78.1**	**80.3**	**80.5**	**79.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-16	S-17	S-18	S-19	S-20
				Sampling date / time	25-Jun-2021 14:32	25-Jun-2021 14:48	25-Jun-2021 14:54	25-Jun-2021 15:10	25-Jun-2021 15:15
Compound	CAS Number	LOR	Unit		ES2123870-016	ES2123870-017	ES2123870-018	ES2123870-019	ES2123870-020
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		107	103	103	98.8	103
Anthracene-d10	1719-06-8	0.5	%		99.2	94.9	94.7	92.2	94.7
4-Terphenyl-d14	1718-51-0	0.5	%		89.0	84.9	85.8	82.8	84.0
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		101	84.5	85.6	76.6	83.4
Toluene-D8	2037-26-5	0.2	%		105	91.7	95.7	82.8	88.7
4-Bromofluorobenzene	460-00-4	0.2	%		100	82.7	90.2	75.7	80.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-21	S-22	S-23	S-24	S-25
			Sampling date / time	25-Jun-2021 16:15	25-Jun-2021 16:16	25-Jun-2021 16:17	25-Jun-2021 16:18	25-Jun-2021 16:19
Compound	CAS Number	LOR	Unit	ES2123870-021	ES2123870-022	ES2123870-023	ES2123870-024	ES2123870-025
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	27.8	11.5	8.4	15.7	11.4
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
Sample weight (dry)	----	0.01	g	369	542	593	596	472
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	14	14	20	12	8
Copper	7440-50-8	5	mg/kg	27	20	24	21	32
Lead	7439-92-1	5	mg/kg	24	12	11	20	14
Nickel	7440-02-0	2	mg/kg	17	16	22	12	13
Zinc	7440-66-6	5	mg/kg	132	238	100	76	62
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-21	S-22	S-23	S-24	S-25
			Sampling date / time	25-Jun-2021 16:15	25-Jun-2021 16:16	25-Jun-2021 16:17	25-Jun-2021 16:18	25-Jun-2021 16:19
Compound	CAS Number	LOR	Unit	ES2123870-021	ES2123870-022	ES2123870-023	ES2123870-024	ES2123870-025
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-21	S-22	S-23	S-24	S-25
			Sampling date / time	25-Jun-2021 16:15	25-Jun-2021 16:16	25-Jun-2021 16:17	25-Jun-2021 16:18	25-Jun-2021 16:19
Compound	CAS Number	LOR	Unit	ES2123870-021	ES2123870-022	ES2123870-023	ES2123870-024	ES2123870-025
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**0.7**	<0.5	**0.5**	<0.5	**1.1**
Pyrene	129-00-0	0.5	mg/kg	**0.7**	**0.6**	**0.6**	<0.5	**1.2**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
Chrysene	218-01-9	0.5	mg/kg	**0.6**	<0.5	<0.5	<0.5	**0.6**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**0.8**	**0.8**	**1.2**	<0.5	**1.0**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	**0.9**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	**0.7**	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**0.6**	**0.5**	**0.8**	<0.5	**0.6**
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**3.4**	**1.9**	**4.4**	<0.5	**6.0**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	**0.8**	<0.5	**1.1**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.7**	**0.7**	**1.1**	**0.6**	**1.4**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.4**	**1.2**	**1.7**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-21	S-22	S-23	S-24	S-25
			Sampling date / time	25-Jun-2021 16:15	25-Jun-2021 16:16	25-Jun-2021 16:17	25-Jun-2021 16:18	25-Jun-2021 16:19
Compound	CAS Number	LOR	Unit	ES2123870-021	ES2123870-022	ES2123870-023	ES2123870-024	ES2123870-025
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**1240**	**460**	**340**	**520**	**300**
C29 - C36 Fraction	----	100	mg/kg	**1920**	**610**	**500**	**760**	**630**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**3160**	**1070**	**840**	**1280**	**930**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**2550**	**890**	**680**	**1060**	**720**
>C34 - C40 Fraction	----	100	mg/kg	**1320**	**400**	**440**	**540**	**610**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**3870**	**1290**	**1120**	**1600**	**1330**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**78.2**	**77.5**	**98.0**	**83.3**	**77.4**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**73.9**	**78.5**	**110**	**105**	**95.5**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**79.7**	**64.8**	**86.5**	**89.2**	**71.9**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**92.8**	**89.3**	**91.9**	**92.4**	**88.4**
2-Chlorophenol-D4	93951-73-6	0.5	%	**86.7**	**85.9**	**88.6**	**88.6**	**85.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	**92.5**	**85.0**	**87.0**	**91.4**	**84.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-21	S-22	S-23	S-24	S-25
				Sampling date / time	25-Jun-2021 16:15	25-Jun-2021 16:16	25-Jun-2021 16:17	25-Jun-2021 16:18	25-Jun-2021 16:19
Compound	CAS Number	LOR	Unit		ES2123870-021	ES2123870-022	ES2123870-023	ES2123870-024	ES2123870-025
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		100	97.8	99.8	102	96.4
Anthracene-d10	1719-06-8	0.5	%		91.1	88.7	90.1	94.2	88.0
4-Terphenyl-d14	1718-51-0	0.5	%		86.1	83.0	83.8	87.5	80.8
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		99.2	132	128	114	89.6
Toluene-D8	2037-26-5	0.2	%		111	87.5	86.2	97.7	77.3
4-Bromofluorobenzene	460-00-4	0.2	%		97.7	89.6	86.6	93.9	78.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-26	S-27	S-28	S-13D	DUP-2
			Sampling date / time	25-Jun-2021 16:20	25-Jun-2021 16:21	25-Jun-2021 16:45	25-Jun-2021 14:08	25-Jun-2021 16:15
Compound	CAS Number	LOR	Unit	ES2123870-026	ES2123870-027	ES2123870-028	ES2123870-029	ES2123870-030
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	13.9	19.9	6.8	26.6	25.8
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	----
Asbestos Type	1332-21-4	-	--	-	-	-	-	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	----
Organic Fibre	----	0.1	g/kg	No	No	No	No	----
Sample weight (dry)	----	0.01	g	478	545	567	398	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	24	16	7	25	30
Copper	7440-50-8	5	mg/kg	27	28	19	30	27
Lead	7439-92-1	5	mg/kg	16	19	6	16	24
Nickel	7440-02-0	2	mg/kg	19	22	12	16	18
Zinc	7440-66-6	5	mg/kg	114	85	60	80	163
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-26	S-27	S-28	S-13D	DUP-2
			Sampling date / time	25-Jun-2021 16:20	25-Jun-2021 16:21	25-Jun-2021 16:45	25-Jun-2021 14:08	25-Jun-2021 16:15
Compound	CAS Number	LOR	Unit	ES2123870-026	ES2123870-027	ES2123870-028	ES2123870-029	ES2123870-030
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-26	S-27	S-28	S-13D	DUP-2
			Sampling date / time	25-Jun-2021 16:20	25-Jun-2021 16:21	25-Jun-2021 16:45	25-Jun-2021 14:08	25-Jun-2021 16:15
Compound	CAS Number	LOR	Unit	ES2123870-026	ES2123870-027	ES2123870-028	ES2123870-029	ES2123870-030
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.8**
Pyrene	129-00-0	0.5	mg/kg	**0.7**	**0.6**	<0.5	<0.5	**0.9**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**0.6**	<0.5	<0.5	<0.5	**0.8**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.5**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**1.3**	**0.6**	<0.5	<0.5	**3.6**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.9**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S-26	S-27	S-28	S-13D	DUP-2
			Sampling date / time	25-Jun-2021 16:20	25-Jun-2021 16:21	25-Jun-2021 16:45	25-Jun-2021 14:08	25-Jun-2021 16:15
Compound	CAS Number	LOR	Unit	ES2123870-026	ES2123870-027	ES2123870-028	ES2123870-029	ES2123870-030
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**820**	**1370**	**260**	<100	**1410**
C29 - C36 Fraction	----	100	mg/kg	**1340**	**2230**	**440**	**110**	**2060**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**2160**	**3600**	**700**	**110**	**3470**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**1880**	**2930**	**610**	<100	**2970**
>C34 - C40 Fraction	----	100	mg/kg	**870**	**1550**	**300**	**130**	**1470**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**2750**	**4480**	**910**	**130**	**4440**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**81.6**	**124**	**124**	**92.2**	**107**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**114**	**106**	**119**	**127**	**115**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**74.8**	**64.1**	**85.6**	**71.8**	**81.5**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**90.6**	**87.9**	**91.4**	**92.9**	**88.5**
2-Chlorophenol-D4	93951-73-6	0.5	%	**88.3**	**84.2**	**90.4**	**90.7**	**84.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**92.2**	**86.7**	**85.8**	**83.6**	**86.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S-26	S-27	S-28	S-13D	DUP-2
				Sampling date / time	25-Jun-2021 16:20	25-Jun-2021 16:21	25-Jun-2021 16:45	25-Jun-2021 14:08	25-Jun-2021 16:15
Compound	CAS Number	LOR	Unit		ES2123870-026	ES2123870-027	ES2123870-028	ES2123870-029	ES2123870-030
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		102	97.9	101	101	96.4
Anthracene-d10	1719-06-8	0.5	%		93.7	88.7	92.7	94.3	87.3
4-Terphenyl-d14	1718-51-0	0.5	%		88.8	86.3	85.9	84.5	85.5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		106	120	105	124	127
Toluene-D8	2037-26-5	0.2	%		89.9	76.7	88.2	80.7	77.6
4-Bromofluorobenzene	460-00-4	0.2	%		90.3	78.5	90.1	82.1	80.1

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	S-1shale - 25-Jun-2021 10:03	Mid brown soil.
EA200: Description	S-2silty clay loam - 25-Jun-2021 10:18	Mid brown soil.
EA200: Description	S-3silty clay loam - 25-Jun-2021 10:39	Mid brown soil.
EA200: Description	S-4 - 25-Jun-2021 10:56	Mid brown soil.
EA200: Description	S-5 - 25-Jun-2021 11:12	Mid brown soil.
EA200: Description	S-6 - 25-Jun-2021 11:21	Mid brown soil.
EA200: Description	S-7 - 25-Jun-2021 11:32	Mid brown soil.
EA200: Description	S-8 - 25-Jun-2021 11:40	Mid brown soil.
EA200: Description	S-9 - 25-Jun-2021 11:47	Mid brown soil.
EA200: Description	S-10 - 25-Jun-2021 11:53	Mid brown soil.
EA200: Description	S-11 - 25-Jun-2021 13:35	Mid brown soil.
EA200: Description	S-12 - 25-Jun-2021 13:37	Mid brown soil.
EA200: Description	S-13 - 25-Jun-2021 14:08	Mid brown soil.
EA200: Description	S-14 - 25-Jun-2021 14:06	Mid brown soil.
EA200: Description	S-15 - 25-Jun-2021 14:30	Mid brown soil.
EA200: Description	S-16 - 25-Jun-2021 14:32	Mid brown soil.
EA200: Description	S-17 - 25-Jun-2021 14:48	Mid brown soil.
EA200: Description	S-18 - 25-Jun-2021 14:54	Mid brown soil.
EA200: Description	S-19 - 25-Jun-2021 15:10	Mid brown soil.
EA200: Description	S-20 - 25-Jun-2021 15:15	Mid brown soil.
EA200: Description	S-21 - 25-Jun-2021 16:15	Mid brown soil.
EA200: Description	S-22 - 25-Jun-2021 16:16	Mid brown soil.
EA200: Description	S-23 - 25-Jun-2021 16:17	Mid brown soil.
EA200: Description	S-24 - 25-Jun-2021 16:18	Mid brown soil.
EA200: Description	S-25 - 25-Jun-2021 16:19	Mid brown soil.
EA200: Description	S-26 - 25-Jun-2021 16:20	Mid brown soil.
EA200: Description	S-27 - 25-Jun-2021 16:21	Mid brown soil.
EA200: Description	S-28 - 25-Jun-2021 16:45	Mid brown soil.
EA200: Description	S-13D - 25-Jun-2021 14:08	Mid brown soil.

Surrogate Control Limits

Sub-Matrix: RINSATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)T: PAH Surrogates - Continued			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order	: **ES2123870**	Page	: 1 of 24
Client	: **BENBOW ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Taylor	Contact	: Customer Services ES
Address	: 25-27 SHERWOOD STREET NORTHMEAD NSW, AUSTRALIA 2152	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: 191318-03	Date Samples Received	: 28-Jun-2021
Order number	: 191318-03	Date Analysis Commenced	: 29-Jun-2021
C-O-C number	: 24510	Issue Date	: 05-Jul-2021
Sampler	: DAMIEN THOMAS, Matthew Taylor		
Site	: 191318-03		
Quote number	: COMPASS BLANKET QUOTE		
No. of samples received	: 31		
No. of samples analysed	: 31		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3768587)									
ES2123865-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	38	38	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	21	21	0.0	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	9	9	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	11	10	11.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	2290	2620	13.3	0% - 20%
ES2123870-009	S-9	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	7	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	33	33	0.0	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	34	34	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	21	23	9.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	95	102	7.8	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3768589)									
ES2123870-019	S-19	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	19	20	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	9	10	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	13	19.9	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	17	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	40	33	19.1	No Limit
ES2123870-029	S-13D	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	25	19	26.3	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	16	16	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3768589) - continued									
ES2123870-029	S-13D	EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	30	22	29.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	21	24.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	80	91	12.6	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3768591)									
ES2123851-003	Anonymous	EA055: Moisture Content	----	0.1	%	50.2	50.9	1.4	0% - 20%
ES2123870-007	S-7	EA055: Moisture Content	----	0.1	%	8.7	9.1	4.2	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3768592)									
ES2123870-016	S-16	EA055: Moisture Content	----	0.1	%	17.3	18.5	6.6	0% - 50%
ES2123870-027	S-27	EA055: Moisture Content	----	0.1	%	19.9	22.8	13.4	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3768588)									
ES2123865-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2123870-009	S-9	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3768590)									
ES2123870-019	S-19	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2123870-029	S-13D	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3762625)									
ES2123870-001	S-1 shale	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2123870-011	S-11	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3762643)									
ES2123870-021	S-21	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2123870-030	DUP-2	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3762624)									
ES2123870-001	S-1 shale	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3762624) - continued									
ES2123870-001	S-1 shale	EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2123870-011	S-11	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3762642)									
ES2123870-021	S-21	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3762642) - continued									
ES2123870-021	S-21	EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2123870-030	DUP-2	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3762624)									
ES2123870-001	S-1 shale	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3762624) - continued									
ES2123870-001	S-1 shale	EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2123870-011	S-11	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3762642)									
ES2123870-021	S-21	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3762642) - continued									
ES2123870-021	S-21	EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2123870-030	DUP-2	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 3762623)									
ES2123870-001	S-1 shale	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)A: Phenolic Compounds (QC Lot: 3762623) - continued									
ES2123870-011	S-11	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 3762641)									
ES2123870-021	S-21	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
ES2123870-030	DUP-2	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3762623)									
ES2123870-001	S-1 shale	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3762623) - continued									
ES2123870-001	S-1 shale	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2123870-011	S-11	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3762641)									
ES2123870-021	S-21	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3762641) - continued									
ES2123870-021	S-21	EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.7	0.7	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.7	0.8	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.8	0.8	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	3.4	4.0	16.2	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	0.6	0.0	No Limit
ES2123870-030	DUP-2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.8	0.9	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.9	0.9	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.6	0.7	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.8	0.8	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.5	0.6	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	3.6	4.4	20.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	0.6	0.7	15.9	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3762622)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3762622) - continued									
ES2123870-001	S-1 shale	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2123870-011	S-11	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3762640)									
ES2123870-021	S-21	EP071: C15 - C28 Fraction	----	100	mg/kg	1240	1210	2.7	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	1920	1800	6.3	0% - 50%
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2123870-030	DUP-2	EP071: C15 - C28 Fraction	----	100	mg/kg	1410	1380	1.7	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	2060	2190	5.7	0% - 20%
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3764883)									
ES2123870-001	S-1 shale	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2123870-011	S-11	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3764894)									
ES2123844-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2123870-025	S-25	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3762622)									
ES2123870-001	S-1 shale	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2123870-011	S-11	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3762640)									
ES2123870-021	S-21	EP071: >C16 - C34 Fraction	----	100	mg/kg	2550	2540	0.0	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	1320	1320	0.0	0% - 50%
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2123870-030	DUP-2	EP071: >C16 - C34 Fraction	----	100	mg/kg	2970	3060	2.9	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	1470	1530	4.0	0% - 50%
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3764883)									
ES2123870-001	S-1 shale	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2123870-011	S-11	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3764894)									
ES2123844-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2123870-025	S-25	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC Lot: 3764883)									
ES2123870-001	S-1 shale	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2123870-011	S-11	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
EP080: BTEXN (QC Lot: 3764894)									
ES2123844-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES2123870-025	S-25	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020T: Total Metals by ICP-MS (QC Lot: 3764710)									
ES2123888-007	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0019	0.0019	0.0	0% - 50%
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.007	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.005	24.1	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.105	0.124	16.3	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.233	0.261	11.4	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.007	0.008	17.7	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.409	0.446	8.6	0% - 20%
ES2123888-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0016	0.0014	8.4	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 3764710) - continued									
ES2123888-001	Anonymous	EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.009	0.007	27.3	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.050	0.043	13.9	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.172	0.148	15.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.010	0.008	18.7	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.335	0.285	16.2	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3762298)									
ES2123291-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES2123905-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3762775)									
EW2102737-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES2122800-010	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3762775)									
EW2102737-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES2122800-010	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 3762775)									
EW2102737-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES2122800-010	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3768587)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	106	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	88.7	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	96.9	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	98.2	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	103	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	106	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	94.0	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3768589)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	93.3	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	81.6	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	88.3	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	90.5	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	103	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	99.0	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	94.3	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3768588)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	87.8	70.0	125
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3768590)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	87.8	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3762625)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	95.8	62.0	126
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3762643)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	96.0	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 3762624)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.0	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	76.3	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	99.7	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	102	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.3	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.0	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	102	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	63.0	117

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3762624) - continued								
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	99.3	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	108	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	105	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	102	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	98.7	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	94.4	54.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3762642)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	101	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	100	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	100	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	101	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	98.5	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	92.9	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	102	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	90.9	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3762624)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	74.6	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	81.8	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	98.9	67.0	119

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3762624) - continued								
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	102	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	98.7	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	92.0	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	104	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	96.0	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	103	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.8	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	103	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	100.0	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.8	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	75.2	41.0	123
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3762642)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	83.2	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	98.1	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	93.8	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.8	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.2	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	92.8	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	102	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	98.5	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	104	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	88.9	41.0	123
EP075(SIM)A: Phenolic Compounds (QCLot: 3762623)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	107	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	106	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	102	71.0	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 3762623) - continued								
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	107	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	84.6	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	97.1	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	99.9	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	107	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	95.8	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	100	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	104	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	# 59.6	10.0	57.0
EP075(SIM)A: Phenolic Compounds (QCLot: 3762641)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	102	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	102	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	98.2	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	104	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	77.4	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	94.2	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	97.8	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	93.4	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	99.3	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	102	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	53.0	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3762623)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	105	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	105	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	102	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	103	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	103	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	101	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	103	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	105	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	92.9	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	97.3	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.1	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	102	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	98.2	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	105	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	104	62.0	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3762623) - continued								
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	98.6	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3762641)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	101	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	101	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	98.9	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	101	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	101	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	99.0	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	101	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	103	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	92.7	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	97.2	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	90.0	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	97.0	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	101	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	99.6	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	93.0	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762622)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	86.6	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	88.8	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	93.5	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762640)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	92.2	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	99.6	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	92.5	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3764883)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	96.2	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3764894)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	93.4	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762622)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	88.1	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	91.3	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	77.7	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762640)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	100	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	91.3	74.0	138

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762640) - continued								
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	75.7	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3764883)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	97.5	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3764894)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	100	68.4	128
EP080: BTEXN (QCLot: 3764883)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	94.6	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	92.2	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	91.1	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	89.6	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	89.5	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	76.0	63.0	119
EP080: BTEXN (QCLot: 3764894)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	98.3	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.2	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	90.7	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	86.4	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	87.4	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	81.5	63.0	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 3764710)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.9	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.7	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.6	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.6	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.3	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.5	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	96.0	79.0	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3762298)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.3	77.0	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762775)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	93.6	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762775)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762775) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	100	75.0	127
EP080: BTEXN (QCLot: 3762775)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.5	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	102	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	105	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	104	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	106	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	107	70.0	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3768587)							
ES2123851-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	90.2	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	70.6	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	# Not Determined	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	92.7	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	94.9	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	74.3	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	# Not Determined	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3768589)							
ES2123870-014	S-14	EG005T: Arsenic	7440-38-2	50 mg/kg	91.6	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	109	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	86.3	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	88.5	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	106	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	104	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	112	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3768588)							
ES2123865-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	110	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3768590)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3768590) - continued							
ES2123870-019	S-19	EG035T: Mercury	7439-97-6	5 mg/kg	111	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3762625)							
ES2123870-001	S-1 shale	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	113	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3762643)							
ES2123870-021	S-21	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	83.0	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3762624)							
ES2123870-001	S-1 shale	EP068: gamma-BHC	58-89-9	0.5 mg/kg	96.5	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	76.0	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	88.0	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	86.1	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	84.8	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	94.2	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3762642)							
ES2123870-021	S-21	EP068: gamma-BHC	58-89-9	0.5 mg/kg	86.6	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	77.9	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	85.5	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	104	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	79.0	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	79.2	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3762624)							
ES2123870-001	S-1 shale	EP068: Diazinon	333-41-5	0.5 mg/kg	110	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	87.0	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	85.6	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	83.1	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	75.8	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3762642)							
ES2123870-021	S-21	EP068: Diazinon	333-41-5	0.5 mg/kg	106	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	84.0	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	82.0	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	96.2	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	80.4	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 3762623)							
ES2123870-001	S-1 shale	EP075(SIM): Phenol	108-95-2	10 mg/kg	106	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	108	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	84.8	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	94.6	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	68.5	20.0	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 3762641)							
ES2123870-021	S-21	EP075(SIM): Phenol	108-95-2	10 mg/kg	96.2	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	97.0	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	79.5	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	89.1	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	87.6	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3762623)							
ES2123870-001	S-1 shale	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.2	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	103	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3762641)							
ES2123870-021	S-21	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	89.5	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	93.9	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762622)							
ES2123870-001	S-1 shale	EP071: C10 - C14 Fraction	----	480 mg/kg	115	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	115	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	123	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762640)							
ES2123870-021	S-21	EP071: C10 - C14 Fraction	----	480 mg/kg	106	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	124	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	129	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3764883)							
ES2123870-001	S-1 shale	EP080: C6 - C9 Fraction	----	32.5 mg/kg	98.7	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3764894)							
ES2123844-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	112	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762622)							
ES2123870-001	S-1 shale	EP071: >C10 - C16 Fraction	----	860 mg/kg	127	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	115	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	113	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762640)							
ES2123870-021	S-21	EP071: >C10 - C16 Fraction	----	860 mg/kg	132	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	123	53.0	131
		EP071: >C34 - C40 Fraction	----	890 mg/kg	119	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3764883)							
ES2123870-001	S-1 shale	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	96.3	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3764894)							
ES2123844-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	118	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EP080: BTEXN (QCLot: 3764883)							
ES2123870-001	S-1 shale	EP080: Benzene	71-43-2	2.5 mg/kg	90.4	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	89.7	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	91.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	91.1	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	91.5	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	73.4	70.0	130
EP080: BTEXN (QCLot: 3764894)							
ES2123844-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	103	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	91.8	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	83.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	83.4	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.8	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	84.8	70.0	130

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Acceptable Limits (%) Low	Acceptable Limits (%) High
EG020T: Total Metals by ICP-MS (QCLot: 3764710)							
ES2123545-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.4	70.0	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	96.9	70.0	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	95.2	70.0	130
		EG020A-T: Copper	7440-50-8	1 mg/L	98.2	70.0	130
		EG020A-T: Lead	7439-92-1	1 mg/L	104	70.0	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.1	70.0	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.2	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3762298)							
ES2123296-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	97.2	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3762775)							
ES2122800-010	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	108	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3762775)							
ES2122800-010	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	110	70.0	130
EP080: BTEXN (QCLot: 3762775)							
ES2122800-010	Anonymous	EP080: Benzene	71-43-2	25 µg/L	104	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	102	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	105	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 3762775) - continued							
ES2122800-010	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	101	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	102	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	92.2	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2123870**	Page	: 1 of 13
Client	: **BENBOW ENVIRONMENTAL**	Laboratory	: Environmental Division Sydney
Contact	: Matthew Taylor	Telephone	: +61-2-8784 8555
Project	: 191318-03	Date Samples Received	: 28-Jun-2021
Site	: 191318-03	Issue Date	: 05-Jul-2021
Sampler	: DAMIEN THOMAS, Matthew Taylor	No. of samples received	: 31
Order number	: 191318-03	No. of samples analysed	: 31

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP075(SIM)A: Phenolic Compounds	QC-3762623-002	----	**Pentachlorophenol**	87-86-5	59.6 %	10.0-57.0%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EG005(ED093)T: Total Metals by ICP-AES	ES2123851--001	Anonymous	**Chromium**	7440-47-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG005(ED093)T: Total Metals by ICP-AES	ES2123851--001	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**----**	----	----	**01-Jul-2021**	09-Jul-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20,							
S-21,	S-22,							
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200)								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**----**	----	----	**29-Jun-2021**	22-Dec-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20,							
S-21,	S-22,							
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D								
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**01-Jul-2021**	22-Dec-2021	✓	**01-Jul-2021**	22-Dec-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20,							
S-21,	S-22,							
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-13D, DUP-2	**25-Jun-2021**	**01-Jul-2021**	23-Jul-2021	✓	**02-Jul-2021**	23-Jul-2021	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
Soil Glass Jar - Unpreserved (EP066)							
S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-13D, DUP-2	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Aug-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20							
Soil Glass Jar - Unpreserved (EP068)								
S-21,	S-22,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Aug-2021	✓
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20							
Soil Glass Jar - Unpreserved (EP068)								
S-21,	S-22,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Aug-2021	✓
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20							
Soil Glass Jar - Unpreserved (EP075(SIM))								
S-21,	S-22,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Aug-2021	✓
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
S-1 - shale,	S-2 - silty clay loam,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
S-3 - silty clay loam,	S-4,							
S-5,	S-6,							
S-7,	S-8,							
S-9,	S-10,							
S-11,	S-12,							
S-13,	S-14,							
S-15,	S-16,							
S-17,	S-18,							
S-19,	S-20							
Soil Glass Jar - Unpreserved (EP075(SIM))								
S-21,	S-22,	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Aug-2021	✓
S-23,	S-24,							
S-25,	S-26,							
S-27,	S-28,							
S-13D,	DUP-2							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-13D, DUP-2	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP071)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**01-Jul-2021**	09-Aug-2021	✓
Soil Glass Jar - Unpreserved (EP080)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-13D, DUP-2	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Jul-2021	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
S-1 - shale, S-2 - silty clay loam, S-3 - silty clay loam, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12, S-13, S-14, S-15, S-16, S-17, S-18, S-19, S-20, S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-13D, DUP-2	**25-Jun-2021**	**30-Jun-2021**	09-Jul-2021	✓	**02-Jul-2021**	09-Jul-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Soil Glass Jar - Unpreserved (EG020A-T)							
RINSATE	**25-Jun-2021**	**30-Jun-2021**	22-Dec-2021	✓	**30-Jun-2021**	22-Dec-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
RINSATE	**25-Jun-2021**	**----**	----	----	**29-Jun-2021**	09-Jul-2021	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
RINSATE	**25-Jun-2021**	**30-Jun-2021**	02-Jul-2021	✓	**30-Jun-2021**	02-Jul-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
RINSATE	**25-Jun-2021**	**30-Jun-2021**	02-Jul-2021	✓	**30-Jun-2021**	02-Jul-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
RINSATE	**25-Jun-2021**	**30-Jun-2021**	02-Jul-2021	✓	**30-Jun-2021**	02-Jul-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Total Mercury by FIMS	EG035T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM Schedule B(3)
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

CHAIN OF CUSTODY

COC#: **24510** *ALS Laboratory:* ES Sydney

CLIENT: BENENV - BENBOW ENVIRONMENTAL

PROJECT: 191318-03

SITE: 191318-03

ORDER NO: 191318-03

PROJECT MANAGER: Matt Taylor CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Damien Thomas QUOTE NO: COMPASS BLANKET QUOTE / ES2021BENENV0001

EMAIL REPORTS TO: mtaylor@benbowenviro.com.au, damien@benbowenviro.com.au

EMAIL INVOICES TO: accountsreceivable@benbowenviro.com.au

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	EA200B (asbestos) SOLID	S-19 SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	S-1	shale	25/06/2021 10:03 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		Shale
002	S-2	silty clay loam	25/06/2021 10:18 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
003	S-3	silty clay loam	25/06/2021 10:39 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
004	S-4		25/06/2021 10:56 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
005	S-5		25/06/2021 11:12 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
006	S-6		25/06/2021 11:21 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
007	S-7		25/06/2021 11:32 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
008	S-8		25/06/2021 11:40 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
009	S-9		25/06/2021 11:47 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		

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Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	EA200B (asbestos) SOLID	S-19 SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	S-10		25/06/2021 11:53 AM	Soil	ALS: 1 Non ALS: 1	No		X	X		
011	S-11		25/06/2021 01:35 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
012	S-12		25/06/2021 01:37 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
013	S-13		25/06/2021 02:08 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
014	S-14		25/06/2021 02:06 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
015	S-15		25/06/2021 02:30 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
016	S-16		25/06/2021 02:32 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
017	S-17		25/06/2021 02:48 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
018	S-18		25/06/2021 02:54 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		

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Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	EA200B (asbestos) SOLID	S-19 SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	S-19		25/06/2021 03:10 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
020	S-20		25/06/2021 03:15 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
021	S-21		25/06/2021 04:15 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
022	S-22		25/06/2021 04:16 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
023	S-23		25/06/2021 04:17 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
024	S-24		25/06/2021 04:18 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
025	S-25		25/06/2021 04:19 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
026	S-26		25/06/2021 04:20 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
027	S-27		25/06/2021 04:21 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		

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Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Analysis NOT REQUIRED	EA200B (asbestos) SOLID	S-19 SOIL	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
028	S-28		25/06/2021 04:45 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
029	S-13D		25/06/2021 02:08 PM	Soil	ALS: 1 Non ALS: 1	No		X	X		
030	DUP-2		25/06/2021 04:15 PM	Soil	ALS: 1 Non ALS: 0	No			X		
031	RINSATE		25/06/2021 05:04 PM	Water	ALS: 1 Non ALS: 0	No	-			VOC, metals	

CHAIN OF CUSTODY

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Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	S-1	Soil Glass Jar - Unpreserved	250 mL	00261020096319	Orange	No	
002	S-2	Soil Glass Jar - Unpreserved	250 mL	00261020096412	Orange	No	
003	S-3	Soil Glass Jar - Unpreserved	250 mL	00261020096391	Orange	No	
004	S-4	Soil Glass Jar - Unpreserved	250 mL	00261020096387	Orange	No	
005	S-5	Soil Glass Jar - Unpreserved	250 mL	00261020096345	Orange	No	
006	S-6	Soil Glass Jar - Unpreserved	250 mL	00261020096433	Orange	No	
007	S-7	Soil Glass Jar - Unpreserved	250 mL	00261020096214	Orange	No	
008	S-8	Soil Glass Jar - Unpreserved	250 mL	00261020096193	Orange	No	
009	S-9	Soil Glass Jar - Unpreserved	250 mL	00261020096454	Orange	No	
010	S-10	Soil Glass Jar - Unpreserved	250 mL	00261020096368	Orange	No	
011	S-11	Soil Glass Jar - Unpreserved	250 mL	00261020096274	Orange	No	
012	S-12	Soil Glass Jar - Unpreserved	250 mL	00261020096138	Orange	No	
013	S-13	Soil Glass Jar - Unpreserved	250 mL	00261020096365	Orange	No	
014	S-14	Soil Glass Jar - Unpreserved	250 mL	00261020096201	Orange	No	
015	S-15	Soil Glass Jar - Unpreserved	250 mL	00261020096384	Orange	No	
016	S-16	Soil Glass Jar - Unpreserved	250 mL	00261020096377	Orange	No	
017	S-17	Soil Glass Jar - Unpreserved	250 mL	00261020096382	Orange	No	
018	S-18	Soil Glass Jar - Unpreserved	250 mL	00261020096355	Orange	No	
019	S-19	Soil Glass Jar - Unpreserved	250 mL	00261020096372	Orange	No	
020	S-20	Soil Glass Jar - Unpreserved	250 mL	00261020096353	Orange	No	
021	S-21	Soil Glass Jar - Unpreserved	250 mL	00261020096025	Orange	No	
022	S-22	Soil Glass Jar - Unpreserved	250 mL	00261020096371	Orange	No	
023	S-23	Soil Glass Jar - Unpreserved	250 mL	00261020096179	Orange	No	
024	S-24	Soil Glass Jar - Unpreserved	250 mL	00261020095974	Orange	No	
025	S-25	Soil Glass Jar - Unpreserved	250 mL	00261020096147	Orange	No	
026	S-26	Soil Glass Jar - Unpreserved	250 mL	00261020096043	Orange	No	

CHAIN OF CUSTODY

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TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

027	S-27	Soil Glass Jar - Unpreserved	250 mL	00261020096174	Orange	No	
028	S-28	Soil Glass Jar - Unpreserved	250 mL	00261020096210	Orange	No	
029	S-13D	Soil Glass Jar - Unpreserved	250 mL	00261020096385	Orange	No	
030	DUP-2	Soil Glass Jar - Unpreserved	250 mL	00261020096215	Orange	No	
031	RINSATE	Soil Glass Jar - Unpreserved	250 mL	00261020096127	Orange	No	

Total Bottle Count: ALS: 31, Non ALS: 29

EIS Appendix 11: Aboriginal Heritage Report

Due Diligence Aboriginal Archaeological Assessment

344 Park Road, Wallacia NSW 2745

Report prepared for Benbow Environmental

May 2020

Report:	Due Diligence Aboriginal Archaeological Assessment Report
Prepared for:	Benbow Environmental
Prepared by:	Narla Environmental Pty Ltd
Project no:	Benb2
Date:	May 2020
Version:	Final

Narla Environmental Pty Ltd

www.narla.com.au

Report Certification

Works for this report were undertaken by:

Staff Name	Position
Alexander Graham *BSc*	Narla Environmental- General Manager / Senior Ecologist / Environmental Scientist
Emily Rix *BSc Hons*	Narla Environmental- Project Manager/ Ecologist / Environmental Scientist
Sarah Cardenzana *BEnvSci*	Narla Environmental- Ecologist / Environmental Scientist
Jack Tatler *PhD*	Narla Environmental- Project Manager / Ecologist / Environmental Scientist

Document Control

Revision	Document Name	Issue Date	Internal Document Review
Draft v1.0	Due Diligence Aboriginal Archaeological Assessment Report for 344 Park Road, Wallacia NSW	5/05/2020	Emily Rix Chris Moore Alexander Graham
Final	Due Diligence Aboriginal Archaeological Assessment Report for 344 Park Road, Wallacia NSW	07/05/2020	Jack Tatler

Table of Contents

1. Introduction

1.1 Project Background

Narla Environmental Pty Ltd (Narla) was engaged by Benbow Environmental on behalf of the proponent (Australasean Group Pty Ltd) to undertake a Due Diligence Aboriginal Archaeological Assessment Report for the proposed Resource Recovery Facility at 344 Park Road, Wallacia NSW (Lot 5/-/DP655046; the 'Subject Property').

The proposed development where all activities associated with the business will occur, is located in the north-eastern area of the Subject Property and is considered the 'Subject Land' for the purpose of this assessment (**Figure 1**). The native bushland which is located in the southern half of the Subject Property will be left as per its original condition and fenced off for that purpose. This area has not been assessed under the current proposal.

This assessment has been prepared in accordance with the requirements of the Due Diligence Code of Practice for the Protection of Aboriginal Objects (DECCW 2010).

The aim of this assessment was to identify any potential Aboriginal archaeological constraints that may exist within the Subject Land and provide recommendations to avoid or mitigate impacts to any known or suspected sites, objects or areas that have archaeological sensitivity in accordance with the requirements of the National Parks and Wildlife Act 1974 (NPW Act).

1.2 Site Location and Description

The Subject Property is located within the Penrith Local Government Area, which is situated within the Gandangara Local Aboriginal Land Council.

The proposed development includes the installation of a weighbridge, storage containers, a small weighbridge office, a car park, access road, operation of a resource recovery facility, high fencing around the perimeter of the relevant section of the property and premises screening involving tree planting. The existing dwelling will be transformed to accommodate the site office and associated staff amenities.

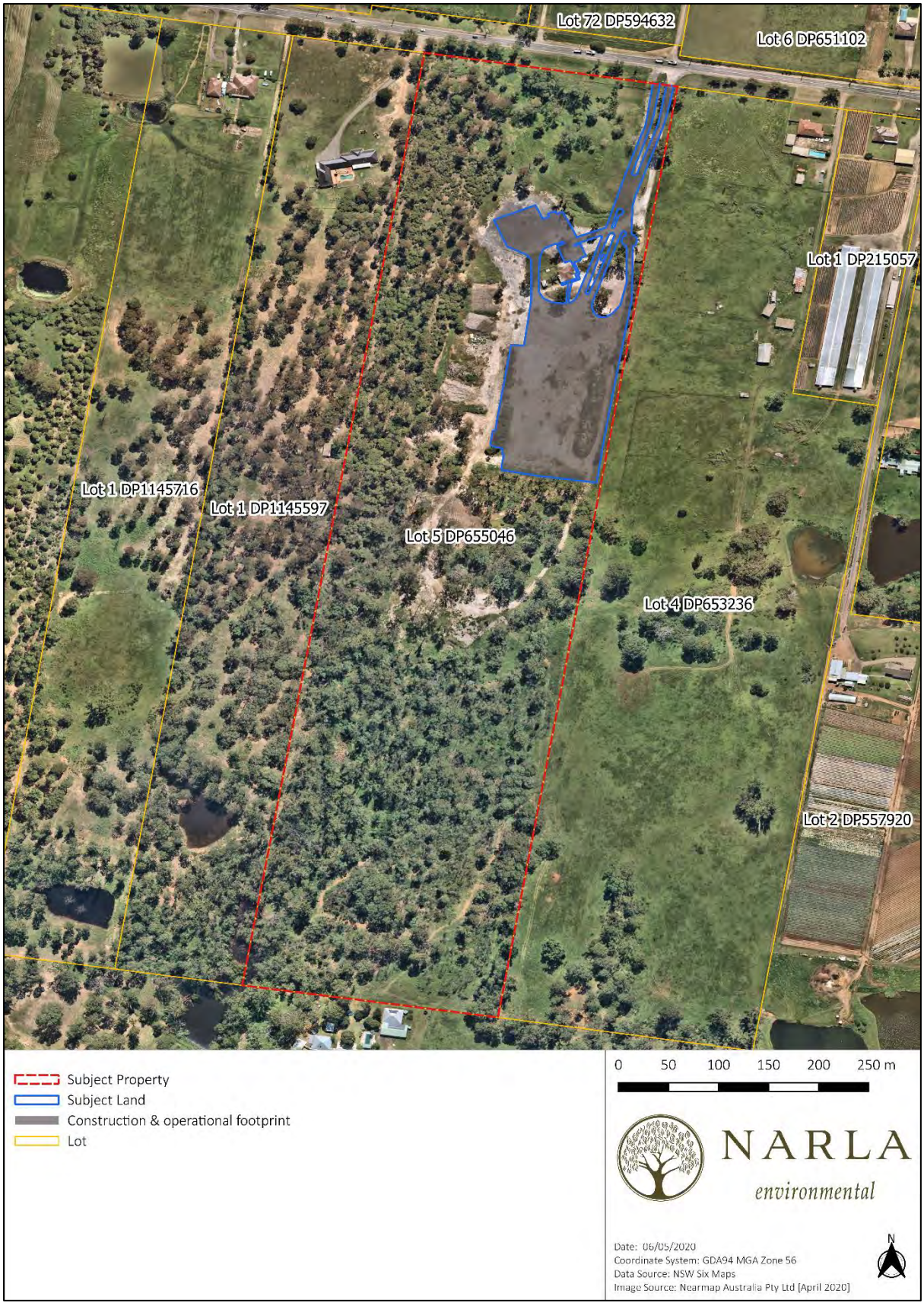


Figure 1. The location of the Subject Property and Subject Land.

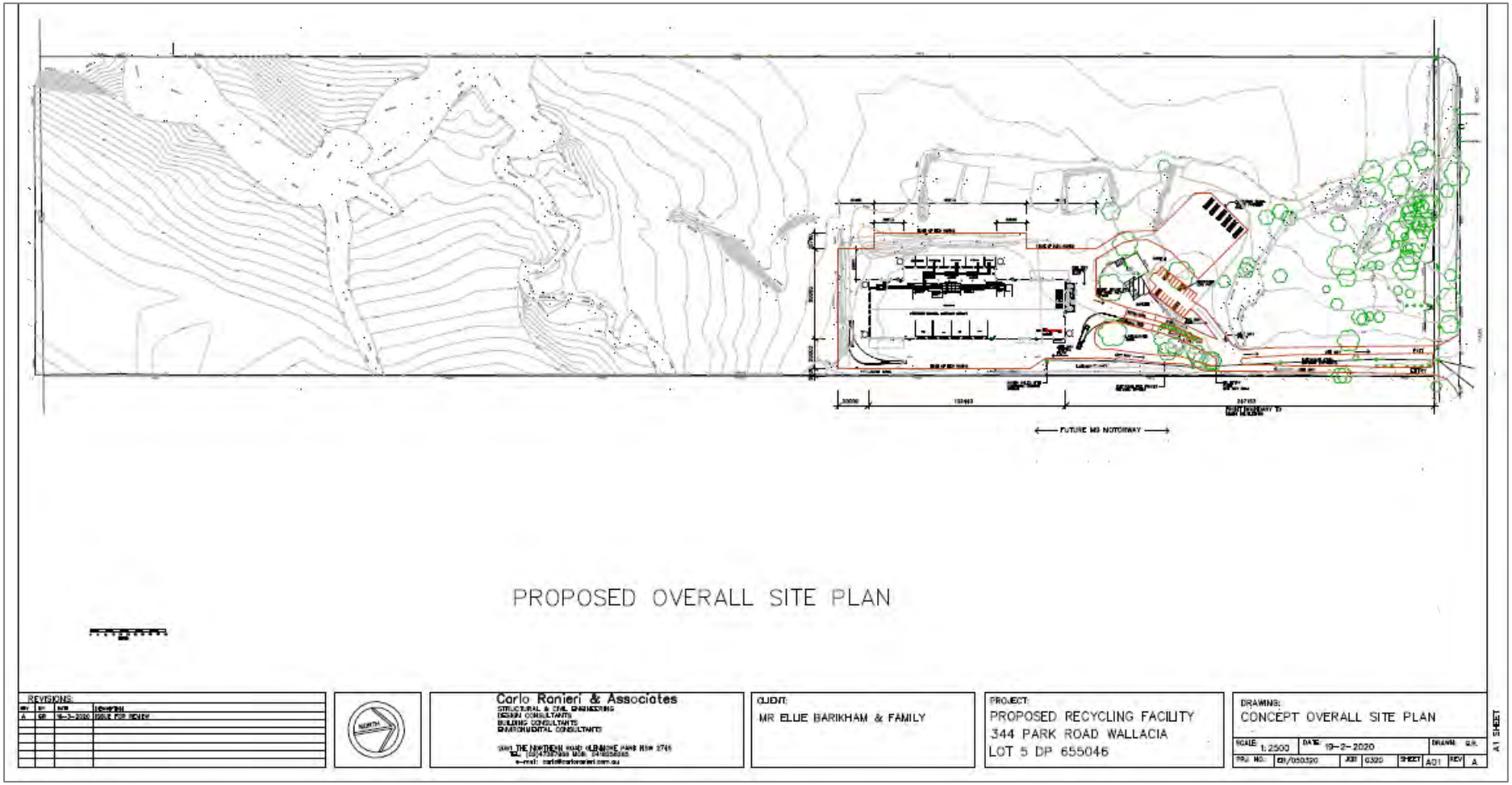


Figure 2. Design Plans for the Proposed Development (Carlo Ranieri and Associates 2020).

2. Environmental Context

2.1 Topography, Geology and Soils

The Subject Property is situated in a relatively flat landscape, with elevation ranging between 68m and 81m Australian Height Datum. The Subject Property occurs on the Blacktown soil landscape, which is typically characterised by gently undulating rises on Wianamatta Group shales. Local relief is to 30m, with slopes usually >5%. The underlying geology is typically Wianamatta Group—Ashfield Shale consisting of laminite and dark grey siltstone, Bringelly Shale which consists of shale with occasional calcareous claystone, laminite and infrequent coal, and Minchinbury Sandstone consisting of fine to medium-grained quartz lithic sandstone.

Soils of the Blacktown soil landscape are shallow to moderately deep (>100cm) hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines. This soil landscape is almost completed cleared, with vegetation comprising open-forest and open-woodland (dry sclerophyll forest) (Bannerman & Hazelton 1990).

2.2 Vegetation

Vegetation within the Subject Land has been historically cleared. Some vegetation has regenerated since at least 2002 after historical clearing (Google Earth 2020). It is comprised of a sparse native canopy layer, a dense mid-story/shrub layer, and a mixed native/exotic ground layer. The canopy was comprised of *Eucalyptus moluccana,* with the dense shrub layer dominated by *Melaleuca decora.* The ground layer comprises a diverse native and exotic species assemblage.

2.3 Past Land Use and Historical Disturbance

The northern half of the Subject Property was historically used for rural practices including grazing, crops in hot house environments and some dwellings, some waste processing facilities, resource recovery facilities, residential and small-scale agricultural purposes. Some buildings and structures within this area have been demolished and the land cleared over the past 10 years. This area is now cleared of most vegetation revealing bare ground. (**Appendix B**)

The southern half of the Subject Property remains as relatively intact native bushland with the exception of a few dirt roads.

2.4 Hydrology

A small first order tributary of Duncan's Creek flows through the southern half of the Subject Property.

A small unmapped, manmade dam established around 2012 is located within the Subject Land (**Figure 3**). This dam will be slightly impacted by the proposal.

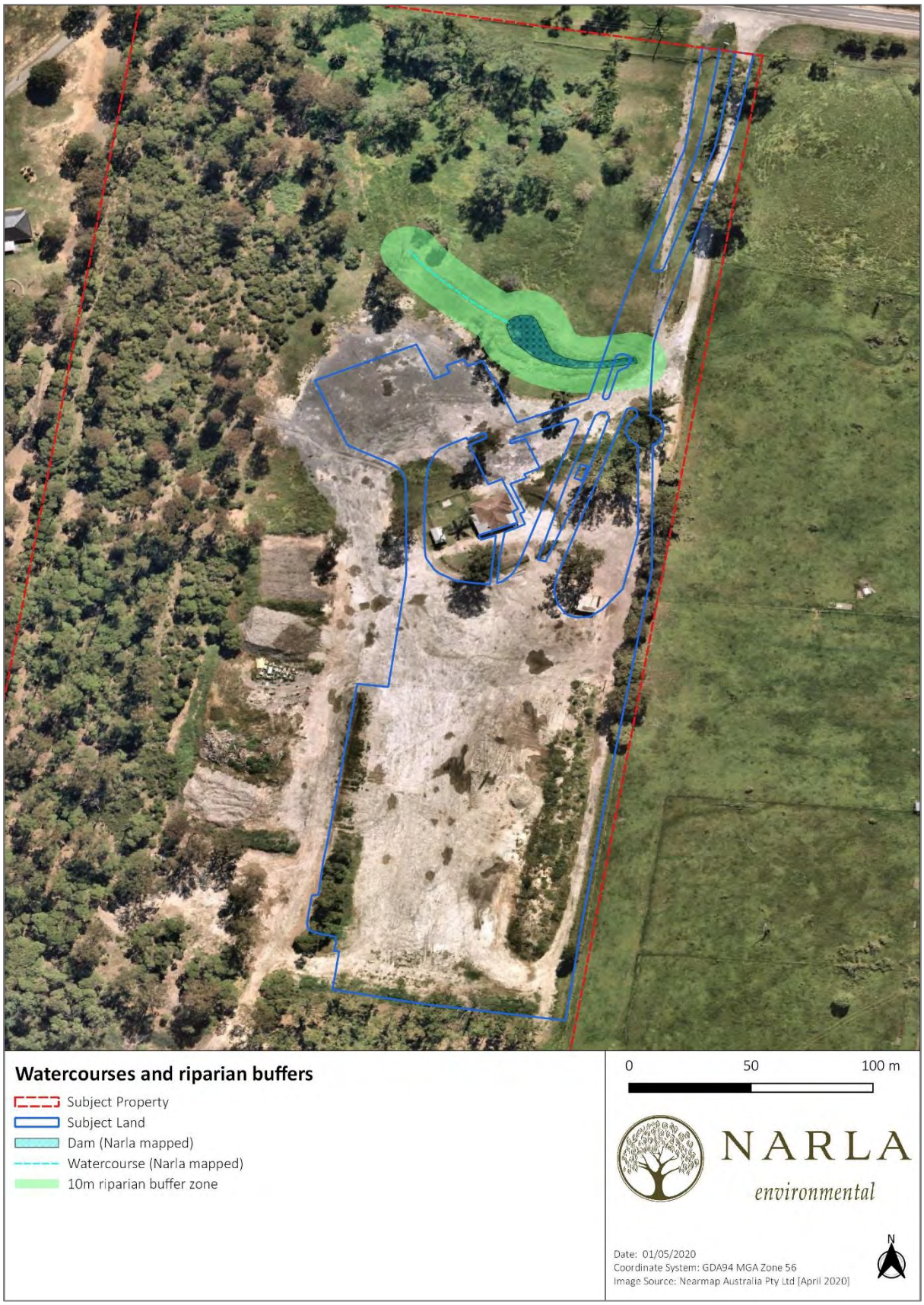


Figure 3. Man-made dam within the Subject Land.

3. Aboriginal Due Diligence Assessment

3.1 Scope of Assessment

Aboriginal objects are protected under the NSW National Parks and Wildlife Act 1974. Part 6 of the NPW Act 'Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW' provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Harm is defined to mean destroying, defacing or damaging an Aboriginal object or declared Aboriginal place, or removing an object from the land.

An Aboriginal cultural heritage assessment report is a written report detailing the results of the assessment and recommendations for actions to be taken before, during and after an activity to manage and protect Aboriginal objects and declared Aboriginal places identified by the investigation and assessment.

The 'Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW' assistd individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether they should apply for consent in the form of an Aboriginal Heritage Impact Permit (AHIP).

3.2 Assessment Methodology

This Due Diligence Aboriginal Archaeological Assessment Report follows the Generic Due Diligence Process (**Figure 4**) (DECCW 2010).

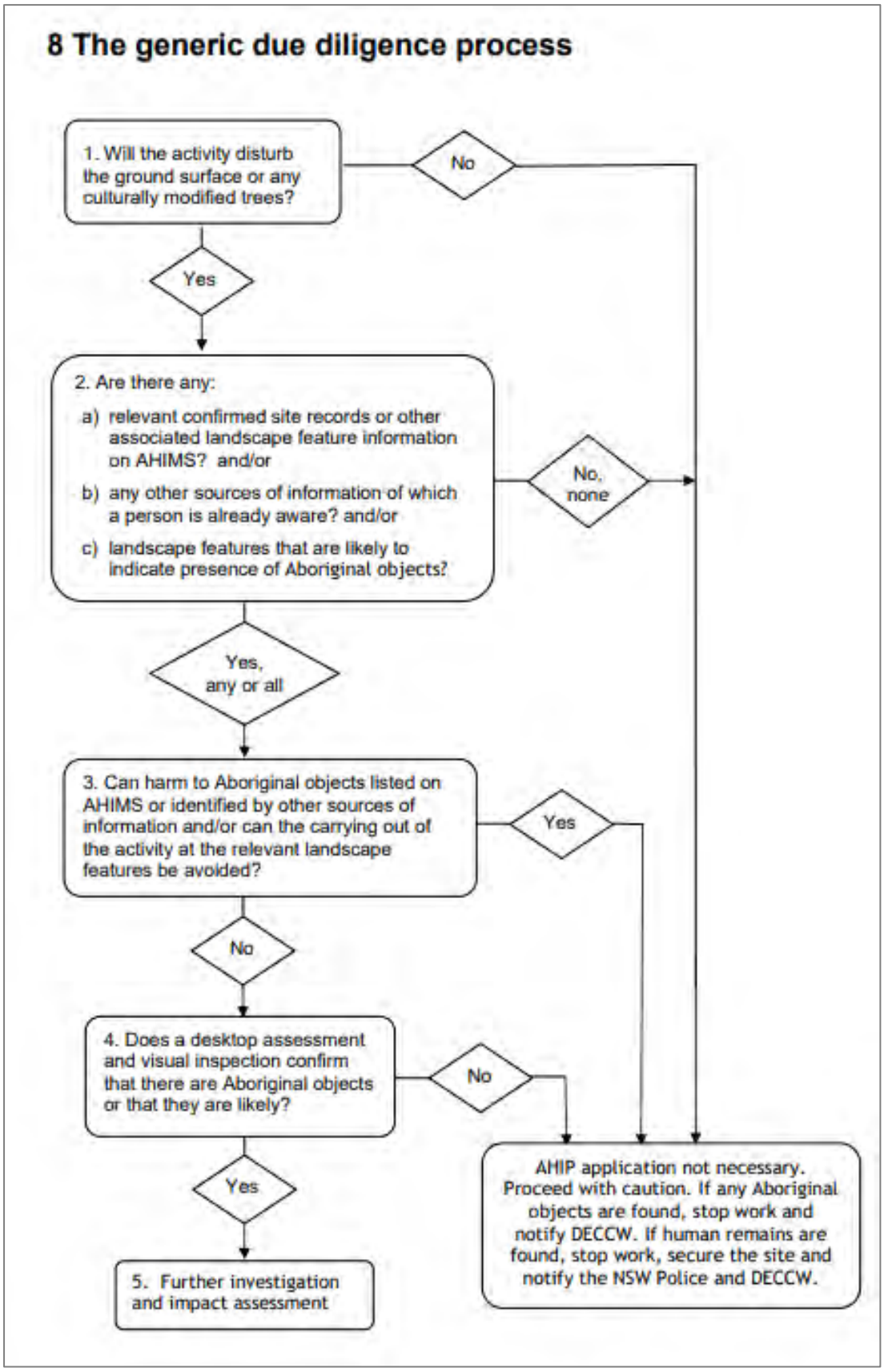


Figure 4. The Generic Due Diligence Process (DECCW 2010).

3.3 The Due Diligence Process

Step 1. Will the activity disturb the ground surface?

Yes. The proposed development involves earthworks and vegetation clearance and therefore has the potential to disturb Aboriginal objects.

Step 2a. Are there any relevant confirmed site records or other associated landscape feature information on AHIMS?

AHIMS

A basic search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on the 24th April 2020 over a 200m area centred on the Subject Property. No documented Aboriginal archaeological sites or objects were identified to occur within the search area.

Other Heritage Registers

Searches of the State Heritage Register, the Penrith Local Environmental Plan (LEP) (2010) and the Penrith Development Control Plan (DCP) (2014) were conducted on the 24th April 2020. The searches concluded that there were no recorded Aboriginal or historic items within the Subject Property.

Step 2b. Are there any other sources of information of which a person is already aware?

No other sources of information are available for the Aboriginal Heritage of the site.

Step 2c - Are there landscape features that are likely to indicate the presence of Aboriginal Objects?

Yes. A mapped first order watercourse and an unmapped dam are located within the southern half of the Subject Property. In accordance with the Due Diligence Code of Practice, there is a higher probability of Aboriginal objects occurring within land that is within 200m of water. However, first order watercourses are often associated with infrequent and low densities of artefacts from movement through the landscape rather than long term occupation or focused occupation.

Step 3. Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?

Yes. The desktop assessment identified that there were no Aboriginal Objects likely to occur within the Subject Property due to the degree of disturbance within it. As a result, there is no reason to move or avoid the activity. In addition, the first order watercourse mapped to the south of the Subject Land will not be directly impacted by the proposed development as the area in which it is located will be appropriately fenced off and unimpacted by development. An unmapped, man-made dam will be impacted by the proposal. It is unlikely that this is an important Aboriginal site or place as the dam is manmade, holding low archaeological significance.

Step 4: Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?

No. The desktop assessment and visual inspection indicated that there were no Aboriginal Objects likely to occur within the Subject Land due to the degree of disturbance. As a result, there is no reason to move or avoid the activity.

Step 5. Further investigations and impact assessment

No further investigations required.

4. Conclusion and Recommendations

The Subject Land does not contain any documented Aboriginal sites or objects, or any specific areas of potential Aboriginal archaeological sensitivity as assessed within this report. The Subject Land has been historically heavily degraded due to vegetation clearing and demolition of existing structures.

No Aboriginal heritage constraints were identified for the proposed activity and no further investigation or impact assessment is required. The proposed activity may therefore proceed with caution without a further Aboriginal Cultural Heritage Assessment or AHIP.

It is recommended that:

- All site workers and contractors be inducted to the Subject Land and informed of their obligations under the NPW Act;
- In the unlikely event that any Aboriginal objects are found and cannot be avoided, all activities with the potential to impact the objects must stop and an appropriately qualified archaeologist engaged to assess the findings, and notification is provided to the Department of Planning Industry and Environment; and
- In the unlikely event that human remains are found, stop work, secure the site and notify the NSW Police and the Office of Environment and Heritage.

5. References

Bannerman and Hazelton (1990) Soil Landscapes of the Penrith 1:100 000 Sheet. Soil Conservation Service of NSW, Sydney.

Carlo Ranieri & Associates (2020) Concept Overall Site Plan for the Proposed Recycling Facility at 344 Park Road, Wallacia

Department Environment, Climate Change and Water NSW, 2010c. Aboriginal Cultural Heritage Consultation Requirements for Proponent 2010: Part 6 of the National Parks and Wildlife Act 1974. Department of Environment, Climate Change and Water NSW.

Department Environment, Climate Change and Water NSW, 2010a. Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales: Part 6 National Parks and Wildlife Act 1974, Department of Environment, Climate Change and Water NSW. Available at: http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf.

Department Environment, Climate Change and Water NSW, 2010b. Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales, Department of Environment, Climate Change and Water NSW.

Penrith Development Control Plan 2014

Penrith Local Environmental Plan 2010

6. Appendices

Appendix A. Basic AHIMS Search

Appendix B. Historic Aerial Imagery of the Subject Property

Appendix A. Basic AHIMS Search

Office of Environment & Heritage

NSW GOVERNMENT

AHIMS Web Services (AWS)

Search Result

Purchase Order/Reference : Benbow

Client Service ID : 499250

Narla Environmental

Unit 1 26-30 Tepko Road
Terrey Hills New South Wales 2084
Attention: Alexander Graham

Email: reception@narla.com.au

Date: 24 April 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 5, DP:DP655046 with a Buffer of 200 meters, conducted by Alexander Graham on 24 April 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix B. Historic Aerial Imagery of the Subject Land.

Historical Aerial Image of the Subject Land (January 2018)

Subject Property
Subject Land
Lot

0 50 100 m

NARLA environmental

Date: 06/05/2020
Coordinate System: GDA94 MGA Zone 56
Image Source: Nearmap Australia Pty Ltd (Feb 2010)

N

NARLA

environmental

Eastern Sydney Office
2/8 Apollo Street
Warriewood
NSW 2102
Ph: 02 9986 1295

Western Sydney Office
7 Twentyfifth Avenue
West Hoxton
NSW 2171
Ph: 0414314859

Hunter Valley Office
10/103 Glenwood Drive
Thornton
NSW 2322
Ph: 0414314859

www.narla.com.au

EIS Appendix 12: Traffic and Parking Assessment

TRAFFIC AND PARKING IMPACT ASSESSMENT OF A RESOURCE RECOVERY FACILITY

344 Park Road-Wallacia

Traffic and Parking Impact Report

Prepared for: Benbow Environmental

A201693N (Version 1e)

January 2022

Motion Traffic Engineers Pty Ltd
Telephone:
94033588
sydney@motiontraffic.com.au

ACN 600201583

1. INTRODUCTION

Motion Traffic Engineers was commissioned by Benbow Environmental to undertake a traffic and parking impact assessment of a proposed Resource Recovery Facility at 344 Park Road in Wallacia.

The proposed construction and operation of a resource recovery facility will process up to 95000 tonnes per year for construction and demolition (C&D) and commercial and industrial (C&I) waste material.

The premises will be divided into two parts; the first part is the main active working area where all activities associated with the business will occur and the second which will be left as per its original condition (non-active working area) and will be fenced off for that purpose. The premises are located to the north eastern part of the property.

The vehicle access and egress to the car park is via Park Road. The site is currently a vacant lot.

This traffic report focuses on the proposed resource recovery Facility and changes in car usage and car park utilisation and additional trips from the proposed resource Recovery Facility

In the course of preparing this assessment, the subject site and its environs have been inspected, plans of the development examined, and all relevant traffic and parking data collected and analysed.

2. BACKGROUND AND EXISTING CONDITIONS OF THE PROPOSED LOCATION

2.1 Location and Land Use

The proposed resource recovery facility is located to the West of The Northern Road and is in the area which is a primarily production. Residential buildings are primarily located far west to the site and south of Wallacia Country Club.

Currently the site is a large vacant lot.

Figures 1 and 2 shows the location of the resource recovery site from the aerial and street map perspective respectively.

Figures 3 shows the existing site.

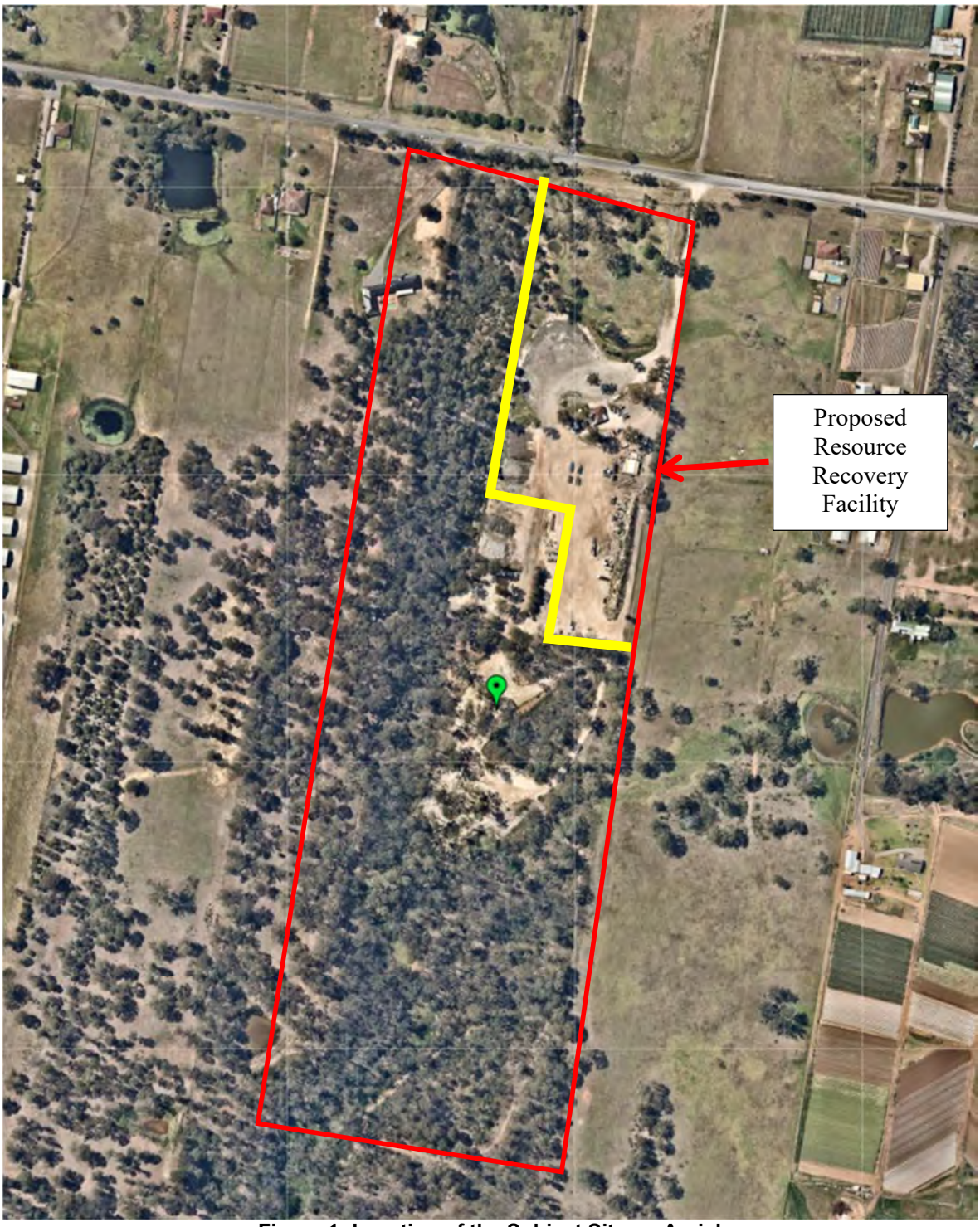


Figure 1: Location of the Subject Site on Aerial

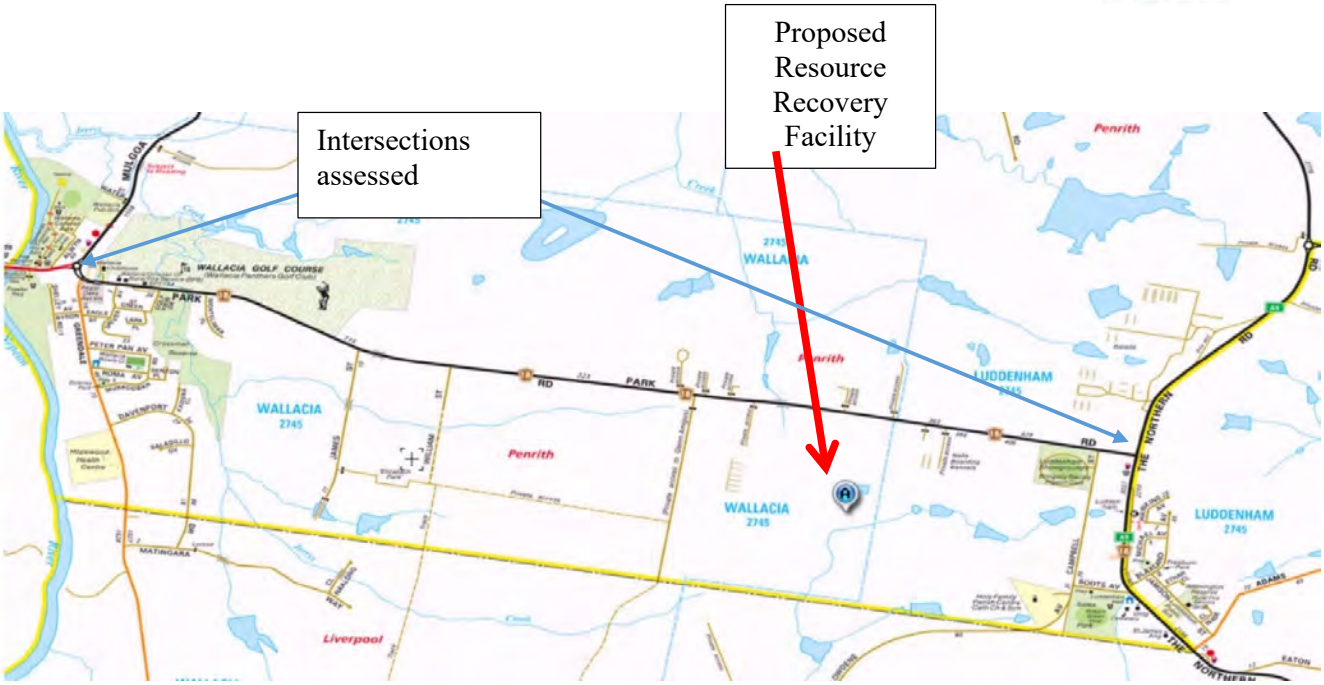


Figure 2: Street Map of the Location of the resource recovery site

Figure 3: Resource recovery site(344 Park Road in Wallacia)

2.2 Road Network

This section describes the roads near the proposed resource Recovery Facility The entrance to the resource recovery site is from Park Road.

Park Road is a rural road with one lane each way with a sign posted speed limit of 80 km/hr. On street parking is not permitted on either side of the road. The road shoulder is available for emergency vehicles to park. Figure 4 shows the photograph of Park Road.

The Northern Road is an arterial road with one lane each way near the intersection with Park Road. sign posted speed limit of 80km/hr south-bound and 60km/hr north-bound near the intersection with Park Road. Road shoulder is available for emergency vehicles to park. Figure 5 shows a photograph of The Northern Road near the intersection with Park Road.

Figure 4: Park Road looking west

Figure 5: The Northern Road intersection with Park Road

2.3 Public Parking Opportunities

The resource recovery site is located in a Primary Production zone (RU1). On-street parking is not available on either side of Park Road.

2.4 Intersection Description

As part of this traffic impact assessment two intersections is assessed:

- Stop intersection of The Northern Road with Park Road.
- Priority intersection of Park Road with Greendale Road

External traffic travelling to and from the site will most likely need to travel through the above intersection.

The stop intersection of The Northern Road with Park Roade is a three-leg intersection with all turn movements permitted. Drivers on Park Road must stop and give way to vehicles on The Northern Road. A short lane with left turn movement is available on the north leg of the intersection. Figure 6 shows a layout of the intersection using SIDRA – an industry standard intersection assessment software. The number on the lane represent the length of a short lanes in metres.

The Priority Intersection of Park Road with Greendale Road is a three-leg intersection. All turn movements are permitted. Drivers on Greendale Road must give way to vehicles on Park Road. Figure 7 shows a layout of the intersection using SIDRA. an industry standard intersection assessment software

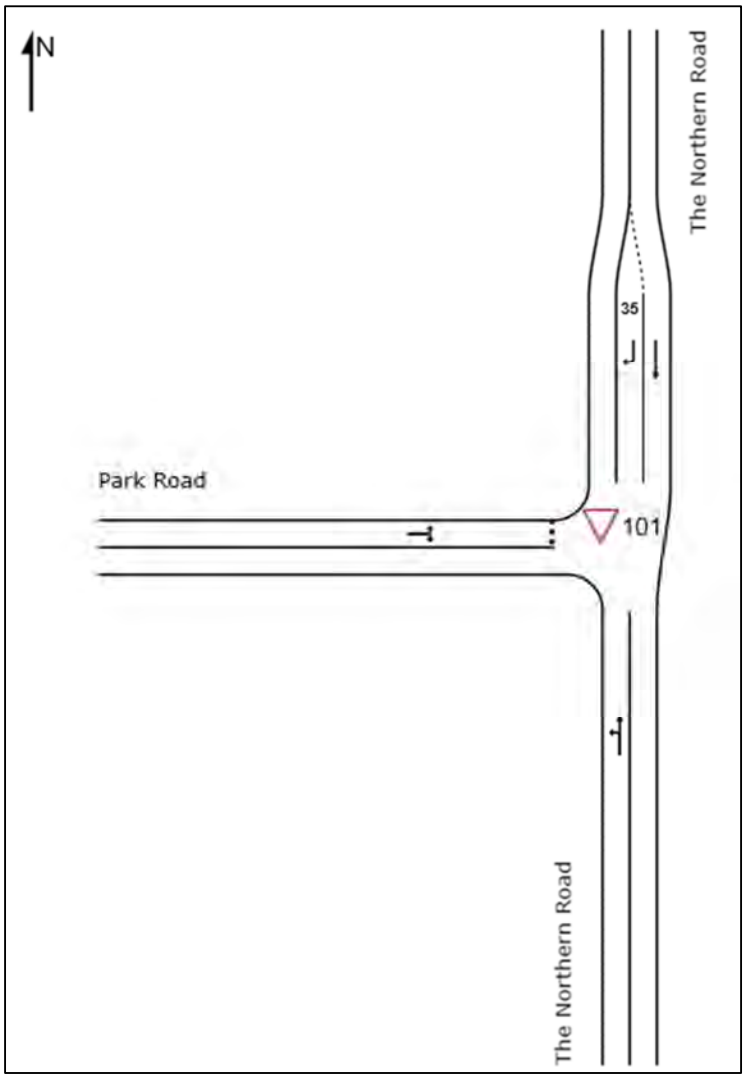


Figure 6: Stop Intersection of The Northern Road with Park Road (SIDRA)

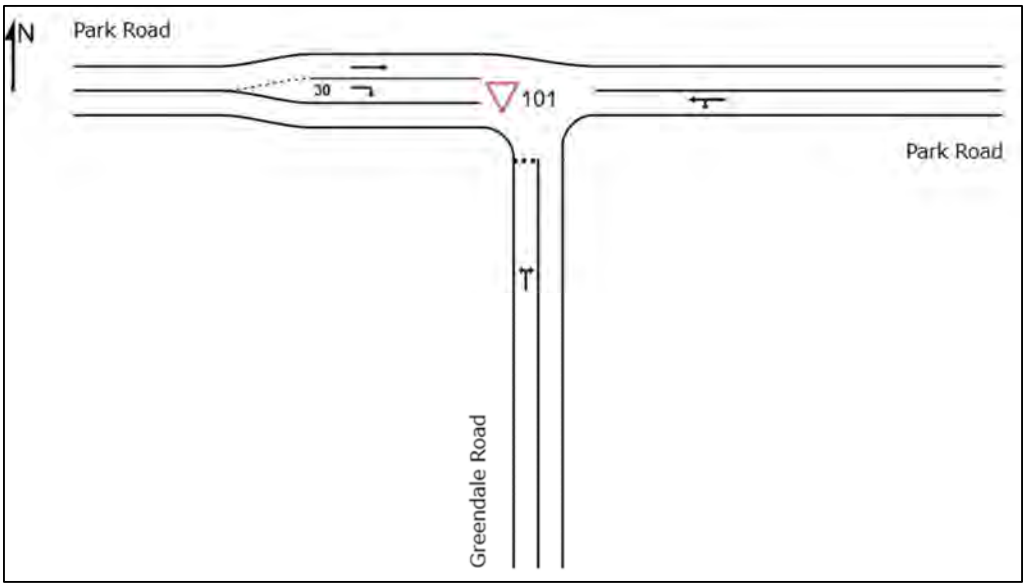


Figure 7: Priority Intersection of Park Road with Greendale Road (SIDRA)

2.5 Existing Traffic Volumes

As part of the traffic assessment, traffic counts have been undertaken at the intersection for the weekday AM and PM peak hour periods. The peak hours are 8:00am to 9:00am and 5:00pm to 6:00pm for the weekday AM and PM peak hours respectively.

Figures 8 and 9 presents in vehicle numbers the existing weekday AM and PM peak hour traffic volumes respectively. The bracketed numbers are trucks/buses and unbracketed are cars.

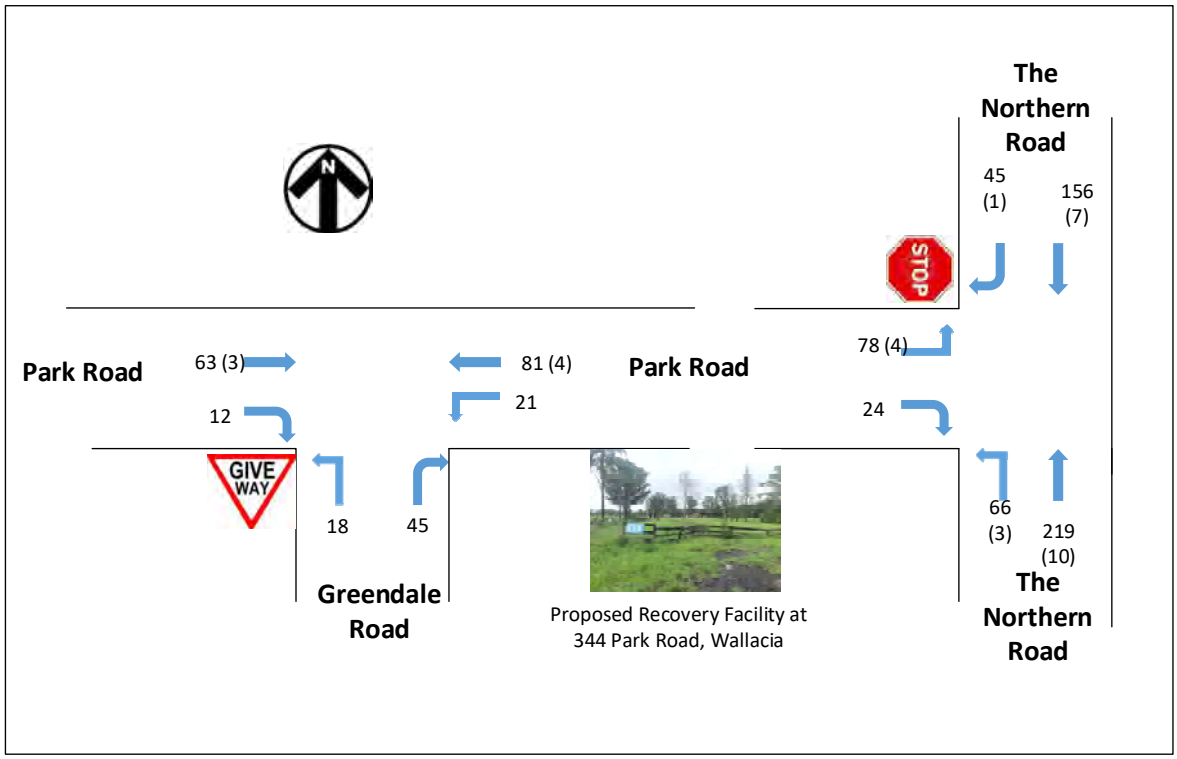


Figure 8: Existing Weekday Traffic Volumes AM Peak Hour

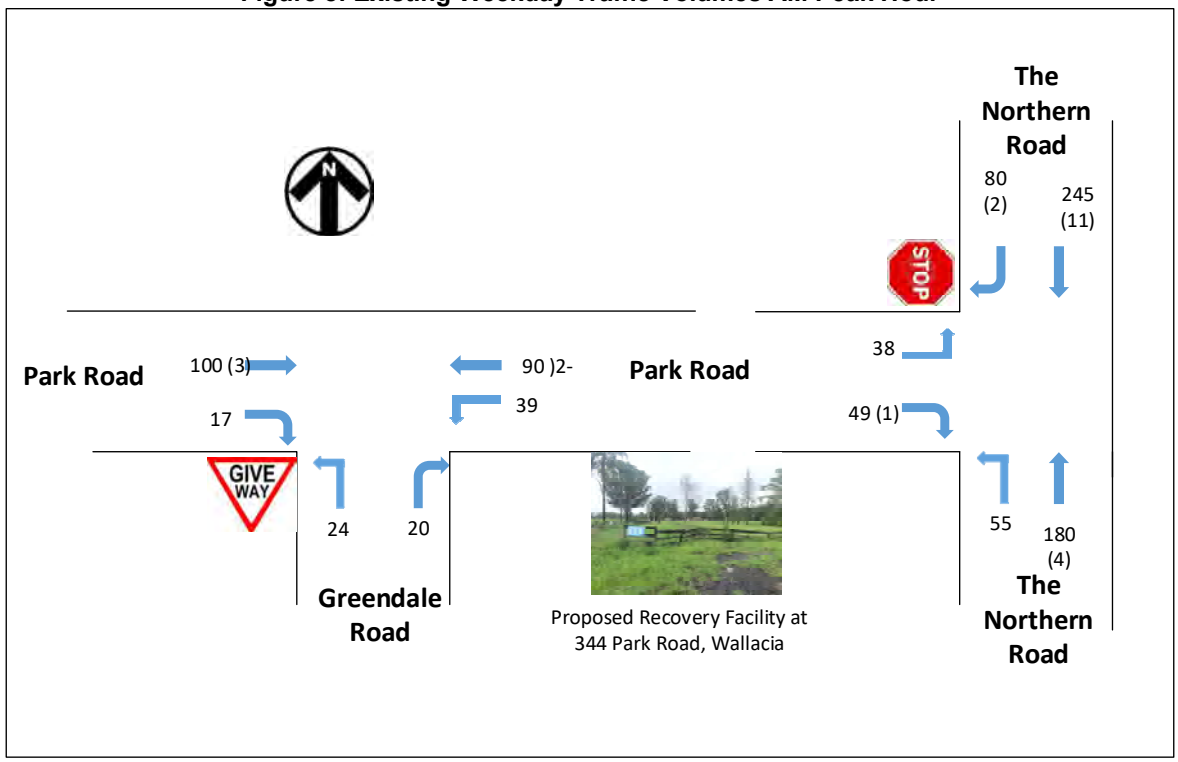


Figure 9: Existing Weekday Traffic Volumes PM Peak Hour

2.6 Intersection Assessment

An intersection assessment has been undertaken for:

- Stop intersection of The Northern Road with Park Road.
- Priority intersection of Park Road with Greendale Road

The existing intersection operating performance was assessed using the SIDRA software package (version 8) to determine the Degree of Saturation (DS), Average Delay (AVD in seconds) and Level of Service (LoS) at each intersection. The SIDRA program provides Level of Service Criteria Tables for various intersection types. The key indicator of intersection performance is Level of Service, where results are placed on a continuum from 'A' to 'F', as shown in Table 1.

LoS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction control
A	Good operation	Good operation
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but accident study required
D	Operating near capacity	Near capacity & accident study required
E	At capacity, at signals incidents will cause excessive delays.	At capacity, requires other control mode
F	Unsatisfactory and requires additional capacity, Roundabouts require other control mode	At capacity, requires other control mode

Table 1: Intersection Level of Service

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection as indicated below, which relates AVD to LOS. The AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner-city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for level of service assessment should be that movement with the highest average delay.

LoS	Average Delay per Vehicles (seconds/vehicle)
A	Less than 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	>70

Table 2: Intersection Average Delay (AVD)

The degree of saturation (DS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt to keep DS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9 queues can be anticipated.

The result of the intersection analysis is as follows:

Stop Intersection of The Northern Road with Park Road

- All turn movements have a LoS A for AM and PM peak hours
- There is a spare capacity at this intersection

Priority Intersection of Park Road with Greendale Road

- All turn movements have a LoS A for AM and PM peak hours
- There is spare capacity at this intersection.

The full Sidra results are presented in Appendix A.

2.7 Acceleration & Deceleration lane for entry truck manoeuvrability

Acceleration and deceleration lane are required at the intersection of Park Road with entry driveway for the purpose of road safety.

Part of the deceleration lane is on adjacent property as the location of the entry driveway does not allow for a deceleration lane on the site frontage only.

The current location of the site frontage and the site entry allow to have an acceleration lane and this can be the condition of the development consent.

2.8 Public Transport

There is no public transport close to the development site. Visitors must use their private vehicles in order to reach to the site.

2.9 Conclusions on the Existing Conditions

The proposed resource recovery facility is located to the West of The Northern Road and is in the area which zoned as primarily production

The nearby intersection performs well to accommodate additional traffic of the development site.

3. PROPOSED RESOURCE RECOVERY FACILITY

The details of the proposed resource recovery facility are as follows:

- The building area for the resource recovery is 5,807 m2
- Existing house to be used as an office and a new office attached to the resource recovery building is 146m2
- Thirty-two car spaces are provided in parking area
- A truck parking area for eleven high rigid trucks (12.5 metres in length)
- The total number of staff on site at any one time during day shift is 20

The annual capacity of resource recovery facility is 95,000 per annum.

The operating hours are 7am to 6pm Monday to Friday, 8am to 1pm Saturday and closed on Sundays and public holidays.

The expected number of staff involved directly in the resource recovery facility and office is 20 people.

A resource recovery facility is an uncommon landuse. The car space parking provision has been designed to meet the staff numbers i.e. the site is purposely built to the needs of the Resource Recovery Facility and is not a generic landuse such as a warehouse. The parking rate is equivalent to one car space per 305m2.

The car parking is provided on the ground floor.

The site has frontage to Park Road. The car and truck access and egress to the car park area is from Park Road.

The site is near the future A9 motorway. A9 motorway is an arterial road joining Campbelltown with Penrith and Windsor. This route plays a vital role to connect three expanding western Sydney area. Western Sydney is growing rapidly with various developments. Western Sydney airport will host an airport by 2025. All these updates will become a strong reason for NSW Government to propose M9 motorway.

There is insufficient public information on the M9 for an assessment to be made for this proposed resource recovery facility.

A full scaled plan of the proposed resource recovery facility is provided as part of the Development Application.

4. CAR AND TRUCK PARKING CONSIDERATIONS

4.1 Penrith City Council Development Control Plan 2014

The car parking requirements for the proposed recovery facility are not presented in the Penrith Council Development Control Plan 2014.

The parking demand has been calculated based on the number of staff.

The resource recovery facility will employ 20 staff o during day shift. 2 staff in the afternoon and two staff during night shift The provision of 32 car spaces will accommodate all car parking demand.

Eleven on-site parking spaces for high rigid truck (12.5 metres-long) are also provided.

5. VEHICLE TRAFFIC IMPACT CONSIDERATIONS

5.1 Car Trip Generation for the Proposed Resource Recovery Facility

The NSW RTA Guide to Traffic Generating Development document publishes trip generation rates as follows:

Office Units:

- 2 trips per 100m^2 of GFA for both AM and PM peak hour

Table 6 presents the estimated total AM and PM peak period trips generated by the office units during the AM and PM peak hours. The total generated trips in the peak hour are low.

Proposed				
Peak Hour	**Use**	**Area GFA(m2)**	**Trip Generation Rate per GFA(m^2)**	**Trip Generated**
AM/PM	Office	146	0.02	3

Table 6: Trips Generated by the Factory during the AM Peak Period

Table 7 presents the peak hour trips and trip distribution. The generated trips in the peak hour are modest.

Peak Hour	Origin	Destination	Total
AM	1	2	3
PM	2	1	3

Table 8: Trip distribution for the Proposed resource Recovery Facility in the Weekday Peak Hour

5.2 Truck Trip Generation for the Proposed Resource Recovery Facility

The resource recovery facility will process 95,000 tonnes a year. An estimate has been made of the tonnage per day has be made by dividing by 2 weeks and six days per week.

The assumed load capacity for a large rigid truck is 5.5 tonnes and results in 55 trucks per day. The facility operates between 7am to 6pm. The truck arrivals and departures do not have a peak period. This leads to six generated truck trips per hour (six arrivals and six departures).

5.3 Traffic Volumes

The additional development trips are assigned onto the local traffic network. The following figures present the existing with the development trips (in red for origin and blue for destination trips) for the respective peak hours.

The additional development trips represent a low proportion of the existing traffic volumes.

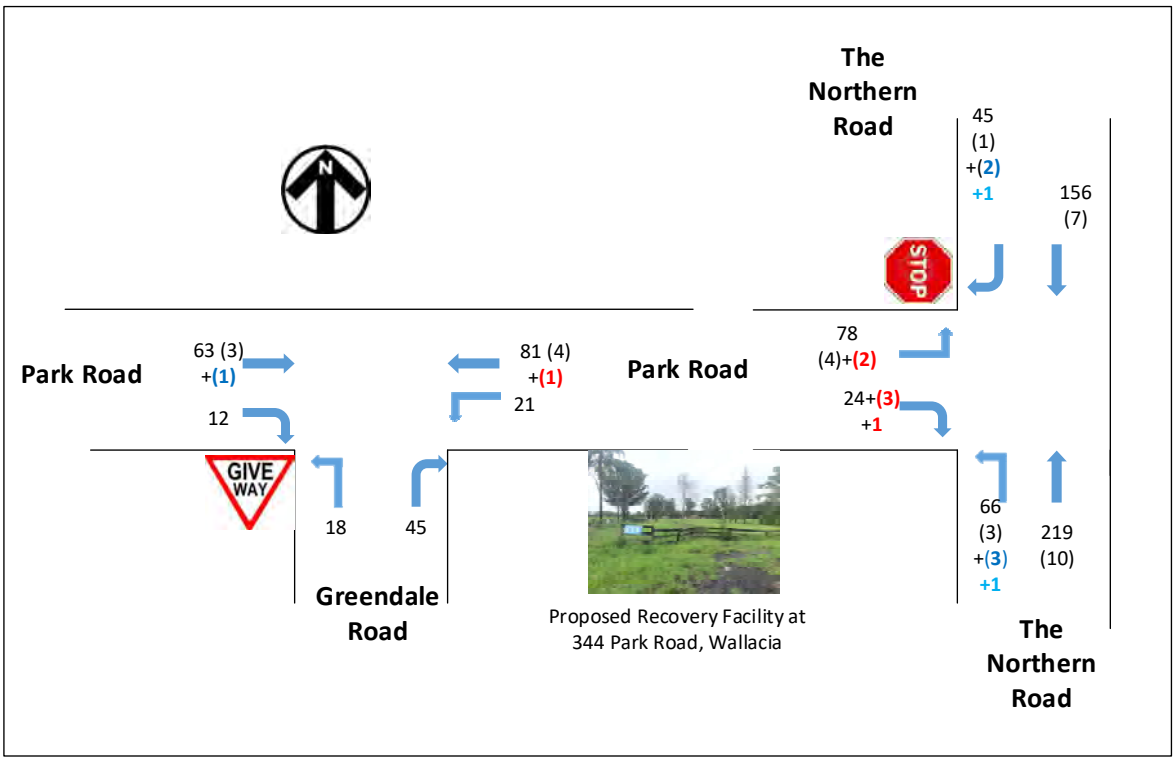


Figure 10: Weekday AM Peak Hour Traffic Volumes with resource recovery facility traffic

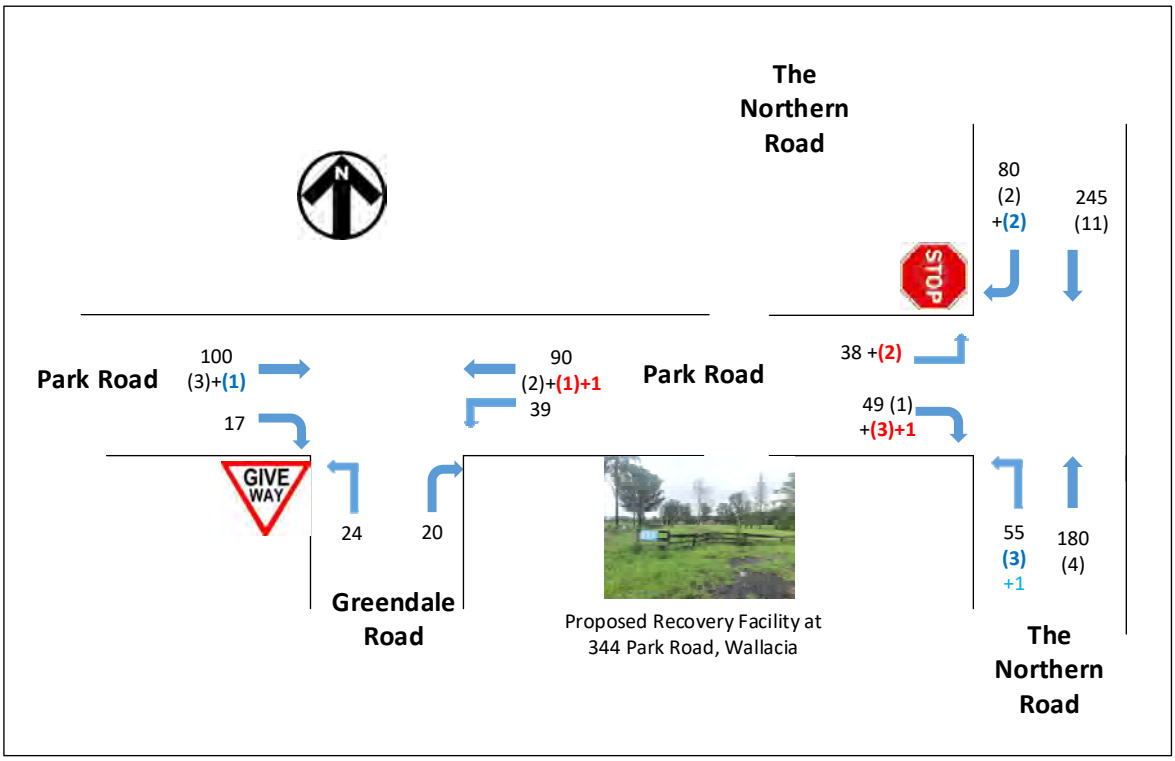


Figure 11: Weekday PM Peak Hour Traffic Volumes with resource recovery facility traffic

5.4 Intersection Assessment

An intersection assessment has been undertaken for the surveyed intersection.

The results of the intersection analysis are as follows:

Stop Intersection of The Northern Road with Park Road

- The overall intersection has a LoS A for both the AM and PM peak hours
- The additional trips do not change the LoS for any turn movement or the overall intersection.

Priority Intersection of Park Road with Greendale Road

- The overall intersection has a LoS A for the AM and PM peak hours respectively
- The additional trips do not change the LoS for any turn movement or the overall intersection.

The full SIDRA results with the resource recovery facility traffic are presented in Appendix B.

6. PROPOSED ACCESS ARRANGEMENTS

Proposed access arrangements / intersection treatment on Park Road have been addressed in a separate report and are not within the scope of this assessment. This is provided in Appendix 12 of the EIS.

7. CONCLUSIONS

Based on the considerations presented in this report, it is considered that:

Parking

The proposed resource Recovery Facility has enough on site car and truck parking to accommodate all parking demand

Traffic

- The proposed resource Recovery Facility is a low trip generator for the weekday AM and PM peak hours.
- The additional trips from the proposed resource Recovery Facility can be accommodated at the nearby intersection without significantly affecting intersection performance, delays or queues.
- There are no traffic engineering reasons why a planning permit for the proposed Recovery Facility at 344 Park Road in Wallacia should be refused.

APPENDIX A

SIDRA Intersection Results for Existing Traffic Conditions

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1	L2	69	3	73	4.3	0.167	5.4	LOS A	0.0	0.0	0.00	0.13	0.00	54.8
2	T1	229	10	241	4.4	0.167	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	56.2
Approach		298	13	314	4.4	0.167	1.3	NA	0.0	0.0	0.00	0.13	0.00	55.9
North: The Northern Road														
8	T1	163	7	172	4.3	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	46	1	48	2.2	0.037	5.7	LOS A	0.2	1.1	0.39	0.58	0.39	45.3
Approach		209	8	220	3.8	0.091	1.3	NA	0.2	1.1	0.09	0.13	0.09	56.0
West: Park Road														
10	L2	82	4	86	4.9	0.106	7.9	LOS A	0.4	3.1	0.38	0.66	0.38	53.4
12	R2	24	0	25	0.0	0.106	10.3	LOS A	0.4	3.1	0.38	0.66	0.38	52.9
Approach		106	4	112	3.8	0.106	8.4	LOS A	0.4	3.1	0.38	0.66	0.38	53.3
All Vehicles		613	25	645	4.1	0.167	2.5	NA	0.4	3.1	0.09	0.22	0.09	55.4

Table A1: Weekday Intersection Performance of The Northern Road with Park Road AM Peak Hour

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Greendale Road														
1	L2	18	0	19	0.0	0.061	4.8	LOS A	0.2	1.7	0.26	0.54	0.26	25.8
3	R2	45	0	47	0.0	0.061	5.6	LOS A	0.2	1.7	0.26	0.54	0.26	45.6
Approach		63	0	66	0.0	0.061	5.4	LOS A	0.2	1.7	0.26	0.54	0.26	40.0
East: Park Road														
4	L2	21	0	22	0.0	0.059	7.0	LOS A	0.0	0.0	0.00	0.46	0.00	69.2
5	T1	85	4	89	4.7	0.059	3.1	LOS A	0.0	0.0	0.00	0.46	0.00	45.3
Approach		106	4	112	3.8	0.059	3.9	NA	0.0	0.0	0.00	0.46	0.00	50.7
West: Park Road														
11	T1	66	3	69	4.5	0.037	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	12	0	13	0.0	0.008	3.7	LOS A	0.0	0.2	0.21	0.53	0.21	61.6
Approach		78	3	82	3.8	0.037	0.6	NA	0.0	0.2	0.03	0.08	0.03	76.5
All Vehicles		247	7	260	2.8	0.061	3.2	NA	0.2	1.7	0.08	0.36	0.08	50.7

Table A2: Weekday Intersection Performance of Park Road with Greendale Road AM Peak Hour

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1	L2	55	0	58	0.0	0.132	5.3	LOS A	0.0	0.0	0.00	0.13	0.00	55.0
2	T1	184	4	194	2.2	0.132	0.0	LOS A	0.0	0.0	0.00	0.13	0.00	56.2
Approach		239	4	252	1.7	0.132	1.3	NA	0.0	0.0	0.00	0.13	0.00	55.9
North: The Northern Road														
8	T1	256	11	269	4.3	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	82	2	86	2.4	0.061	5.4	LOS A	0.3	1.9	0.35	0.57	0.35	45.4
Approach		338	13	356	3.8	0.143	1.3	NA	0.3	1.9	0.09	0.14	0.09	55.6
West: Park Road														
10	L2	38	0	40	0.0	0.120	7.6	LOS A	0.5	3.3	0.42	0.70	0.42	52.5
12	R2	50	1	53	2.0	0.120	11.2	LOS A	0.5	3.3	0.42	0.70	0.42	51.9
Approach		88	1	93	1.1	0.120	9.6	LOS A	0.5	3.3	0.42	0.70	0.42	52.2
All Vehicles		665	18	700	2.7	0.143	2.4	NA	0.5	3.3	0.10	0.21	0.10	55.2

Table A3: Weekday Intersection Performance of The Northern Road with Park Road PM Peak Hour

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Greendale Road														
1	L2	24	0	25	0.0	0.040	4.8	LOS A	0.2	1.1	0.23	0.53	0.23	25.8
3	R2	20	0	21	0.0	0.040	5.9	LOS A	0.2	1.1	0.23	0.53	0.23	45.7
Approach		44	0	46	0.0	0.040	5.3	LOS A	0.2	1.1	0.23	0.53	0.23	34.9
East: Park Road														
4	L2	39	0	41	0.0	0.072	7.0	LOS A	0.0	0.0	0.00	0.19	0.00	71.5
5	T1	92	2	97	2.2	0.072	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	73.8
Approach		131	2	138	1.5	0.072	2.1	NA	0.0	0.0	0.00	0.19	0.00	72.8
West: Park Road														
11	T1	103	3	108	2.9	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	17	0	18	0.0	0.011	3.7	LOS A	0.0	0.3	0.24	0.53	0.24	61.5
Approach		120	3	126	2.5	0.057	0.5	NA	0.0	0.3	0.03	0.08	0.03	76.7
All Vehicles		295	5	311	1.7	0.072	1.9	NA	0.2	1.1	0.05	0.20	0.05	62.1

Table A4: Weekday Intersection Performance of Park Road with Greendale Road PM Peak Hour

APPENDIX B

SIDRA Intersection Results for Existing Conditions with the Resource recovery facility traffic

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1	L2	75	6	79	8.0	0.172	5.4	LOS A	0.0	0.0	0.00	0.14	0.00	54.5
2	T1	229	10	241	4.4	0.172	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	56.0
Approach		304	16	320	5.3	0.172	1.4	NA	0.0	0.0	0.00	0.14	0.00	55.6
North: The Northern Road														
8	T1	163	7	172	4.3	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	50	3	53	6.0	0.041	5.8	LOS A	0.2	1.3	0.41	0.59	0.41	45.2
Approach		213	10	224	4.7	0.091	1.4	NA	0.2	1.3	0.10	0.14	0.10	55.7
West: Park Road														
10	L2	84	6	88	7.1	0.120	8.0	LOS A	0.5	3.6	0.39	0.66	0.39	61.2
12	R2	28	3	29	10.7	0.120	11.1	LOS A	0.5	3.6	0.39	0.66	0.39	59.6
Approach		112	9	118	8.0	0.120	8.8	LOS A	0.5	3.6	0.39	0.66	0.39	60.8
All Vehicles		629	35	662	5.6	0.172	2.7	NA	0.5	3.6	0.10	0.23	0.10	56.5

Table B1: Weekday Intersection Performance of The Northern Road with Park Road AM Peak Hour with resource recovery facility traffic

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Greendale Road														
1	L2	18	0	19	0.0	0.061	4.8	LOS A	0.2	1.7	0.26	0.55	0.26	25.7
3	R2	45	0	47	0.0	0.061	5.6	LOS A	0.2	1.7	0.26	0.55	0.26	45.6
Approach		63	0	66	0.0	0.061	5.4	LOS A	0.2	1.7	0.26	0.55	0.26	40.0
East: Park Road														
4	L2	21	0	22	0.0	0.060	5.3	LOS A	0.0	0.0	0.00	0.25	0.00	54.9
5	T1	86	5	91	5.8	0.060	0.9	LOS A	0.0	0.0	0.00	0.25	0.00	55.6
Approach		107	5	113	4.7	0.060	1.7	NA	0.0	0.0	0.00	0.25	0.00	55.4
West: Park Road														
11	T1	68	4	72	5.9	0.038	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	12	0	13	0.0	0.008	3.7	LOS A	0.0	0.2	0.21	0.53	0.21	61.6
Approach		80	4	84	5.0	0.038	0.5	NA	0.0	0.2	0.03	0.08	0.03	76.5
All Vehicles		250	9	263	3.6	0.061	2.3	NA	0.2	1.7	0.08	0.27	0.08	52.6

Table B2: Weekday Intersection Performance of Park Road with Greendale Road AM Peak Hour with resource recovery facility traffic

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1	L2	60	4	63	6.7	0.136	5.4	LOS A	0.0	0.0	0.00	0.14	0.00	54.6
2	T1	184	4	194	2.2	0.136	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	56.0
Approach		244	8	257	3.3	0.136	1.4	NA	0.0	0.0	0.00	0.14	0.00	55.7
North: The Northern Road														
8	T1	256	11	269	4.3	0.143	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	84	4	88	4.8	0.064	5.5	LOS A	0.3	2.1	0.36	0.57	0.36	45.4
Approach		340	15	358	4.4	0.143	1.4	NA	0.3	2.1	0.09	0.14	0.09	55.5
West: Park Road														
10	L2	42	2	44	4.8	0.140	7.7	LOS A	0.5	4.0	0.43	0.71	0.43	60.6
12	R2	56	4	59	7.1	0.140	11.7	LOS A	0.5	4.0	0.43	0.71	0.43	59.4
Approach		98	6	103	6.1	0.140	10.0	LOS A	0.5	4.0	0.43	0.71	0.43	59.9
All Vehicles		682	29	718	4.3	0.143	2.6	NA	0.5	4.0	0.11	0.22	0.11	56.2

Table B3: Weekday Intersection Performance of The Northern Road with Park Road PM Peak Hour with resource recovery facility traffic

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Greendale Road														
1	L2	24	0	25	0.0	0.040	4.8	LOS A	0.2	1.1	0.23	0.53	0.23	25.8
3	R2	20	0	21	0.0	0.040	5.9	LOS A	0.2	1.1	0.23	0.53	0.23	45.7
Approach		44	0	46	0.0	0.040	5.3	LOS A	0.2	1.1	0.23	0.53	0.23	34.9
East: Park Road														
4	L2	39	0	41	0.0	0.074	7.0	LOS A	0.0	0.0	0.00	0.19	0.00	71.6
5	T1	94	3	99	3.2	0.074	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	73.9
Approach		133	3	140	2.3	0.074	2.0	NA	0.0	0.0	0.00	0.19	0.00	72.9
West: Park Road														
11	T1	104	4	109	3.8	0.058	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	17	0	18	0.0	0.011	3.7	LOS A	0.0	0.3	0.24	0.53	0.24	61.4
Approach		121	4	127	3.3	0.058	0.5	NA	0.0	0.3	0.03	0.07	0.03	76.7
All Vehicles		298	7	314	2.3	0.074	1.9	NA	0.2	1.1	0.05	0.19	0.05	62.2

Table B4: Weekday Intersection Performance of Park Road with Greendale Road PM Peak Hour with resource recovery facility traffic

CARPARK AND DRIVEWAY CERTIFICATION OF A PROPOSED RESOURCE RECOVERY FACILITY

344 Park Road Wallacia

Prepared for: Benbow Environmental

A201693N (Version 1d)

May 2020

Motion Traffic Engineers Pty Ltd
Telephone:
94033588
sydney@motiontraffic.com.au

ACN 600201583

1. INTRODUCTION

Motion Traffic Engineers was commissioned by Benbow Environmental to prepare a car parking certification report of a proposed resource recovery facility at 344 Park Road in Wallacia.

The car park is on the ground floor with vehicle access and egress via Park Road. Separate entry and exit driveways are provided.

Trucks circulate around the waste resource facility building.

Reference is made to AS2890.1 (2004), AS2890.2 (2018) and Council's Development Control Plan for compliance.

2. DRIVEWAY

The details of the entry driveway from Park Road into the ground level are as follows:

- The driveway at the property line is 7 metres wide and remains constant to the ground floor
- Gradients are less than 5 percent

A 14 metre long short lane is provided for cars to turn into the parking area. The intersection is managed by a giveway sign on the parking area access road.

The details of the exit driveway from Park Road into the ground level are as follows:

- The driveway at the property line is 5.9 metres wide and remains constant to the ground floor
- Gradients are less than 5 percent

3. CAR SPACES

The details of the car parking areas are as follows:

Ground Floor

- The car parking aisle is compliant with Australian Standards
- The general 90-degree car spaces are 2.6 metres wide with a length of 5.5 metres
- The disabled car space is 2.6 metres wide and 5.5 metres long
    - A disabled shared zone has the same dimensions as the disabled car space
    - A bollard with a compliant setback should be provided within the shared zone
- Compliant blind aisle extensions are provided

4. SWEPT PATHS

A swept turning path analysis is performed using a 19 metres articulated truck (travelling around the resource recovery building), Heavy Rigid Vehicle with 12.5 metres in length and B85 car with 4.9 metre long, as set in the Australian Standards to confirm that vehicle movements are adequate.

The following Swept Paths have been performed:

- 19 metres long articulated truck inbound movement to the Resource Recovery Facility
- 19 metres long articulated truck left turn outbound movement from the Resource Recovery Facility
    - The truck will have to encroach into the bitumen shoulder adjacent to the driveway to avoid crossing over into Park Road eastbound lane.
- A rejected 19 metres long articulated truck turning from the weighbridge into the exit lane and into the exit driveway.
- 12.5 metres long HRV forward inbound and outbound from the hardstand parking area
    - A 12.5 metres rigid truck is the largest truck that can park and exit the hardstand parking area adequately
- B85 car forward inbound and reverse outbound car movement

The swept paths are provided in Appendix A.

5. CAR SIGHT DISTANCE

The car driver's sight distance requirement to enter the external road is stated in Figure 3.2 of AS2890.1.

The sight distance varies according to the speed of the external road. Park Road has a default speed limit of 60km/hr.

The minimum sight distance required is 65 metres. Site measurements showed that the minimum sight distance looking left or right is met without permanent obstructions.

The pedestrian sight triangle (as set out in Figure 3.3) is met as well.

6. TRUCK SIGHT DISTANCE

The car driver's sight distance requirement to enter the external road is stated in Figure 3. of AS2890.2.

The sight distance varies according to the speed of the external road. Park Road has a default speed limit of 60km/hr.

The minimum sight distance required is 83 metres. Site measurements showed that the minimum sight distance looking left or right is met without permanent obstructions (for a forward out movement)

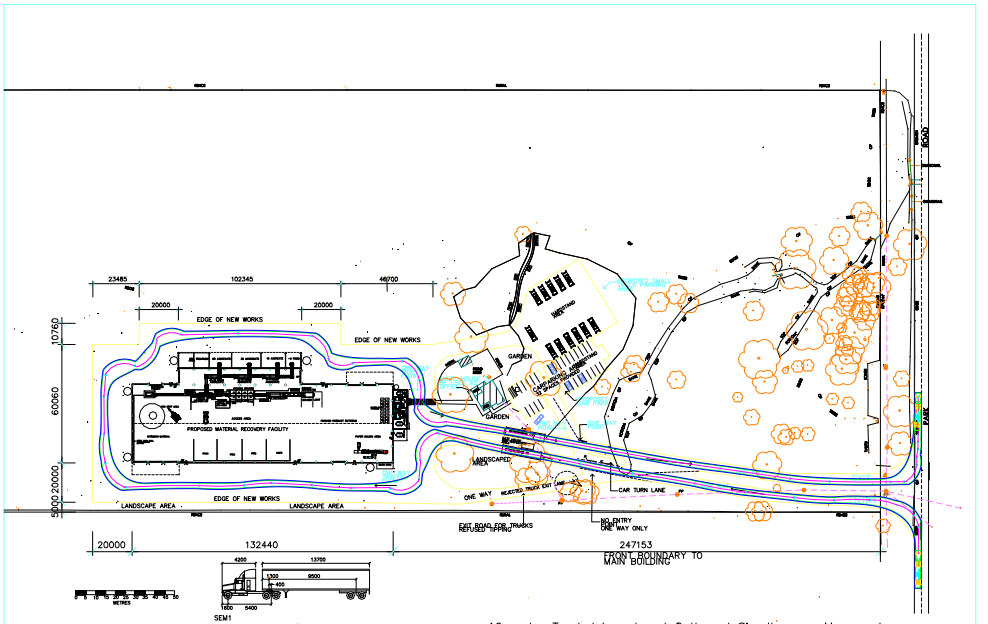
The pedestrian sight triangle (as set out in Figure 3.3) is met as well.

7. CONCLUSIONS AND RECOMMENDATIONS

The car parking area and driveway is compliant with Australian Standards and Council's DCP.

SWEPT PATHS

APPENDIX A



19 metre Truck Inbound and Outbound Simultaneous Movements

mm

Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

REVISIONS:

ISSUE BY	DATE	DESCRIPTION
A	GR	27-3-2020 ISSUED FOR REVIEW
B	GR	27-3-2020

Carlo Ranieri & Associates
STRUCTURAL & CIVIL ENGINEERING
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ENVIRONMENTAL CONSULTANTS
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e-mail: carlo@carloranieri.com.au

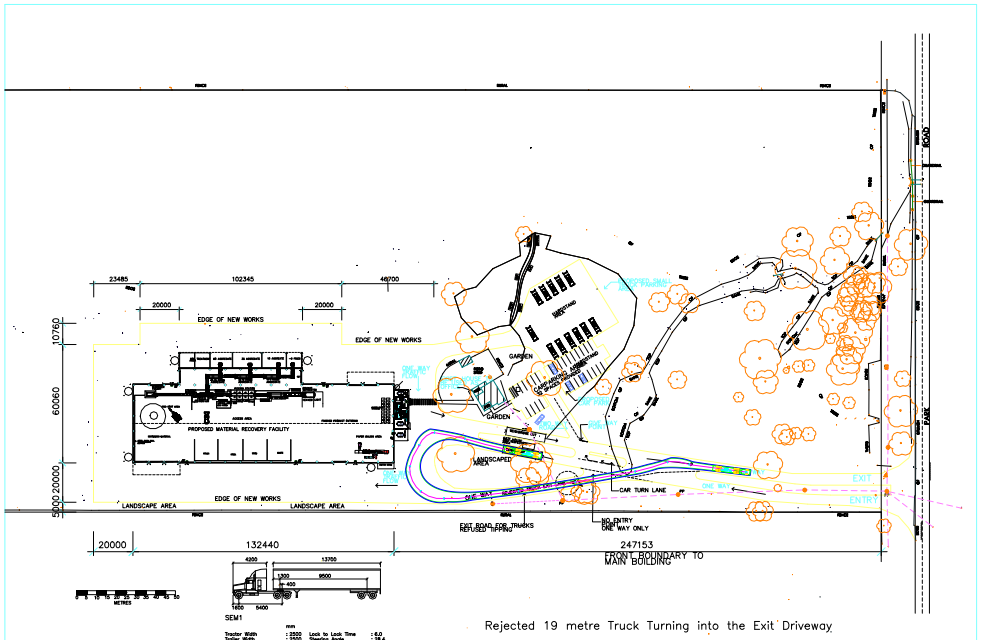
CLIENT: MR ELLIE BARIKHAM & FAMILY

PROJECT: PROPOSED RECYCLING FACILITY
344 PARK ROAD WALLACIA
LOT 5 DP 655046

DRAWING: SEMI TRUCK MOVEMENT PLAN

SCALE	DATE	DRAWN
1:1250	27-3-2020	G.R.
PROJ. NO. EB/050320	JOB 0320	SHEET TM2

ISSUE B
A1 SHEET



Rejected 19 metre Truck Turning into the Exit Driveway

mm

Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

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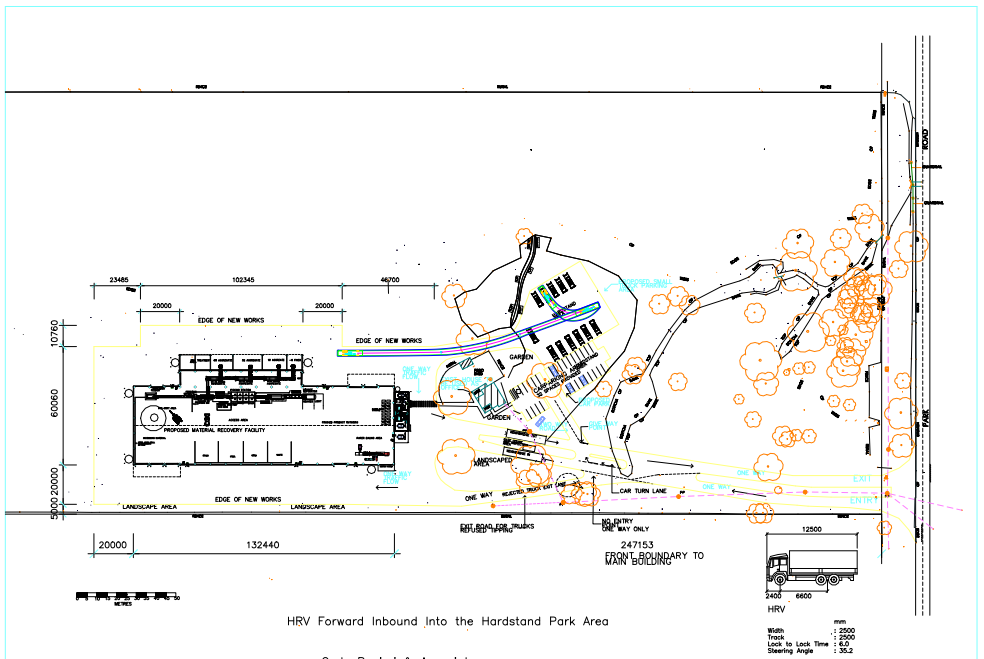

HRV Forward Inbound Into the Hardstand Park Area

HRV

mm

Width	: 2500
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 35.2

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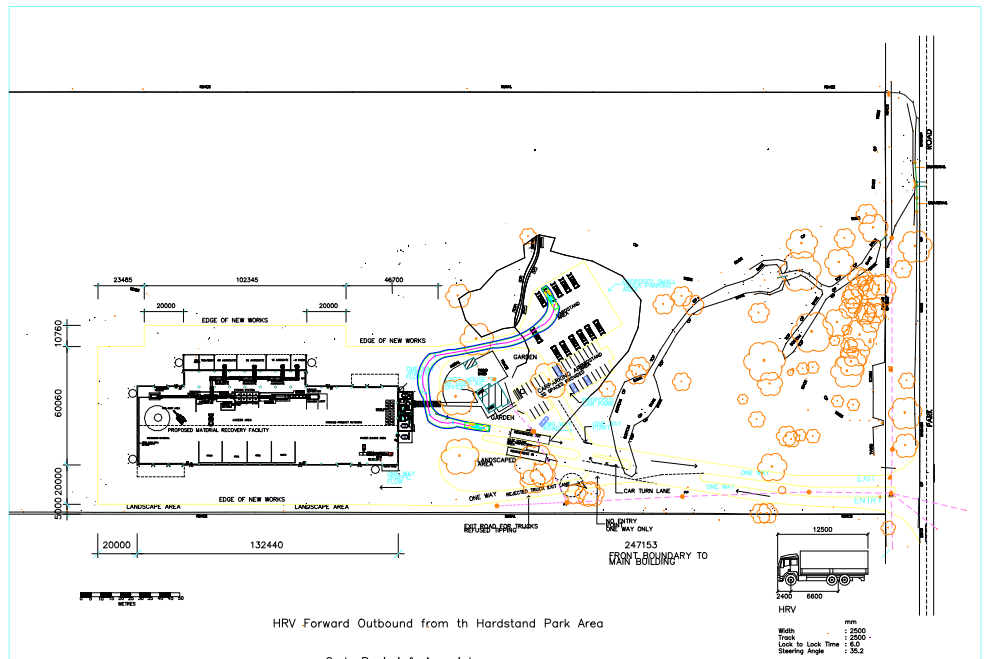

HRV Forward Outbound from th Hardstand Park Area

HRV

mm

Width	: 2500
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 35.2

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344 PARK ROAD WALLACIA
LOT 5 DP 655046

DRAWING: SEMI TRUCK MOVEMENT PLAN

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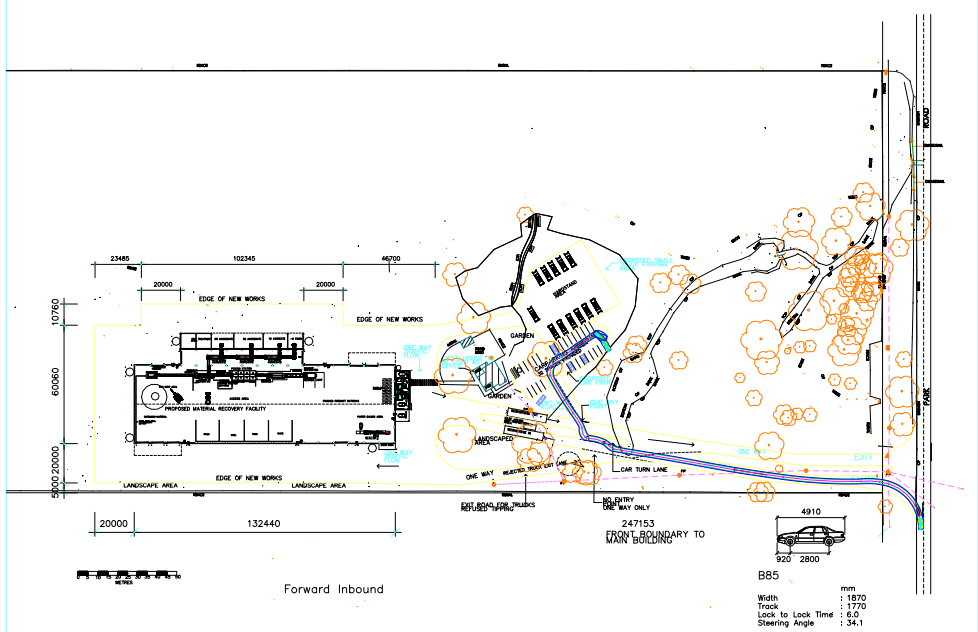
1:1250	27-3-2020	G.R.
PROJ. NO. EB/050320	JOB 0320	SHEET TM1

ISSUE B
A1 SHEET



Forward Inbound

B85

mm

Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

REVISIONS:

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344 PARK ROAD WALLACIA
LOT 5 DP 655046

DRAWING: SEMI TRUCK MOVEMENT PLAN

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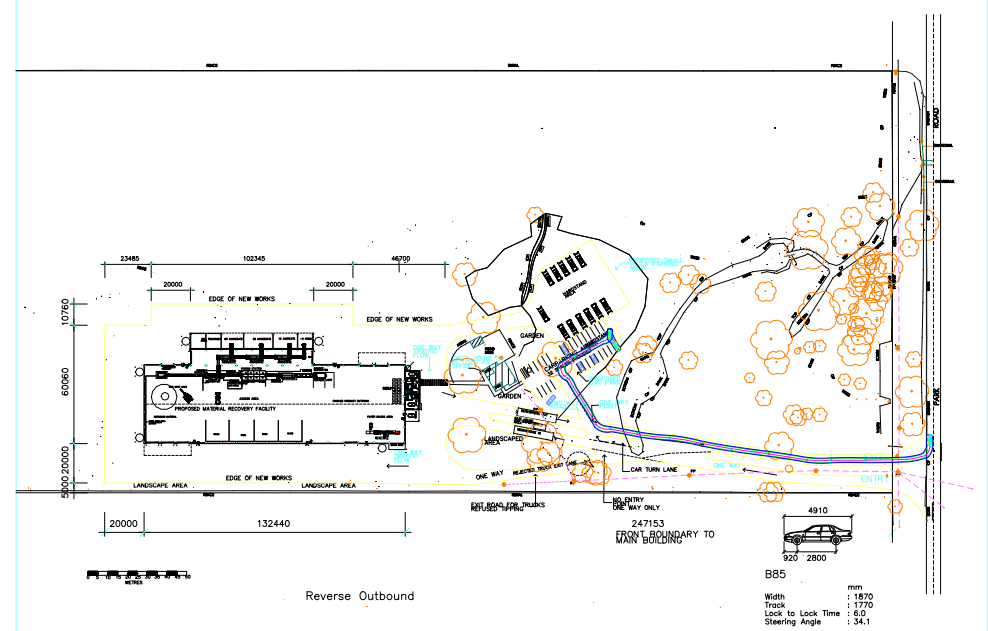
PROJ. NO. EB/050320	JOB 0320	SHEET TM2

ISSUE B
A1 SHEET



Reverse Outbound

B85

mm

Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

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PROJ. NO. EB/050320	JOB 0320	SHEET TM1

ISSUE B
A1 SHEET

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

10 May, 2021

Transport for NSW
231 Elizabeth Street
Sydney
NSW 2000

Attention: Zhaleh Alamouti – Senior Land Use Assessment Coordinator

Dear Sir,

DEVELOPMENT APPLICATION DA 20/0262
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

Reference is made to your correspondence dated 3 December 2020 to Kathryn Saunders of Penrith City Council with respect to the suitability or otherwise of a proposed resource recovery facility at the abovementioned address of 344 Park Road, Wallacia, currently the subject of a development application with Penrith City Council.

ML Traffic Engineers prepared a Traffic & Parking Impact Assessment dated May 2020 in support of the subject Development Application.

This Practice has been engaged by the applicant to address and / or provide comment in response to Items 1 – 5 contained with your abovementioned correspondence with Council, as detailed within the below.

TfNSW Items

1. *TfNSW requests the type of proposed access on Park Road in compliance with AUSTROADS. The applicant should investigate the required access arrangement / intersection treatment in compliance with AUSTROADS Guide to Road Design and the type of right and left turn treatments required (based on the volume of turning traffic versus through traffic).*

Comment

AUSTROADS provide a turning treatment warrant analysis within its *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management* providing turning treatment warrant analysis based on varying design speeds relevant to the subject roads. **Figure 1** overleaf provides turning treatment warrants for roads governed by design speeds of between 70km/h and 100km/h, as applicable to the frontage road of Park Road, being sourced from Figure 3.25 (b) of the abovementioned *Guide*.

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glebe nsw 2037
morgan@stanburytraffic.com.au
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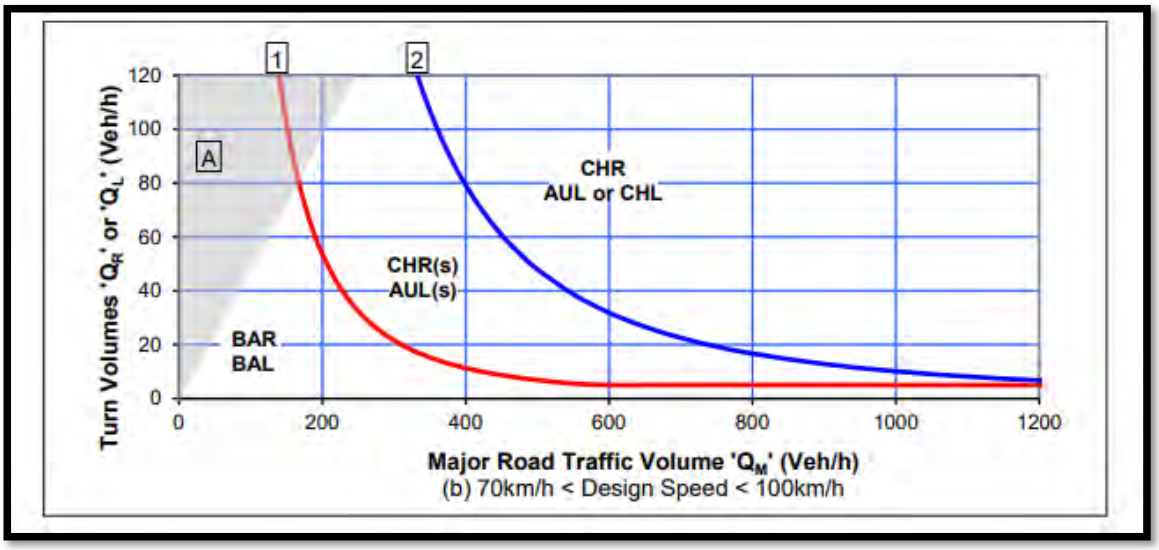
FIGURE 1
WARRANT FOR TURN TREATMENTS ON MAJOR ROADS AT UNSIGNALISED INTERSECTIONS GOVERNED BY A DESIGN SPEED OF BETWEEN 70KM/H AND 100KM/H



An assessment of the projected turn treatment warrants has been undertaken for the junction of Park Road and the proposed site access driveway, based upon the Austroads criteria illustrated within **Figure 1**. The assessment utilised traffic demand surveys and the projected site ingress / egress movements to be undertaken by heavy vehicles servicing the development, as outlined within the development application traffic report.

Table 1 below provides a summary of the analysis results.

TABLE 1
PROJECTED RIGHT / LEFT TURN TREATMENT WARRANT ANALYSIS
JUNCTION OF PROPOSED SITE ACCESS DRIVEWAY AND PARK ROAD

	Projected Conditions	
	AM Peak	**PM Peak**
Left Turn Treatment Analysis		
Left Turn Volume	7	6
Major Road Volume 'Q_m'	106	131
Warrant	BAL	BAR
Right Turn Treatment Analysis		
Right Turn Volume	1	1
Major Road Volume 'Q_m'	212	219
Warrant	BAL	BAR

Table 1 indicates that the projected traffic demands at the junction of Park Road and the proposed site access driveway warrant a basic left turn treatment (BAL) and a basic right turn treatment (BAR), respectively.

The incorporation of a BAL / BAR treatment at the junction of Park Road and the site access driveway necessitates a notable extent of pavement widening. In this regard, Figures 7.5 and 8.2 of AUSTROADS' *Guide to Road Design – Part 4a: Unsignalised and Signalised Intersections* specifies the following pavement widening works:

- An eastbound Park Road pavement width of 6.5m for a length of 64m, to facilitate an ability for trailing through eastbound vehicles to undertake or pass a decelerating or stopped vehicle wishing to turn right into the subject site;

- A taper length of 36m on approach and departure from the abovementioned widened eastbound Park Road pavement; and

- A westbound Park Road pavement width of 6.5m is required on approach to the development site to facilitate a left turn movement of 19m long semi-trailer.

A concept design for the above BAR / BAL treatment at the junction of Park Road and the site access driveway in accordance with the relevant AUSTORADS requirements has been prepared and is attached to this correspondence as **Appendix 1**. The concept design indicates the extent of additional pavement widening required on both sides of Park Road.

The above referenced junction upgrading works (contained within **Appendix 1**) are recommended, the requirement for which can reasonably be imposed as a condition of development consent.

2. *Sight Distance at the proposed access on Park Road should comply with requirements set out in AUSTROADS Guide to Road Design. An assessment should be provided demonstrating the proposed access meet this requirement.*

The provision of sight distance is a critical factor in the level of safety provided at any public road intersection. Austroads *Guide to Road Design Part 4A* provides a minimum safe intersection sight distance of 170m for a roadway connection to a public road which provides an applicable speed limit of 80km/h. Such a sight distance facilitates a motorist travelling at 80km/h a reaction time of between 1.5 seconds prior to braking heavily and stopping prior to entering into a conflict situation.

In order to ascertain the extent of sight distance afforded the proposed site access driveway location, an engineering survey of Park Road was undertaken by Freeburn Surveying, copies of which are submitted under separate cover. This engineering survey has been utilised as a base to prepare a series of sight distance diagrams demonstrating the available sight distance between Park Road directional through traffic and vehicles entering and exiting the proposed site access driveway in accordance with the specifications of Figure 3.2 of Austroads Guide to Road Design Part 4A, whereby driver eye height and top of the car are taken at 1.1 and 1.25m above ground level, respectively.

The following provides a summary of the sight distance assessment results whilst full details are contained within **Appendix 2**:

<u>Proposed Site Access Driveway - Exit Movement Sight Distance</u>

- Horizontal Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) > 254m;

- Horizontal Sight Distance between exiting vehicles and eastbound Park Road traffic (to the west) > 453m;

- Vertical Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) = 238m; and

- Vertical Sight Distance between exiting vehicles and eastbound Park Road traffic (to the east) > 461m.

Proposed Site Access Driveway - Entry Movement Sight Distance

- Horizontal Sight Distance between entering vehicles and westbound Park Road traffic (to the east) > 247m;

- Horizontal Sight Distance between entering vehicles and eastbound Park Road traffic (to the west) > 455m;

- Vertical Sight Distance between entering vehicles and westbound Park Road traffic (to the east) = 232m; and

- Vertical Sight Distance between entering vehicles and eastbound Park Road traffic (to the east) > 463m.

The above sight distance assessment therefore indicates that the available sight distance between entering / exiting vehicles and Park Road through traffic exceeds the minimum Austroads *Guide to Road Design Part 4A* criteria for the sign posted speed limit of 80km/h within Park Road.

The sight distance provisions associated with the proposed site access driveway location is therefore projected to provide motorists with satisfactorily safe conditions with which to enter and exit the site.

3. *TfNSW requests swept path plans for the longest vehicle accessing the site on Park Road for review. The plans should show how simultaneous entry / exit can be achieved at the access.*

Comment

In order to assess the suitability of the above recommended junction upgrade arrangements, a series of swept path plans have been prepared and are attached as **Appendix 3** for reference. These swept path plans illustrate the following:

- The proposed BAR treatment is capable of allowing a trailing B99 passenger vehicle within Park Road to pass a 19m long semi-trailer vehicle turning right into the site, in conjunction with a further 19m long semi-trailer vehicle exiting the site, with both design vehicles providing 300m clearance; and

- A 19m long semi-trailer with 300mm manoeuvring clearance is capable of undertaking a left turn movement to the subject site utilising the proposed BAL treatment in conjunction with a further 19m long semi-trailer with 300mm manoeuvring clearance undertaking a forward right turn movement from the site to Park Road.

On the basis of the above discussion, it is accordingly considered that the proposed compliant BAR and BAL treatments to the junction of Park Road and the site access driveway effectively accommodate the manoeuvring requirements of 19m long semi-trailer movements travelling to and from the site, in a safe and efficient manner.

4. *The proposed access is located opposite of an existing access to the property on the other side of Park Road. TfNSW has concerns regarding the conflicting traffic movements at this location and potential adverse road safety and network efficiency impact. Additional information is required how conflicting traffic movements are managed at this location.*

Comment

It is acknowledged that the previously presented BAR treatment encroaches upon the existing access driveway on the opposite side of the road, servicing 353 – 361 Park Road. The provision of a full width BAL turning treatment (in addition to the proposed BAR treatment) to the abovementioned existing opposite access driveway is however considered impractical given the proximity of existing fencing defining the subject property.

In consideration of the above, it is alternatively proposed that a further driveway splay be applied in addition to the BAR treatment thereby servicing left turn movements from Park Road to 353 – 361 Park Road. The details of the above splay have been included within the turning treatment concept design contained within **Appendix 1**. The requirement for the provision of the abovementioned splay could reasonably be imposed by Council as a Condition of Consent.

5. *The swept path plans provided for the largest vehicle for the two key intersections – Park Road / The Northern Road and Park Road / Greendale Road are not satisfactory. The paths should be a smooth, single radius and not have a kink as currently demonstrated. Please provide amended plans demonstrating the swept paths in a smooth, single radius.*

In order to assess the suitability of 19m long semi-trailer vehicles to negotiate the intersections of Park Road / The Northern Road and Park Road / Greendale Road, a series of swept path plans have been prepared and are attached as **Appendix 4** for reference. These swept path plans have been generated utilising aerial images as a base and illustrate the following:

- A 19m long semi-trailer with 300mm manoeuvring clearance is capable of undertaking a left turn movement from Park Road to The Northern Road in conjunction with a further 19m long semi-trailer with 300mm manoeuvring clearance undertaking a forward right turn movement from The Northern Road to Park Road;

- A 19m long semi-trailer with 300mm manoeuvring clearance is capable of undertaking a left turn movement from The Northern Road to Park Road in conjunction with a further 19m long semi-trailer with 300mm manoeuvring clearance undertaking a forward right turn movement from Park Road to The Northern Road; and

- A 19m long semi-trailer with 300mm manoeuvring clearance is capable of undertaking a left turn movement from Park Road to Greendale Road in conjunction with a further 19m long semi-trailer with 300mm manoeuvring clearance undertaking a forward right turn movement from Greendale Road to Park Road.

The pavement widths servicing the above subject intersections of Park Road / The Northern Road and Park Road / Greendale Road are such that 19m long semi-trailer vehicle manoeuvring is able to occur without any unreasonable encroachment on opposing travel lanes, kerbs and / or parking lanes. The largest vehicle proposed to service the development, being 19m long semi-trailers, are accordingly considered to negotiate the intersections of Park Road / The Northern Road and Park Road / Greendale Road in a safe and efficient manner.

It would be appreciated if Council could consider the additional information contained within this correspondence to assist in its ongoing assessment of the development application.

Submitted for your consideration.

Yours sincerely,

Morgan Stanbury
Director
Traffic Engineer

Enclosed:

Appendix 1	Proposed concept design – basic left & right turn treatments
Appendix 2	Existing horizontal and vertical sight distance diagrams at the junction of the proposed site access driveway and Park Road
Appendix 3	Swept path plans – incorporating proposed turning treatments
Appendix 4	Swept path plans – heavy vehicle manoeuvring within site precinct

APPENDIX 1

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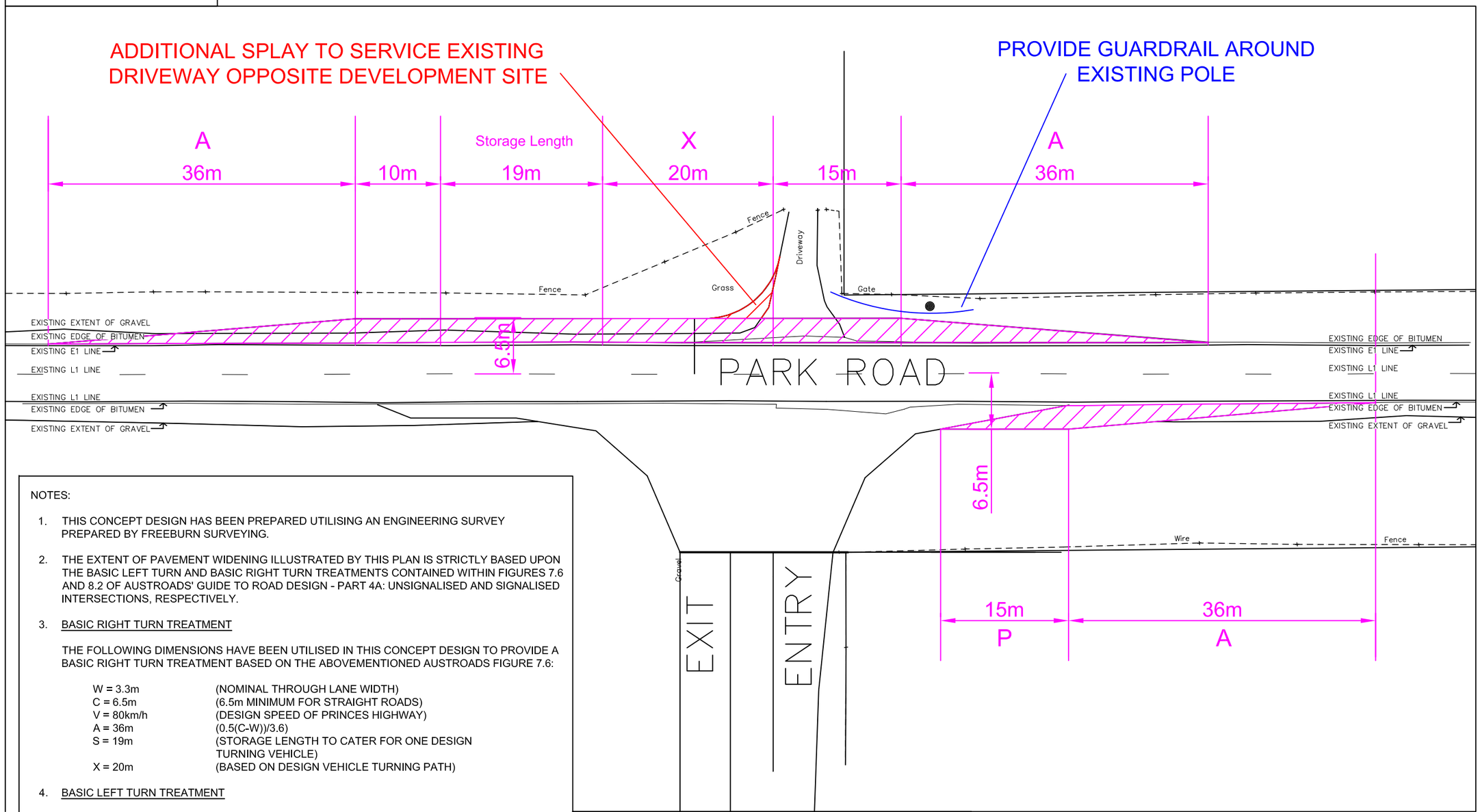

NOTES:

1. THIS CONCEPT DESIGN HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING.

2. THE EXTENT OF PAVEMENT WIDENING ILLUSTRATED BY THIS PLAN IS STRICTLY BASED UPON THE BASIC LEFT TURN AND BASIC RIGHT TURN TREATMENTS CONTAINED WITHIN FIGURES 7.6 AND 8.2 OF AUSTROADS' GUIDE TO ROAD DESIGN - PART 4A: UNSIGNALISED AND SIGNALISED INTERSECTIONS, RESPECTIVELY.

3. BASIC RIGHT TURN TREATMENT

   THE FOLLOWING DIMENSIONS HAVE BEEN UTILISED IN THIS CONCEPT DESIGN TO PROVIDE A BASIC RIGHT TURN TREATMENT BASED ON THE ABOVEMENTIONED AUSTROADS FIGURE 7.6:

W = 3.3m	(NOMINAL THROUGH LANE WIDTH)
C = 6.5m	(6.5m MINIMUM FOR STRAIGHT ROADS)
V = 80km/h	(DESIGN SPEED OF PRINCES HIGHWAY)
A = 36m	(0.5(C-W))/3.6)
S = 19m	(STORAGE LENGTH TO CATER FOR ONE DESIGN TURNING VEHICLE)
X = 20m	(BASED ON DESIGN VEHICLE TURNING PATH)

4. BASIC LEFT TURN TREATMENT

   THE FOLLOWING DIMENSIONS HAVE BEEN UTILISED IN THIS CONCEPT DESIGN TO PROVIDE A BASIC LEFT TURN TREATMENT BASED ON THE ABOVEMENTIONED AUSTROADS FIGURE 8.2:

W = 3.3m	(NOMINAL THROUGH LANE WIDTH)
C = 6.5m	(6.0m MINIMUM FOR STRAIGHT ROADS)
V = 80km/h	(DESIGN SPEED OF PRINCES HIGHWAY)
F = 3.2m	(FORMATION / CARRIAGEWAY WIDENING)
P = 15m	(MIN. LENGTH OF PARALLEL WIDENED SHOULDER)
Sb = 8m	(SETBACK DISTANCE BETWEEN CENTRE OF MAJOR ROAD AND GIVEWAY OR STOP LINE IN MINOR ROAD)
A = 36m	(0.5*V*F)/3.6

LEGEND

EXTENT OF PAVEMENT WIDENING REQUIRED TO ACCOMMODATE TURNING TREATMENTS

PROPOSED ADDITIONAL SPLAY SERVICING EXISTING ACCESS DRIVEWAY OPPOSITE SITE

PROPOSED INDICATIVE GUARDRAIL

A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

STANBURY TRAFFIC PLANNING
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RECOMMENDED CONCEPT DESIGN
BASIC LEFT TURN & RIGHT TURN TREATMENT
PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-009
DATE: MAY 2021
ISSUE: A
SHEET: 1

APPENDIX 2

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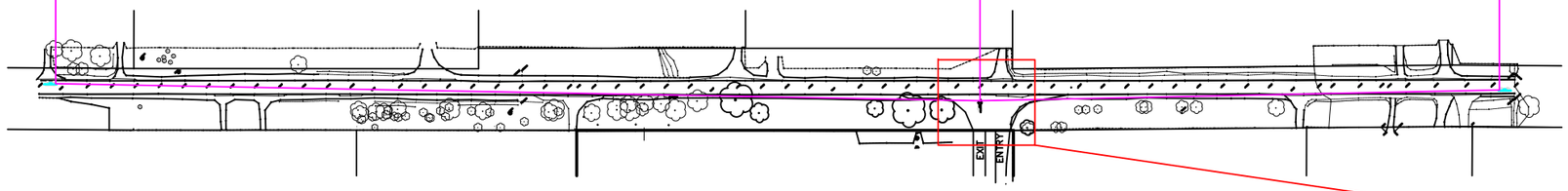
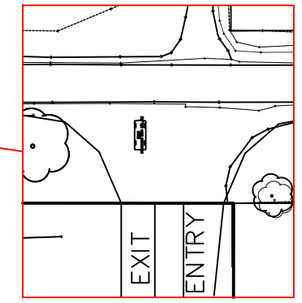
HORIZONTAL SIGHT DISTANCE TO THE WEST > 453m

HORIZONTAL SIGHT DISTANCE TO THE EAST > 254m





VERTICAL SIGHT DISTANCE TO THE WEST > 461m

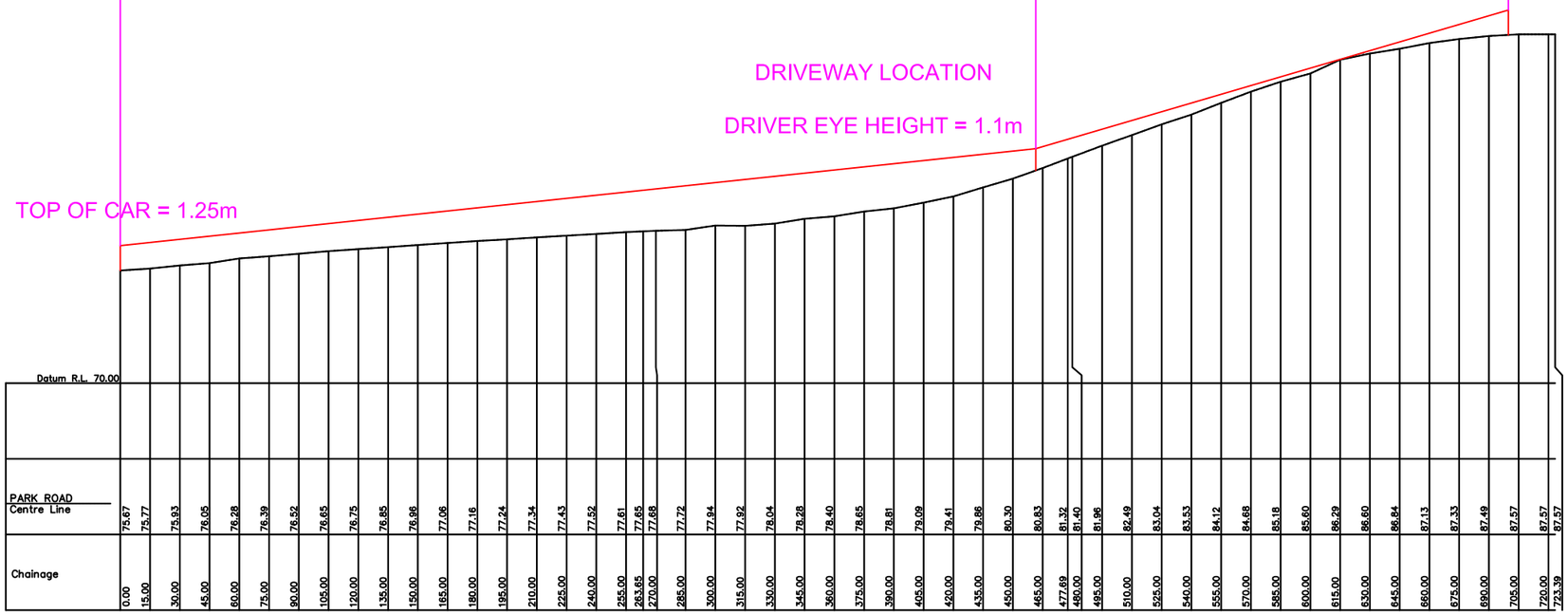
VERTICAL SIGHT DISTANCE TO THE WEST > 238m

TOP OF CAR = 1.25m

DRIVEWAY LOCATION

DRIVER EYE HEIGHT = 1.1m

TOP OF CAR = 1.25m



NOTES:

1. THIS VERTICAL SIGHT DISTANCE DIAGRAM HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING AS A BASE.

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VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
SITE ACCESS DRIVEWAY EGRESS MOVEMENT
JUNCTION OF PARK ROAD AND SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 2
DATE: MAY 2021

DRAWN BY CADD
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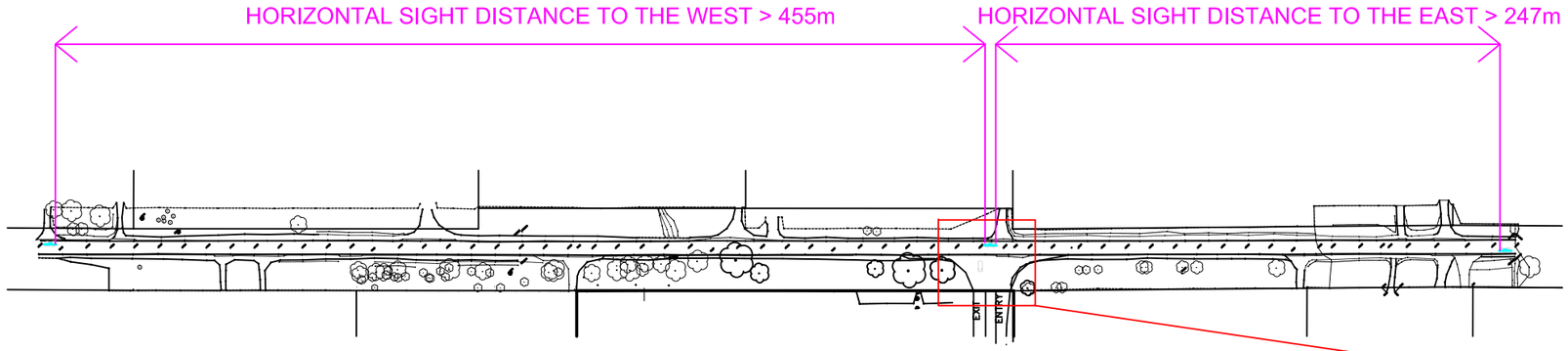

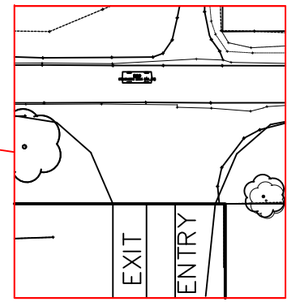

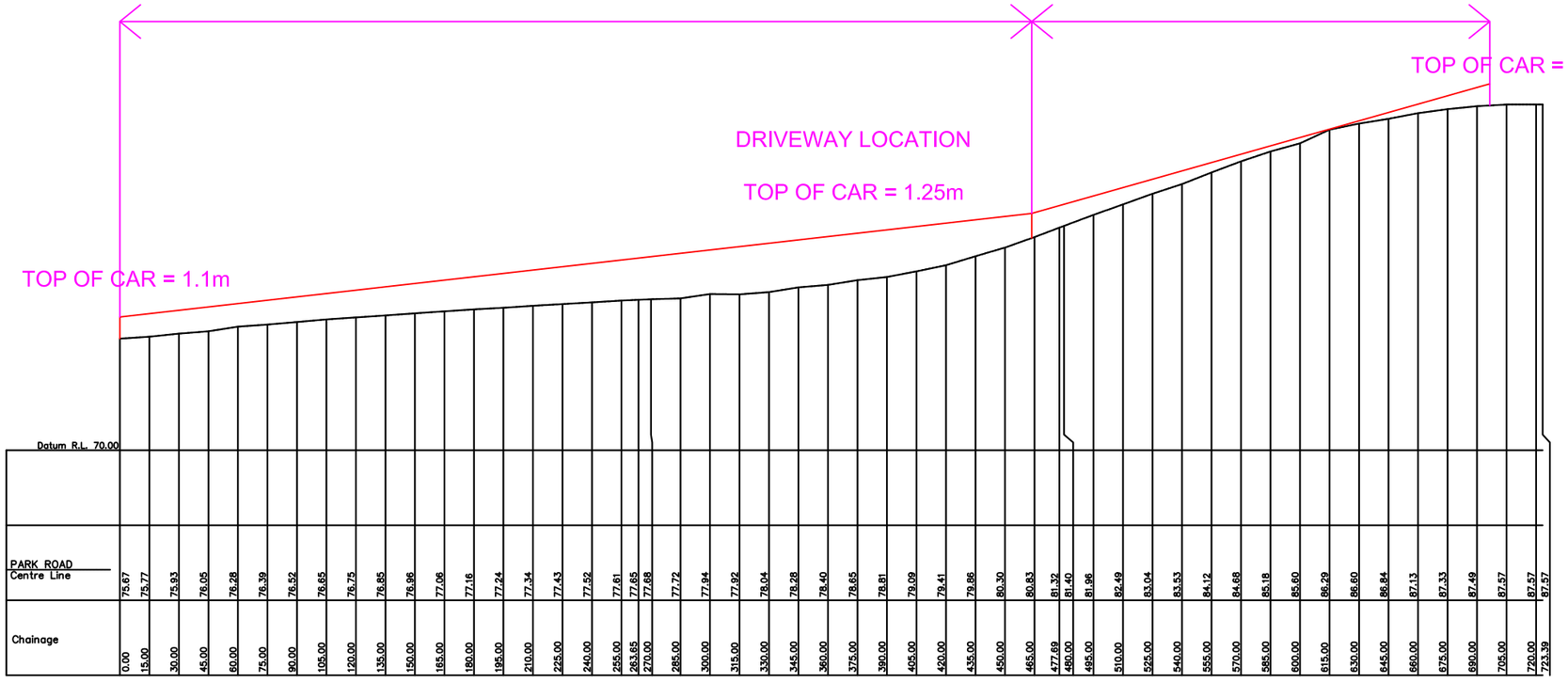

NOTES:

1. THIS VERTICAL SIGHT DISTANCE DIAGRAM HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING AS A BASE.

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VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
SITE ACCESS DRIVEWAY INGRESS MOVEMENT
JUNCTION OF PARK ROAD AND SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 3
DATE: MAY 2021

APPENDIX 3

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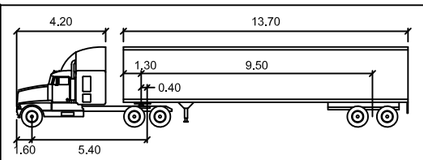
NOTES:

1. THIS PLAN IS BASED ON ENGINEERING SURVEYS PREPARED BY FREEBURN SURVEYING.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE.

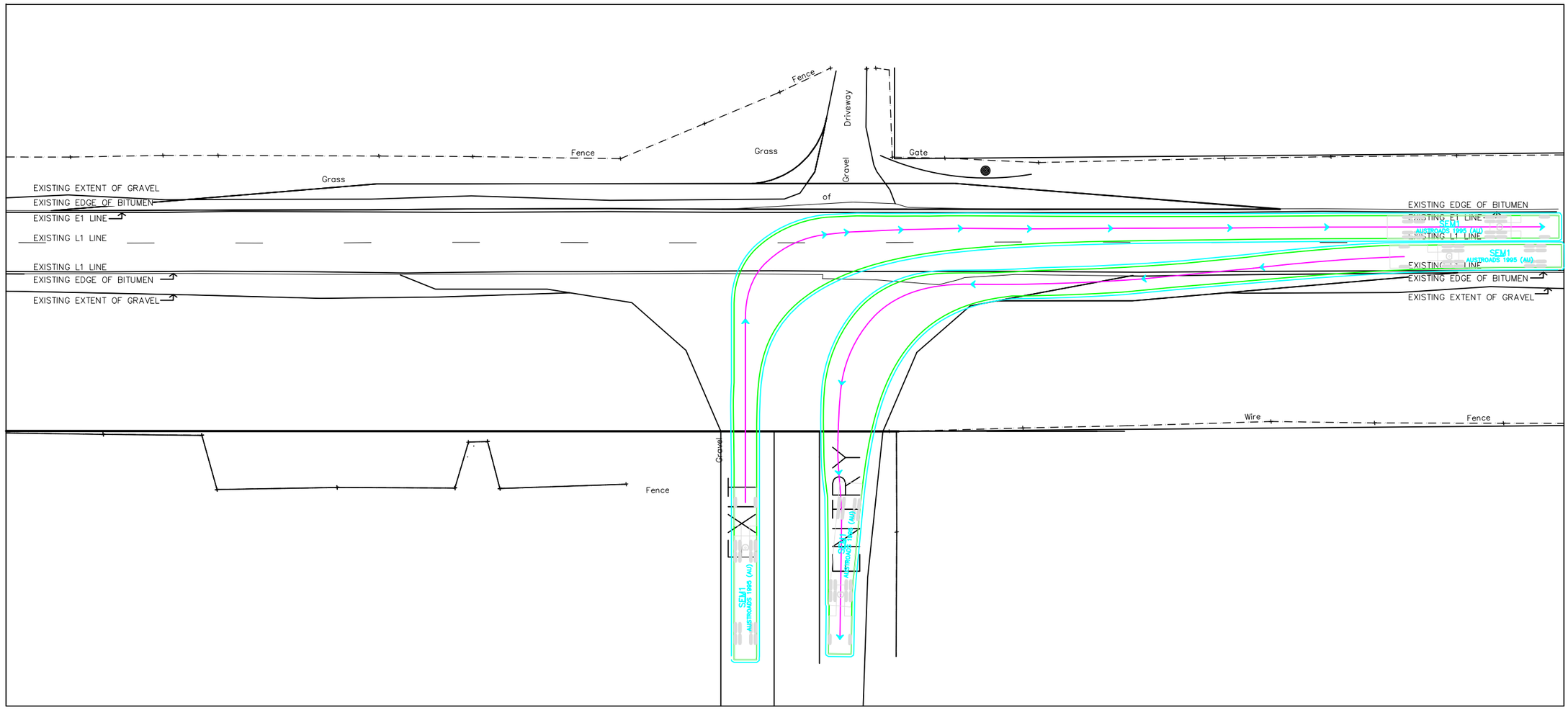


SEM1	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
SITE INGRESS / EGRESS MOVEMENTS
PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: MAY 2021
ISSUE: A
SHEET: 4

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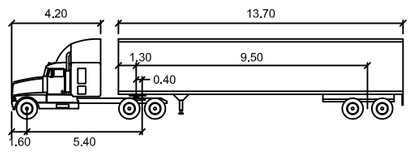
NOTES:

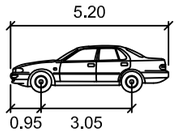
1. THIS PLAN IS BASED ON ENGINEERING SURVEYS PREPARED BY FREEBURN SURVEYING.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE AND B99 PASSENGER VEHICLE MANOEUVRING SPECIFICATIONS IN ACCORDANCE WITH THE AUSTRALIAN STANDARD FOR PARKING FACILITIES PART 1:OFF-STREET CAR PARKING (AS2890.1:2004).



SEM1

	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0



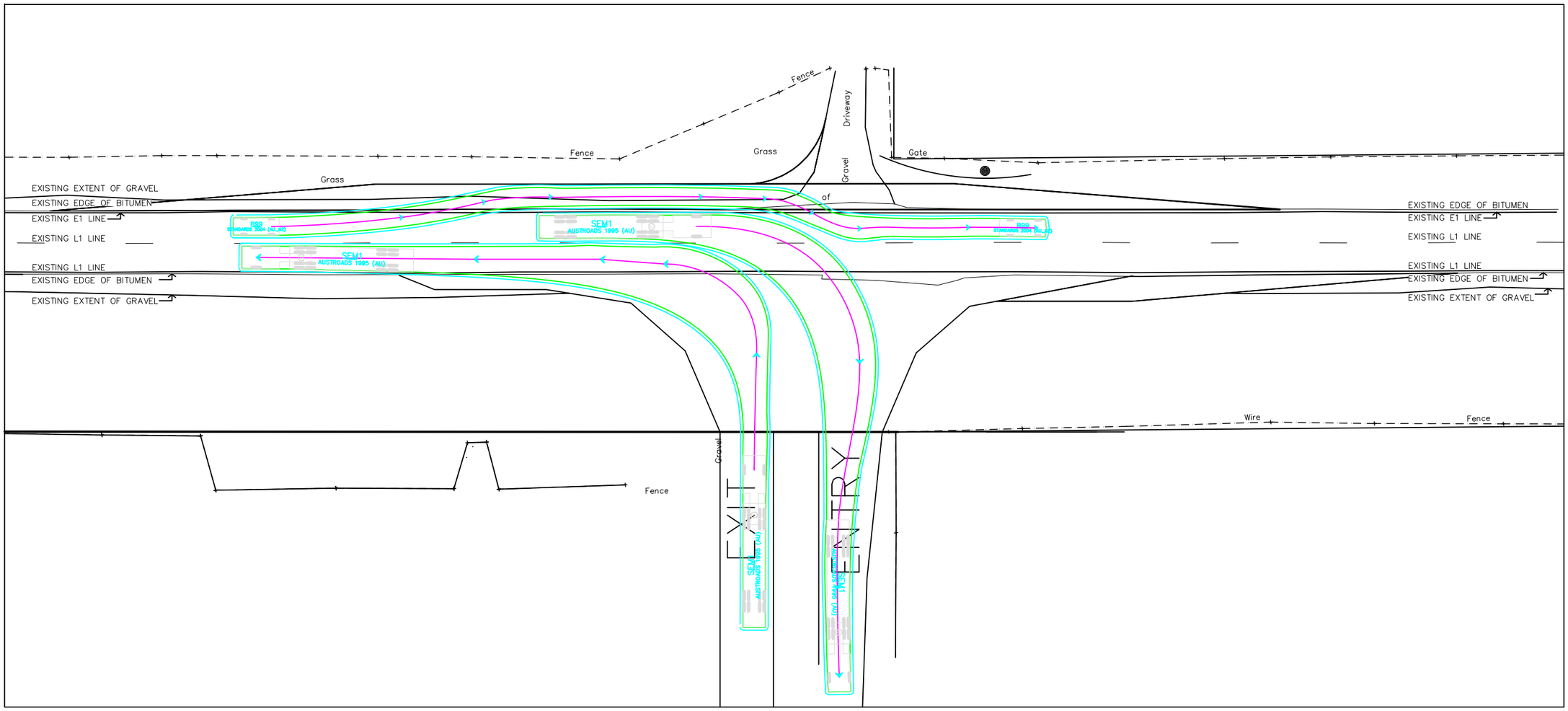
B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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PASSENGER & 19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
TRAILING B99 VEHICLE TRAVELLING PAST 19m SEMI TRAILER
ENTERING PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: MAY 2021
ISSUE: A
SHEET: 5

APPENDIX 4

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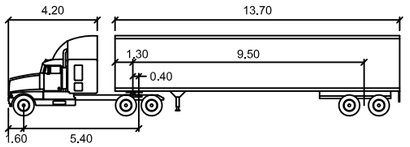
NOTES:

1. THIS PLAN IS BASED ON AERIAL IMAGES TAKEN FROM GOOGLE MAPS.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE.

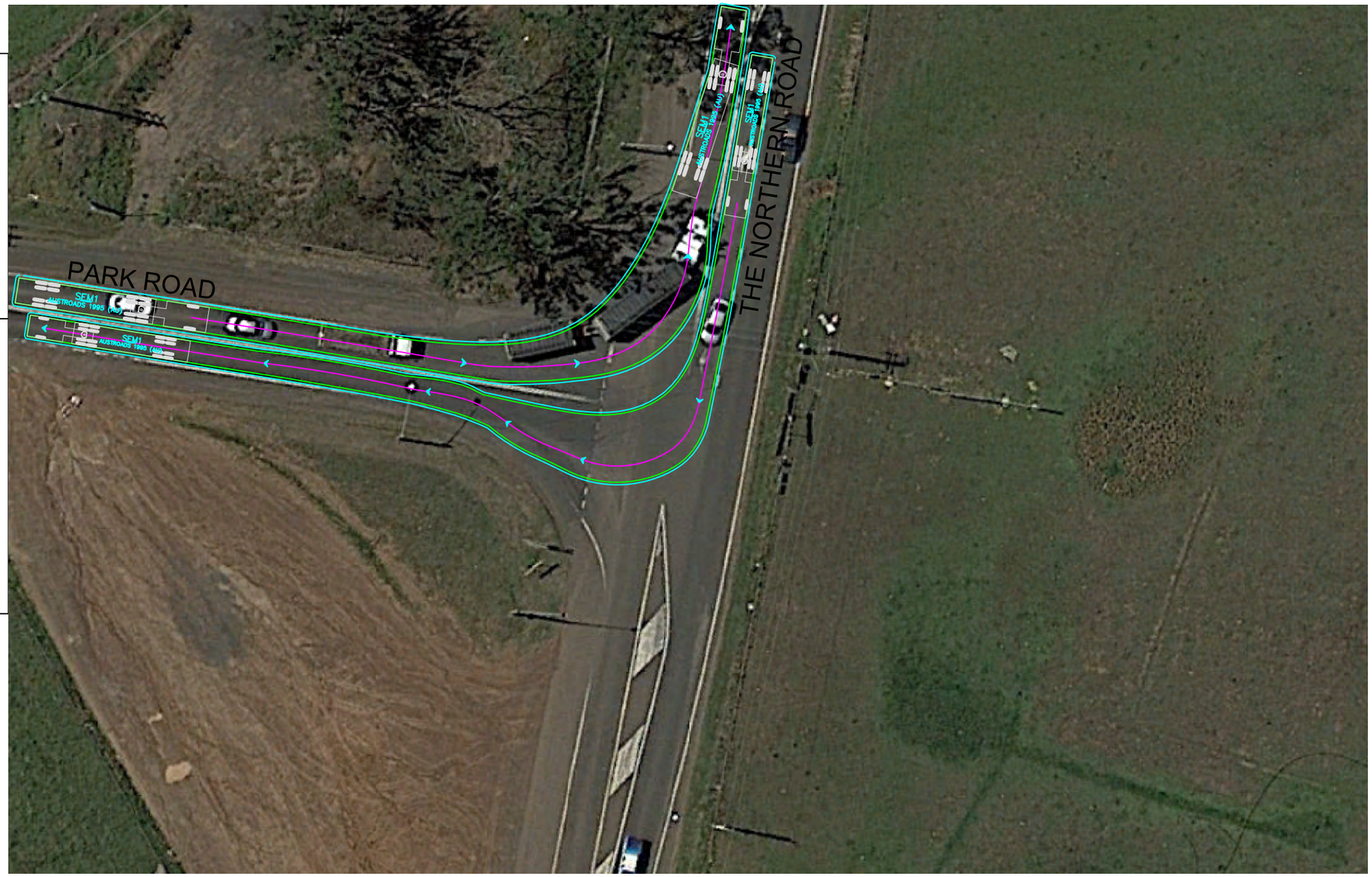


SEM1	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
HEAVY VEHICLE MANOEUVRING WITHIN
INTERSECTION OF THE NORTHERN ROAD / PARK ROAD
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: MAY 2021
ISSUE: A
SHEET: 6

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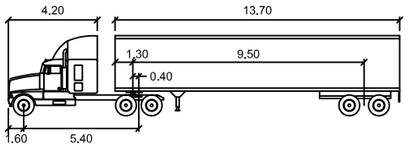
NOTES:

1. THIS PLAN IS BASED ON AERIAL IMAGES TAKEN FROM GOOGLE MAPS.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE.

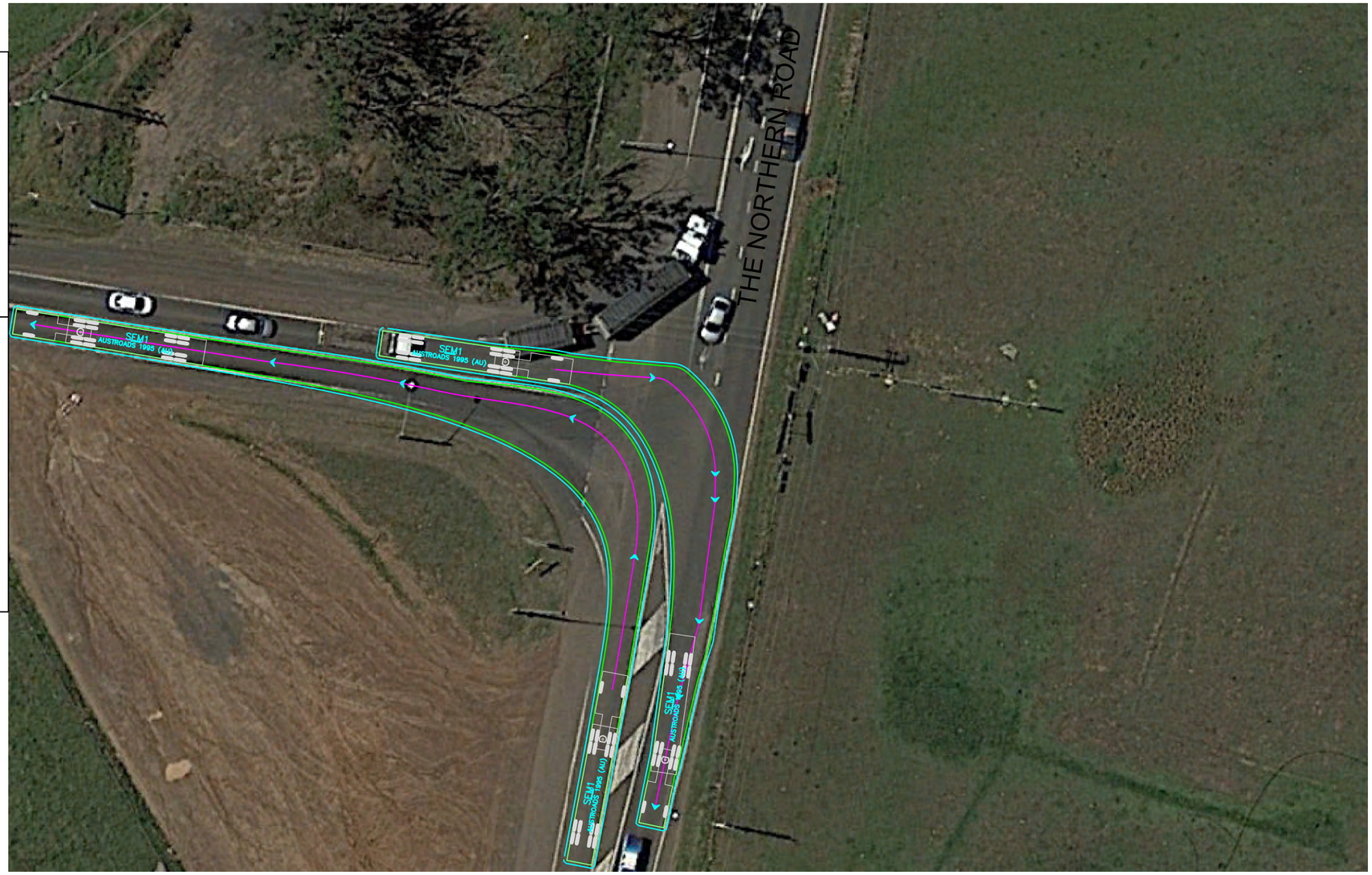


SEM1	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

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WEBSITE: www.stanburytraffic.com.au

19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
HEAVY VEHICLE MANOEUVRING WITHIN
INTERSECTION OF THE NORTHERN ROAD / PARK ROAD
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: MAY 2021
ISSUE: A
SHEET: 7

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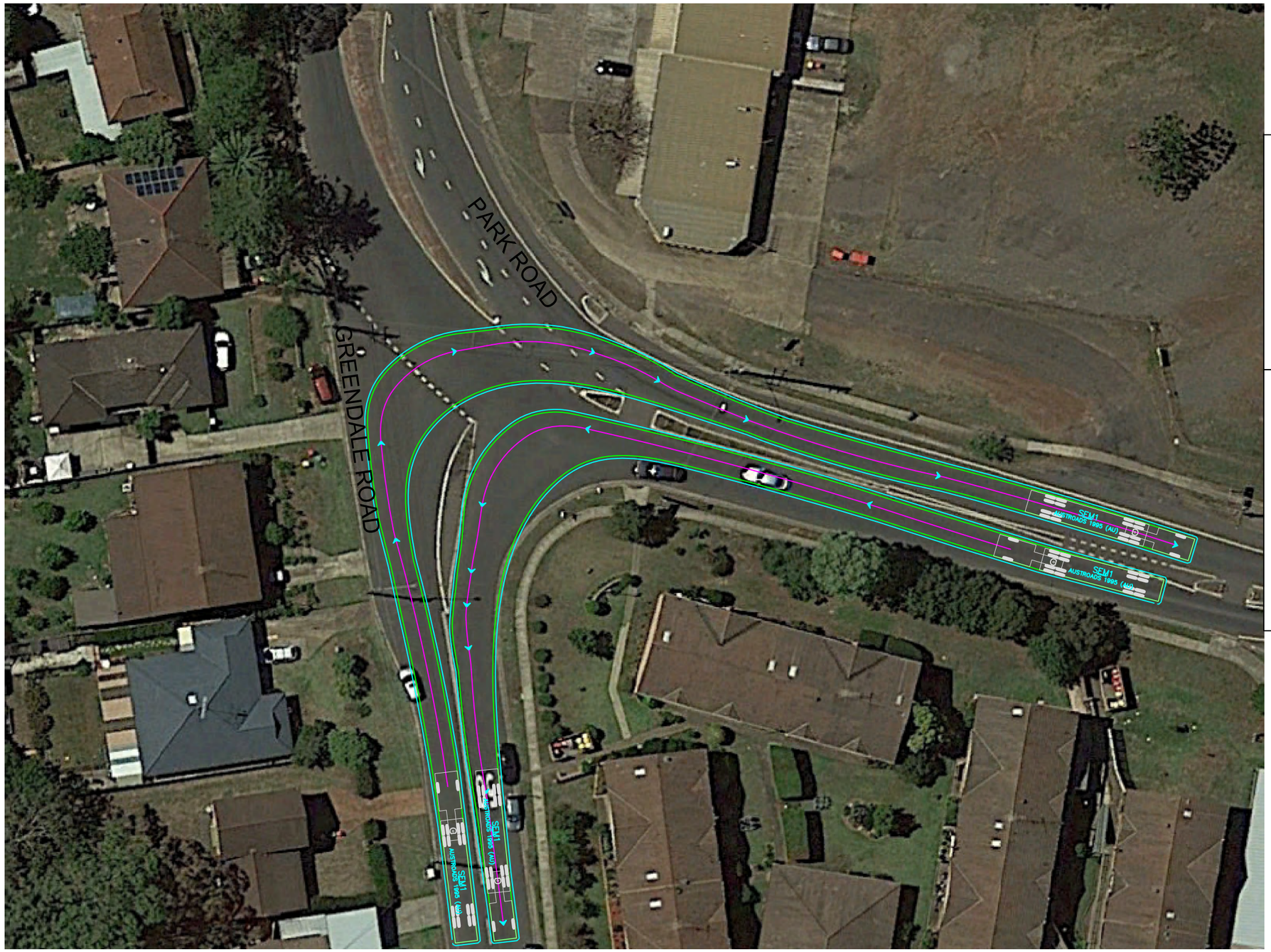
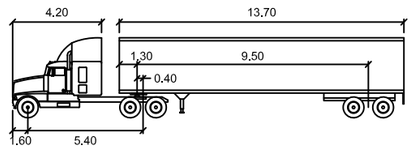


NOTES:

1. THIS PLAN IS BASED ON AERIAL IMAGES TAKEN FROM GOOGLE MAPS.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE.



SEM1	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)

A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

STANBURY TRAFFIC PLANNING
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19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
HEAVY VEHICLE MANOEUVRING WITHIN
INTERSECTION OF GREENDALE ROAD / PARK ROAD
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: MAY 2021
ISSUE: A
SHEET: 8

STANBURY
TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

5 August, 2021

Transport for NSW
Locked Bag 5085
Parramatta
NSW 2124

Attention: Pahee Rathan – Senior Land Use Assessment Coordinator

TfNSW reference: SYD20/00933/04

Dear Sir,

DEVELOPMENT APPLICATION DA 20/0262
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

Reference is made to your correspondence dated 28 May 2021 to Kathryn Saunders of Penrith City Council with respect to the suitability or otherwise of a proposed resource recovery facility at the abovementioned address of 344 Park Road, Wallacia, currently the subject of a development application with Penrith City Council.

Stanbury Traffic Planning prepared a letter dated 10th of May 2021 in support of the subject development application.

This Practice has been subsequently retained by applicant to address and / or provide comment in response to items pertaining to Traffic with your abovementioned correspondence with Council, as detailed within the below.

TfNSW Items

1. *TfNSW notes that a Basic Right and left turn treatment (BAR and BAL) are being proposed for the access to the development. TfNSW does not support the proposed BAL treatment, however would support a rural auxiliary left turn treatment (AUL).*

   The intended use for the site will generate heavy vehicle movements. With the access located on a downhill gradient, with one lane for through traffic and a speed limit of 80km/h, a formalized left turn auxiliary lane will be required to adequately remove slowing vehicles from the through traffic. In this regard the design is to be updated to include an AUL treatment.

2. *The proposed driveway access, shoulder widening and left turn auxiliary lane along Park Road shall be designed to meet TfNSW requirements, and endorsed by a suitably qualified practitioner. The design requirements shall be in accordance with AUSTROADS and other Australian Codes of Practice. The certified copies of the civil design plans shall be submitted to TfNSW for consideration and approval prior to the release of the Construction Certificate by the Principal Certifying Authority and commencement of road works. Please send all documentation to development.sydney@rms.nsw.gov.au.*

302/166 glebe point road
glebe nsw 2037
morgan@stanburytraffic.com.au
www.stanburytraffic.com.au
ph : 0410 561 848
abn : 23 613 111 916

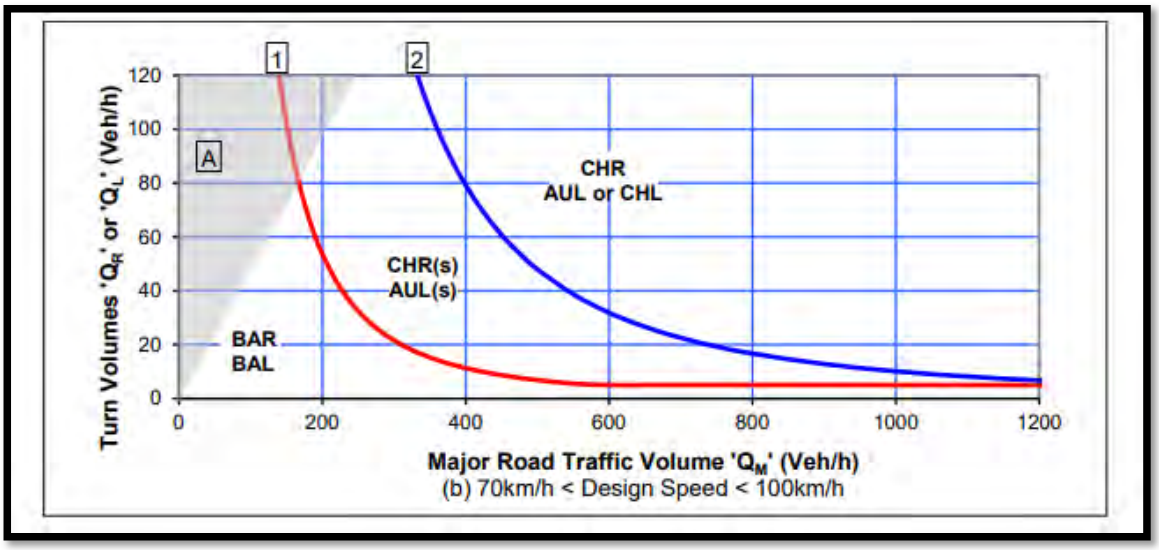
The developer is required to enter into a Works Authorisation Deed (WAD) for the abovementioned works.

TfNSW fees for administration, plan checking, civil works inspections and project management shall be paid by the developer prior to the commencement of works.

Comment

AUSTROADS provide a turning treatment warrant analysis within its *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management* providing turning treatment warrant analysis based on varying design speeds relevant to the subject roads. **Figure 1** overleaf provides turning treatment warrants for roads governed by design speeds of between 70km/h and 100km/h, as applicable to the frontage road of Park Road, being sourced from Figure 3.25 (b) of the abovementioned *Guide*.

FIGURE 1
WARRANT FOR TURN TREATMENTS ON MAJOR ROADS AT UNSIGNALISED INTERSECTIONS GOVERNED BY A DESIGN SPEED OF BETWEEN 70KM/H AND 100KM/H



An assessment of the projected turn treatment warrants has been undertaken for the junction of Park Road and the proposed site access driveway, based upon the Austroads criteria illustrated within **Figure 1**. The assessment utilised traffic demand surveys and the projected site ingress / egress movements to be undertaken by heavy vehicles servicing the development, as outlined within the development application traffic report.

Table 1 overleaf provides a summary of the analysis results.

TABLE 1 PROJECTED RIGHT / LEFT TURN TREATMENT WARRANT ANALYSIS JUNCTION OF PROPOSED SITE ACCESS DRIVEWAY AND PARK ROAD		
	Projected Conditions	
	AM Peak	PM Peak
Left Turn Treatment Analysis		
Left Turn Volume	7	6
Major Road Volume 'Q_m'	106	131
Warrant	BAL	BAR
Right Turn Treatment Analysis		
Right Turn Volume	1	1
Major Road Volume 'Q_m'	212	219
Warrant	BAL	BAR

Table 1 indicates that the projected traffic demands at the junction of Park Road and the proposed site access driveway warrant a basic left turn treatment (BAL) and a basic right turn treatment (BAR), respectively.

Notwithstanding the abovementioned warrant for a basic left turn treatment (BAL) and a basic right turn treatment (BAR), it is understood that TfNSW does not support the proposed BAL treatment and alternatively would support a rural auxiliary left turn treatment (AUL).

The incorporation of a AUL / BAR treatment at the junction of Park Road and the site access driveway necessitates a notable extent of pavement widening. In this regard, Figures 7.5 and 8.2.3 of AUSTROADS' *Guide to Road Design – Part 4a: Unsignalised and Signalised Intersections* specifies the following pavement widening works:

- An eastbound Park Road pavement width of 6.5m for a length of 64m, to facilitate an ability for trailing through eastbound vehicles to undertake or pass a decelerating or stopped vehicle wishing to turn right into the subject site;

- A taper length of 36m on approach and departure from the abovementioned widened eastbound Park Road pavement; and

- A westbound Park Road pavement width of 6.3m for a length of 85m is required on approach to the development site to facilitate the provision of an auxiliary left-turn lane capable of accommodating a left turn movement of a 19m long semi-trailer.

A concept design for the above BAR / AUL treatment at the junction of Park Road and the site access driveway in accordance with the relevant AUSTORADS requirements has been prepared and is attached to this correspondence as **Appendix 1**. The concept design indicates the extent of additional pavement widening required on both sides of Park Road.

The requirement for detailed civil design of the site access treatment and the proponent to enter into a Works Authorisation Deed with respect to the works can reasonably be imposed as a condition of development consent.

3. *The swept path of the longest vehicle (including garbage trucks, building maintenance vehicles and removalists) entering and exiting the subject site, as well as manoeuvrability through the site, shall be in accordance with AUSTROADS. In this regard, a plan shall be submitted to Council for approval, which shows that the proposed development complies with this requirement.*

4. *The largest vehicle to access the site is to be restricted to 19 metres.*

5. *All vehicles are to enter and leave the site in a forward direction.*

6. *All vehicles are to be wholly contained on site before being required to stop.*

Comment

This Practice acknowledges and accepts items 4, 5 and 6 and notes that these operational management measures can reasonably be imposed as conditions of consent.

In order to assess the suitability of the proposed site access arrangements, and in direct response to Item 3, a series of swept path plans have been prepared and are attached as **Appendix 2** for reference. These swept path plans illustrate the following:

- The proposed BAR treatment is capable of allowing a trailing B99 passenger vehicle within Park Road to pass a 19m long semi-trailer vehicle turning right into the site, in conjunction with a further 19m long semi-trailer vehicle exiting the site, with both design vehicles providing 300m clearance; and

- A 19m long semi-trailer with 300mm manoeuvring clearance is capable of undertaking a left turn movement to the subject site utilising the proposed AUL treatment in conjunction with a further 19m long semi-trailer with 300mm manoeuvring clearance undertaking a forward right turn movement from the site to Park Road.

On the basis of the above discussion, it is accordingly considered that the proposed compliant BAR and AUL treatments to the junction of Park Road and the site access driveway effectively accommodate the manoeuvring requirements of 19m long semi-trailer movements travelling to and from the site, in a safe and efficient manner.

7. *Detail design plans and hydraulic calculations of any changes to the stormwater drainage system are to be submitted to TfNSW for approval, prior to the commencement of any works. Please send all documentation to developent.sydney@rms.nsw.gov.au.*

   A plan checking fee will be payable and a performance bond may be required before TfNSW approval is issued.

8. *A Road Occupancy Licence (ROL) should be obtained from Transport Management Centre (TMC) for any works that may impact on traffic flows on Park Road during construction activities. A ROL can be obtained through https://myrta.com/oplinc2/pages/security/oplincLogin.jsf.*

9. *A Construction Pedestrian Traffic Management Plan (CPTMP) detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to Council for approval prior to the issue of a Construction Certificate.*

10. *All demolition and construction vehicles are to be contained wholly within the site and vehicles must enter the site before stopping. A construction zone will not be permitted on Park Road.*

Comment

Items 7 – 10 are noted and can reasonably be imposed as conditions of consent.

11. *Sight distances from the proposed vehicular crossings to vehicles on Park Road are to be in accordance with the Austroads Guide to Road Design: Part 4A: Unsignalised and Signalised Intersections (Section 3 – Sight Distance) and AS 2890. Vegetation and proposed landscaping/fencing must not hinder sight lines to and from the vehicular crossings to motorists, pedestrians and cyclists.*

    The analysis is to include vehicles exiting from 353-361 Park Road Driveway.

Comment

The provision of sight distance is a critical factor in the level of safety provided at any public road intersection. Austroads *Guide to Road Design Part 4A* provides a minimum safe intersection sight distance of 170m for a roadway connection to a public road which provides an applicable speed limit of 80km/h. Such a sight distance facilitates a motorist travelling at 80km/h a reaction time of between 1.5 seconds prior to braking heavily and stopping prior to entering into a conflict situation.

In order to ascertain the extent of sight distance afforded by the proposed site access driveway location and the existing driveway servicing 353 – 361 Park Road, an engineering survey of Park Road was undertaken by Freeburn Surveying, copies of which are submitted under separate cover. This engineering survey has been utilised as a base to prepare a series of sight distance diagrams demonstrating the available sight distance between Park Road directional through traffic and vehicles entering and exiting the proposed site access driveway in accordance with the specifications of Figure 3.2 of Austroads Guide to Road Design Part 4A, whereby driver eye height and top of the car are taken at 1.1 and 1.25m above ground level, respectively.

The following provides a summary of the sight distance assessment results whilst full details are contained within **Appendix 3**:

Proposed Site Access Driveway - Exit Movement Sight Distance

- Horizontal Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) > 254m;

- Horizontal Sight Distance between exiting vehicles and eastbound Park Road traffic (to the west) > 453m;

- Vertical Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) = 238m; and

- Vertical Sight Distance between exiting vehicles and eastbound Park Road traffic (to the east) > 461m.

Proposed Site Access Driveway - Entry Movement Sight Distance

- Horizontal Sight Distance between entering vehicles and westbound Park Road traffic (to the east) > 247m;

- Horizontal Sight Distance between entering vehicles and eastbound Park Road traffic (to the west) > 455m;

- Vertical Sight Distance between entering vehicles and westbound Park Road traffic (to the east) = 232m; and

- Vertical Sight Distance between entering vehicles and eastbound Park Road traffic (to the east) > 463m.

Existing Driveway servicing 353 – 361 Park Road - Exit Movement Sight Distance

- Horizontal Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) > 242m;

- Horizontal Sight Distance between exiting vehicles and eastbound Park Road traffic (to the west) > 464m;

- Vertical Sight Distance between exiting vehicles and westbound Park Road traffic (to the east) = 229m; and

- Vertical Sight Distance between exiting vehicles and eastbound Park Road traffic (to the east) > 473m.

Existing Driveway servicing 353 – 361 Park Road - Entry Movement Sight Distance

- Horizontal Sight Distance between entering vehicles and westbound Park Road traffic (to the east) > 234m;

- Horizontal Sight Distance between entering vehicles and eastbound Park Road traffic (to the west) > 468m;

- Vertical Sight Distance between entering vehicles and westbound Park Road traffic (to the east) = 220m; and

- Vertical Sight Distance between entering vehicles and eastbound Park Road traffic (to the east) > 481m.

The above sight distance assessment therefore indicates that the available sight distance between entering / exiting vehicles and Park Road through traffic exceeds the minimum Austroads *Guide to Road Design Part 4A* criteria for the sign posted speed limit of 80km/h within Park Road.

The sight distance provisions associated with the proposed site access driveway location and the existing driveway servicing 353 – 361 Park Road are therefore concluded to provide motorists with satisfactorily safe conditions with which to enter and exit the site.

12. *The layout of the proposed car parking areas associated with the subject development (including driveways, grades, turn paths, sight distance requirements in relation to landscaping and / or fencing, aisle widths, aisle lengths and parking bay dimensions) should be in accordance with AS2890.1:2004, AS2890.6:2009 and AS2890.2:2018 for heavy vehicle usage. Parking restrictions may be required to maintain the required sight distances at the driveway.*

Comment

Item 12 is noted and can reasonably be imposed as conditions of consent.

The requirement or otherwise for parking restrictions along Park Road can reasonably be included within the civil design package required in response to Item 2.

It would be appreciated if TfNSW could consider the additional information contained within this correspondence to assist in its ongoing assessment of the development application.

Submitted for your consideration.

Yours sincerely,

Morgan Stanbury
Director
Traffic Engineer

Enclosed:

Appendix 1	Proposed concept design – basic right turn & auxiliary left turn treatments
Appendix 2	Swept path plans – incorporating proposed turning treatments
Appendix 3	Existing horizontal and vertical sight distance diagrams at the junctions of the proposed site access driveway / existing driveway servicing 353 – 361 Park Road and Park Road.

APPENDIX 1

DRAWN BY CADD
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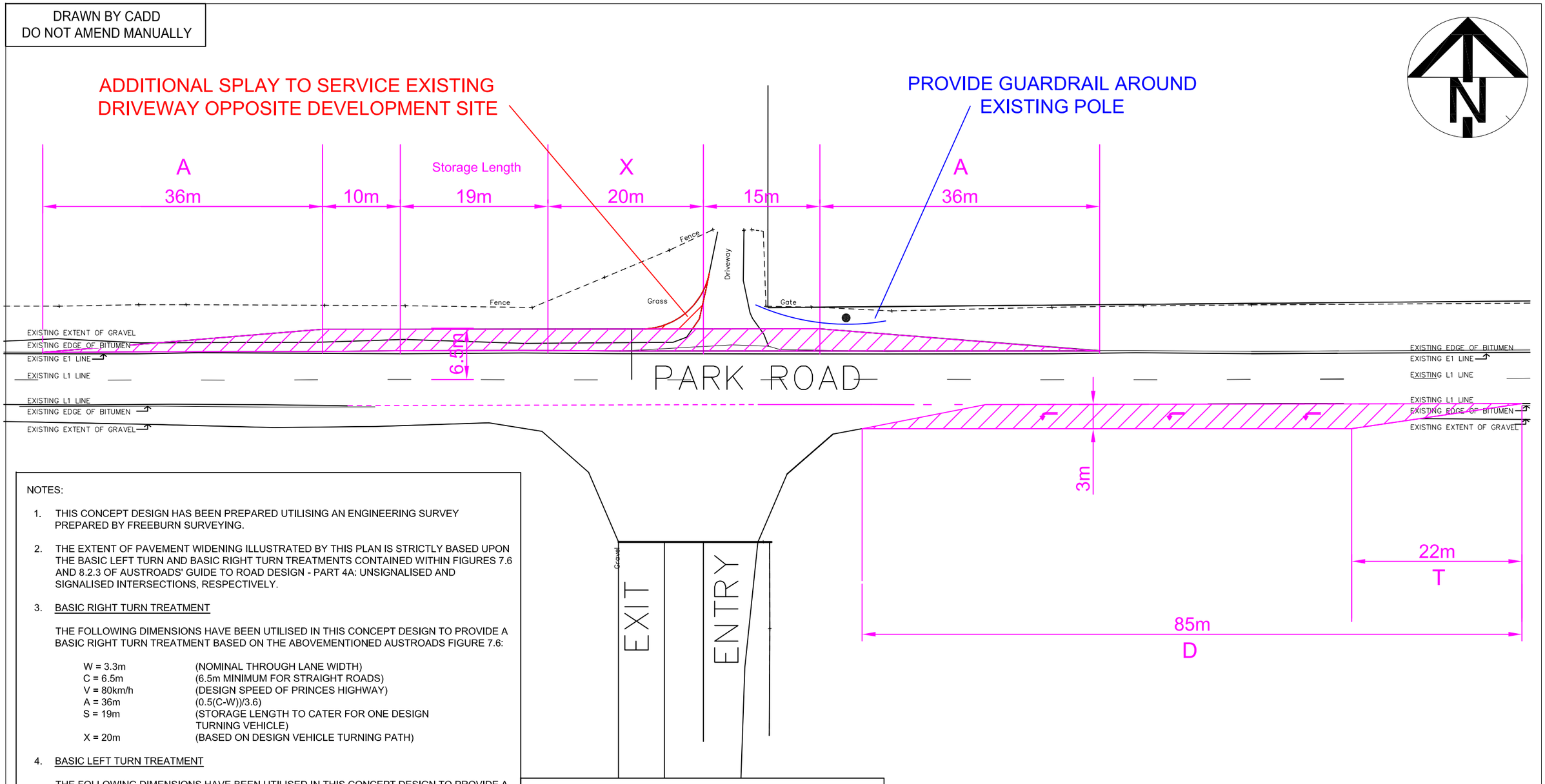

NOTES:

1. THIS CONCEPT DESIGN HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING.

2. THE EXTENT OF PAVEMENT WIDENING ILLUSTRATED BY THIS PLAN IS STRICTLY BASED UPON THE BASIC LEFT TURN AND BASIC RIGHT TURN TREATMENTS CONTAINED WITHIN FIGURES 7.6 AND 8.2.3 OF AUSTROADS' GUIDE TO ROAD DESIGN - PART 4A: UNSIGNALISED AND SIGNALISED INTERSECTIONS, RESPECTIVELY.

3. BASIC RIGHT TURN TREATMENT

   THE FOLLOWING DIMENSIONS HAVE BEEN UTILISED IN THIS CONCEPT DESIGN TO PROVIDE A BASIC RIGHT TURN TREATMENT BASED ON THE ABOVEMENTIONED AUSTROADS FIGURE 7.6:

W = 3.3m	(NOMINAL THROUGH LANE WIDTH)
C = 6.5m	(6.5m MINIMUM FOR STRAIGHT ROADS)
V = 80km/h	(DESIGN SPEED OF PRINCES HIGHWAY)
A = 36m	(0.5(C-W))/3.6)
S = 19m	(STORAGE LENGTH TO CATER FOR ONE DESIGN TURNING VEHICLE)
X = 20m	(BASED ON DESIGN VEHICLE TURNING PATH)

4. BASIC LEFT TURN TREATMENT

   THE FOLLOWING DIMENSIONS HAVE BEEN UTILISED IN THIS CONCEPT DESIGN TO PROVIDE A RURAL AUXILIARY LEFT-TURN TREATMENT BASED ON THE ABOVEMENTIONED AUSTROADS FIGURE 8.2.3:

W = 3.3m	(NOMINAL THROUGH LANE WIDTH)
WT = 3.0m	(3.0m MINIMUM)
D = 85m	(BASED ON TABLE 5.2)
T = 22m	((0.33*V*WT)/3.6))
V = 80km/h	(DESIGN SPEED OF PRINCES HIGHWAY)

LEGEND

- EXTENT OF PAVEMENT WIDENING REQUIRED TO ACCOMMODATE TURNING TREATMENTS
- PROPOSED ADDITIONAL SPLAY SERVICING EXISTING ACCESS DRIVEWAY OPPOSITE SITE
- PROPOSED INDICATIVE GUARDRAIL

A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

STANBURY TRAFFIC PLANNING
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RECOMMENDED CONCEPT DESIGN
AUXILIARY LEFT TURN & BASIC RIGHT TURN TREATMENT
PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
ISSUE: A
FILE: 21-009
DATE: AUGUST 2021
SHEET: 1

APPENDIX 2

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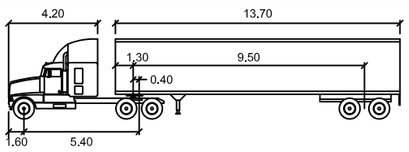
NOTES:

1. THIS PLAN IS BASED ON ENGINEERING SURVEYS PREPARED BY FREEBURN SURVEYING.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE.

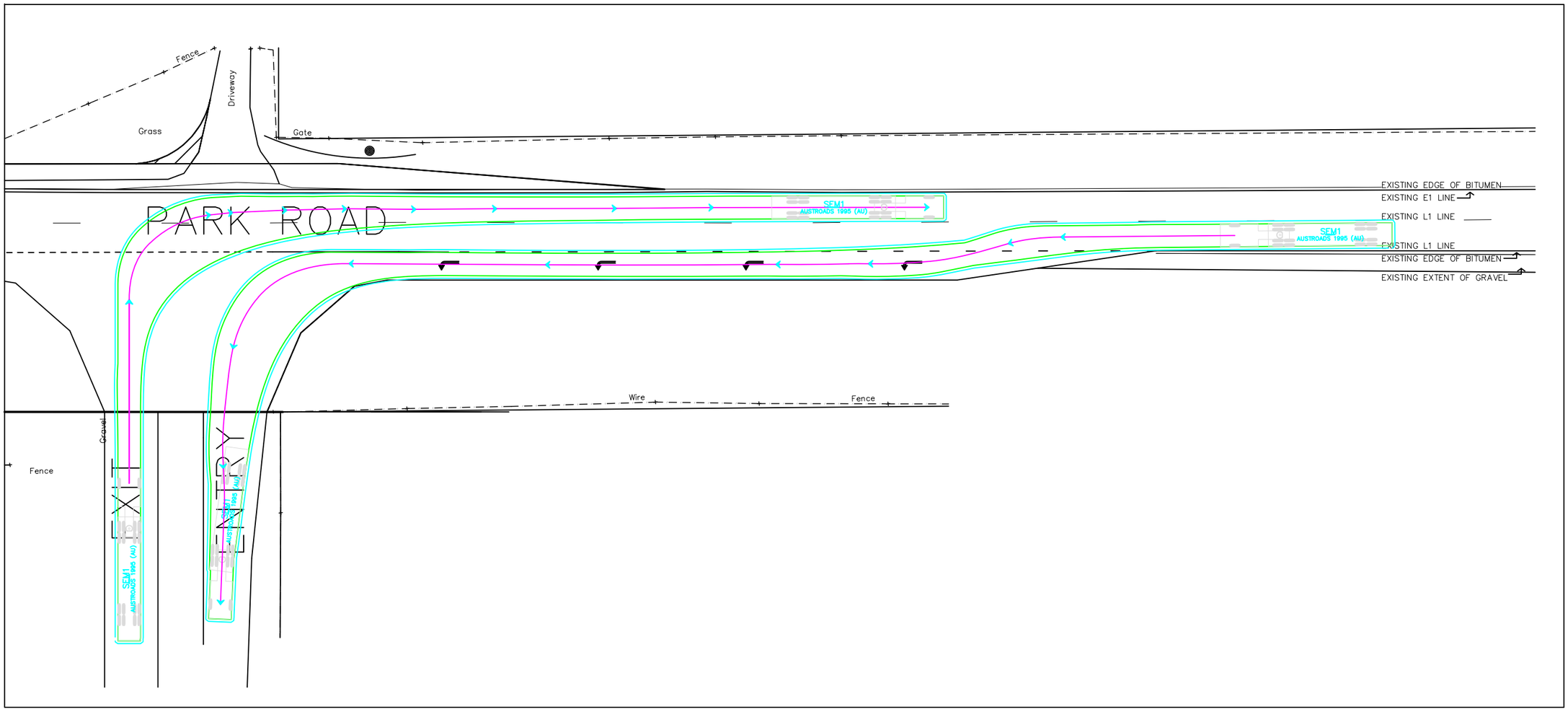


SEM1	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
SITE INGRESS / EGRESS MOVEMENTS
PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: AUGUST 2021
ISSUE: A
SHEET: 2

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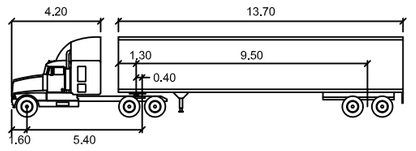
NOTES:

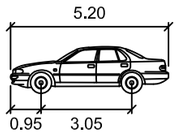
1. THIS PLAN IS BASED ON ENGINEERING SURVEYS PREPARED BY FREEBURN SURVEYING.

2. THE SWEPT PATHS PROVIDED ON THIS PLAN HAVE BEEN GENERATED UTILISING AUTOTURN PRO VERSION 11 IN CONJUNCTION WITH MANOEUVRING SPECIFICATIONS FOR A 19m LONG SEMI TRAILER VEHICLE AND B99 PASSENGER VEHICLE MANOEUVRING SPECIFICATIONS IN ACCORDANCE WITH THE AUSTRALIAN STANDARD FOR PARKING FACILITIES PART 1:OFF-STREET CAR PARKING (AS2890.1:2004).



SEM1

	meters
Tractor Width	: 2.50
Trailer Width	: 2.50
Tractor Track	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 28.4
Articulating Angle	: 70.0



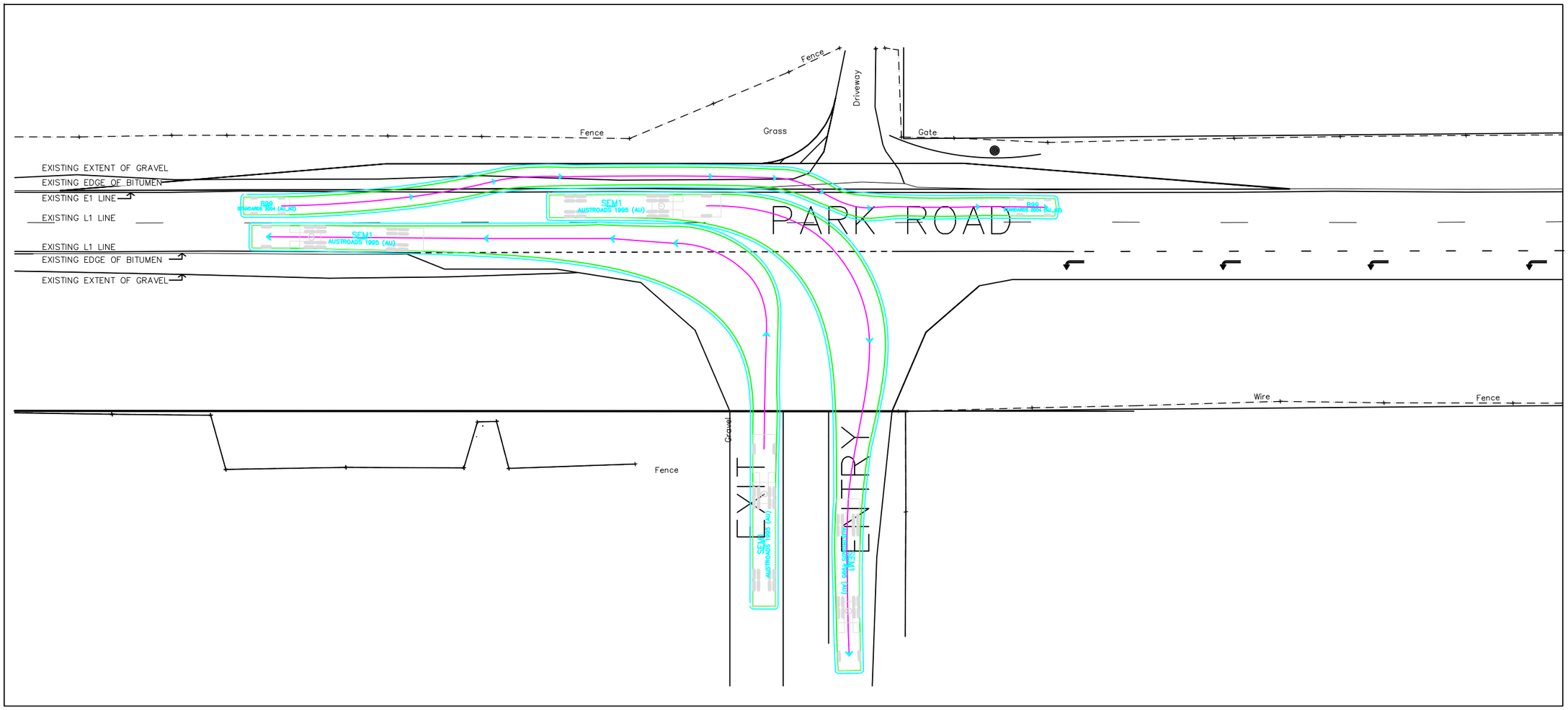
B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9

LEGEND

VEHICLE BODY PATH (INCLUDING OVERHANG)

MANOEUVRING CLEARANCE (300mm)



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PASSENGER & 19m SEMI TRAILER VEHICLE SWEPT PATH PLAN
TRAILING B99 VEHICLE TRAVELLING PAST 19m SEMI TRAILER
ENTERING PROPOSED SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

SCALE: 1:500 @ A3
FILE: 21-057
DATE: AUGUST 2021
ISSUE: A
SHEET: 3

APPENDIX 3

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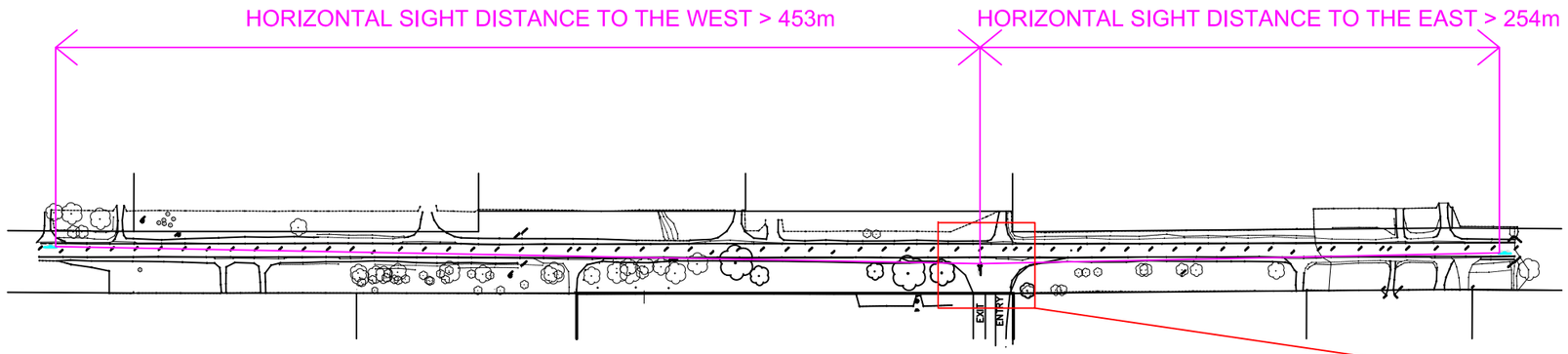

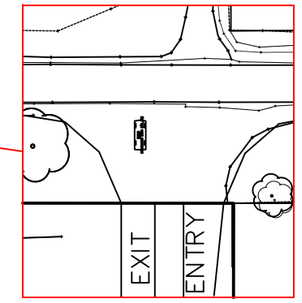

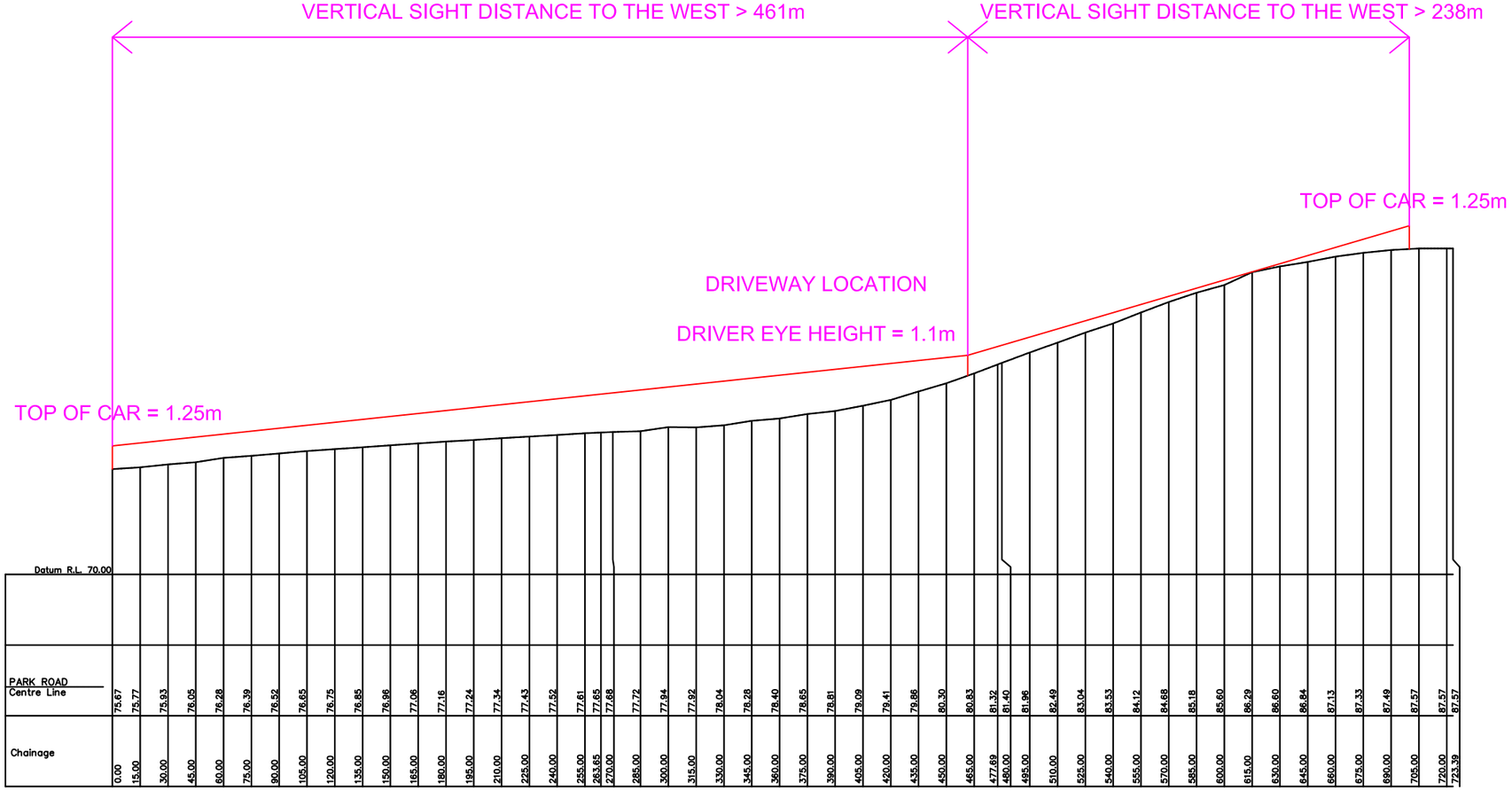

NOTES:

1. THIS VERTICAL SIGHT DISTANCE DIAGRAM HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING AS A BASE.

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STANBURY TRAFFIC PLANNING
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VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
SITE ACCESS DRIVEWAY EGRESS MOVEMENT
JUNCTION OF PARK ROAD AND SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 4
DATE: MAY 2021

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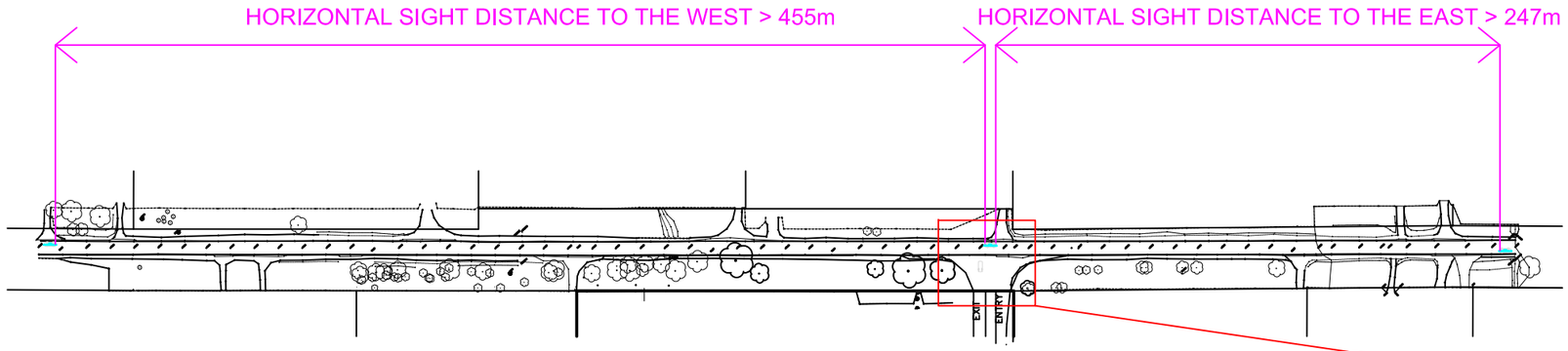

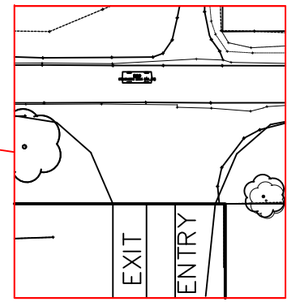

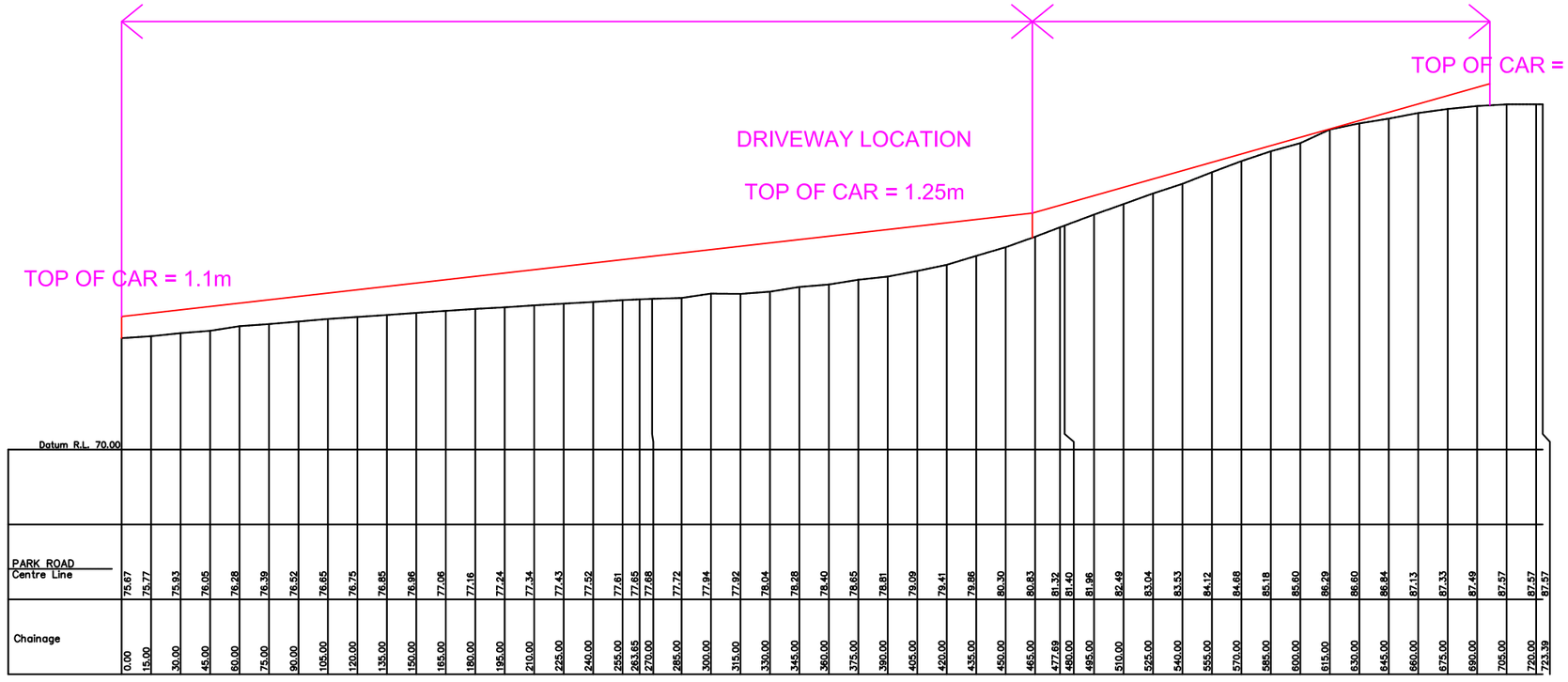

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A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

STANBURY TRAFFIC PLANNING
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VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
SITE ACCESS DRIVEWAY INGRESS MOVEMENT
JUNCTION OF PARK ROAD AND SITE ACCESS DRIVEWAY
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 5
DATE: MAY 2021

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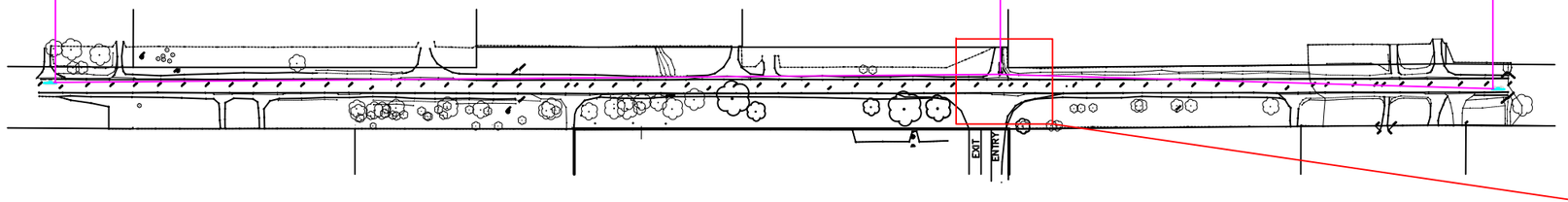
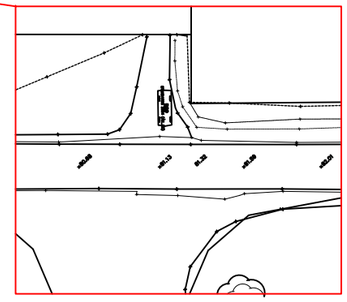
HORIZONTAL SIGHT DISTANCE TO THE WEST > 465m

HORIZONTAL SIGHT DISTANCE TO THE EAST > 242m





VERTICAL SIGHT DISTANCE TO THE WEST > 473m

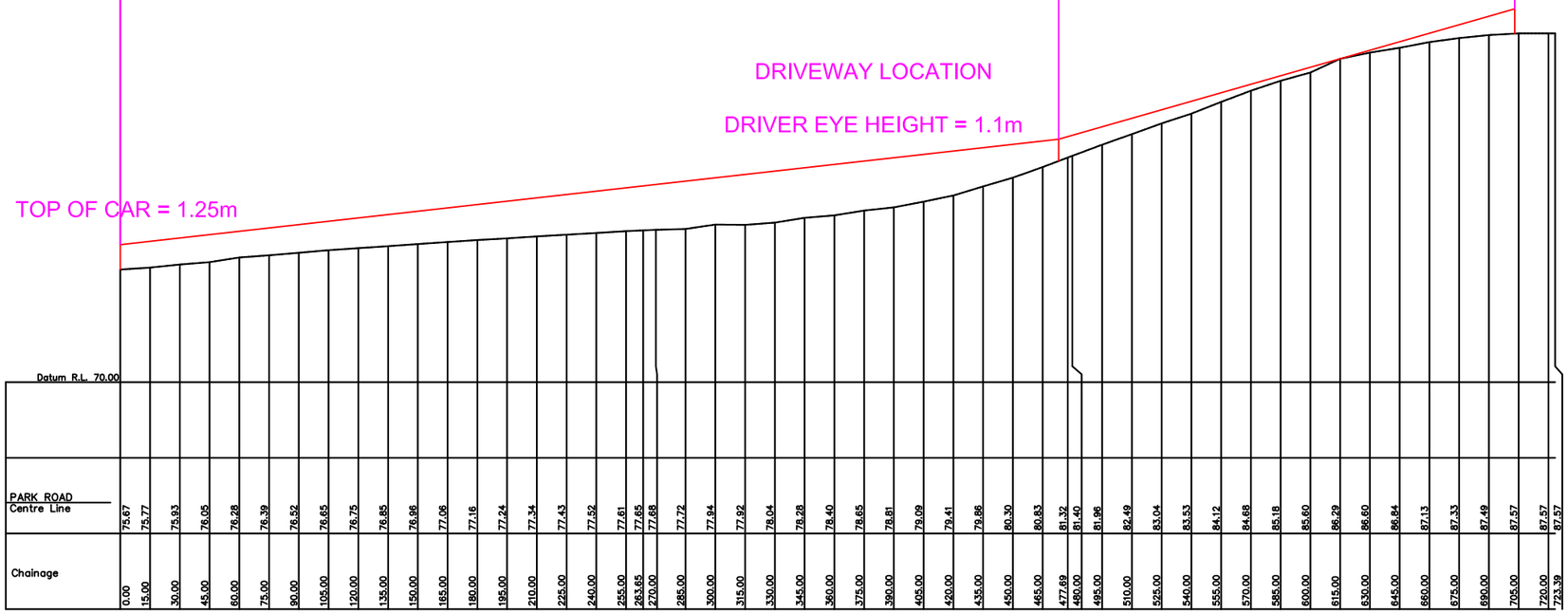
VERTICAL SIGHT DISTANCE TO THE WEST > 229m

TOP OF CAR = 1.25m

DRIVEWAY LOCATION

DRIVER EYE HEIGHT = 1.1m

TOP OF CAR = 1.25m



NOTES:

1. THIS VERTICAL SIGHT DISTANCE DIAGRAM HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING AS A BASE.

A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
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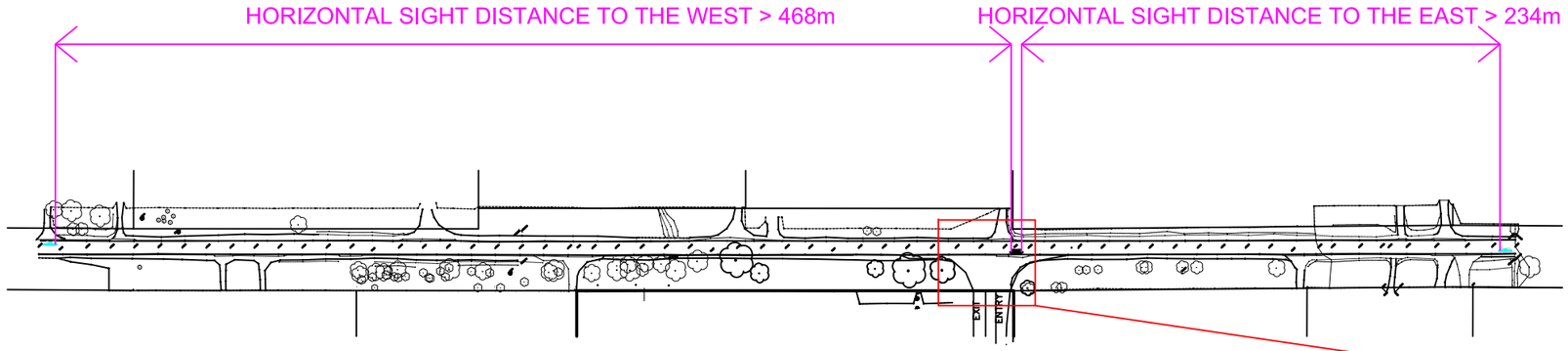
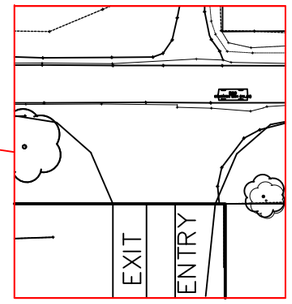
WEBSITE: www.stanburytraffic.com.au

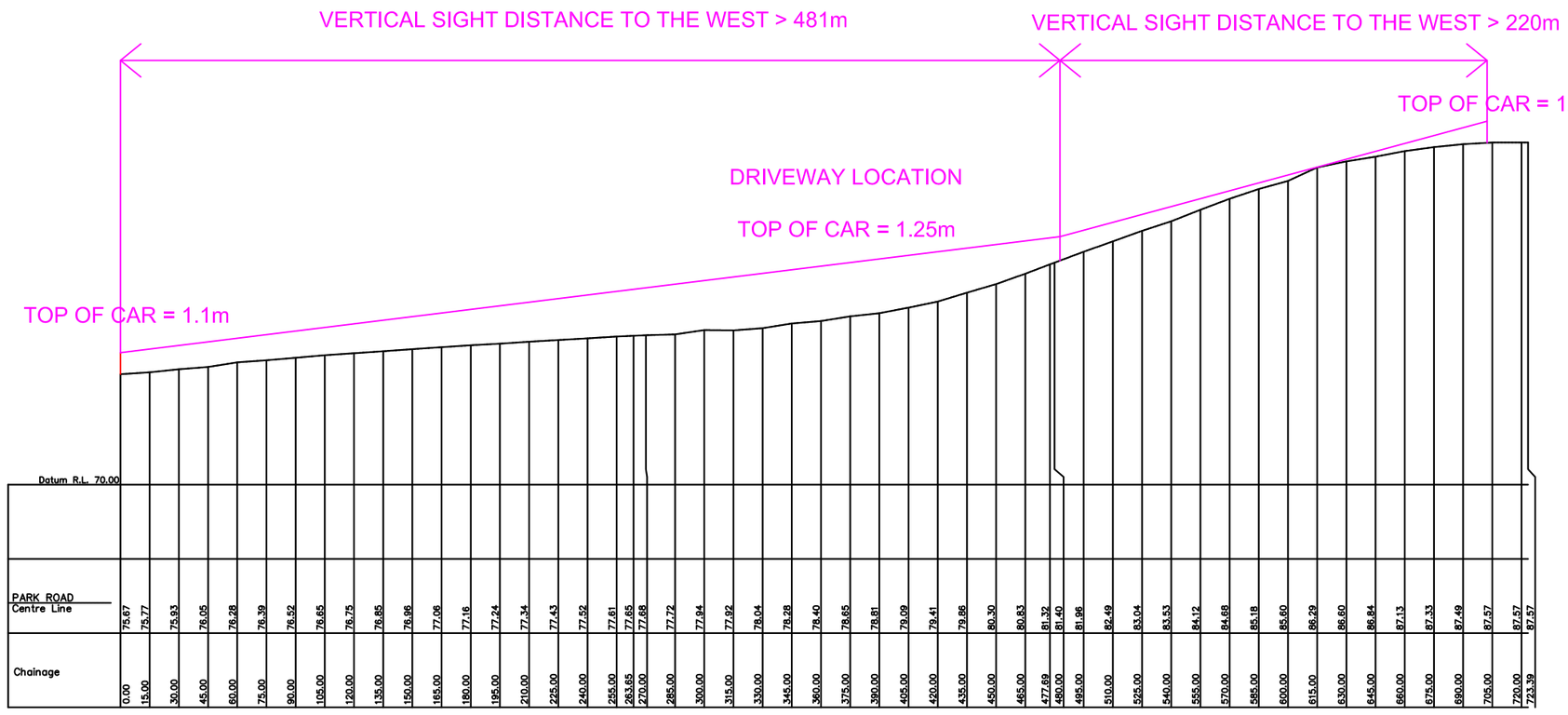
VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
DRIVEWAY EGRESS MOVEMENT - JUNCTION OF PARK ROAD AND EXISTING DRIVEWAY SERVICING 353 - 361 PARK ROAD DRIVEWAY ASSOCIATED WITH PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 6
DATE: AUGUST 2021

DRAWN BY CADD
DO NOT AMEND MANUALLY







NOTES:

1. THIS VERTICAL SIGHT DISTANCE DIAGRAM HAS BEEN PREPARED UTILISING AN ENGINEERING SURVEY PREPARED BY FREEBURN SURVEYING AS A BASE.

A ORIGINAL ISSUE

STANBURY TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

STANBURY TRAFFIC PLANNING
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VERTICAL & HORIZONTAL SIGHT DISTANCE DIAGRAM
SITE ACCESS DRIVEWAY INGRESS MOVEMENT - JUNCTION OF
PARK ROAD/EXISTING DRIVEWAY SERVICING 353-361 PARK ROAD
PROPOSED RESOURCE RECOVERY FACILITY
344 PARK ROAD, WALLACIA

ISSUE A
SCALE: 1:300 @ A3
FILE: 21-009
SHEET 7
DATE: AUGUST 2021

EIS Appendix 13: Operational Plan of Management

Draft Operational Management Plan

Greenfields Resource Recovery Facility

Proposed Resource Recovery Facility

344 Park Road Wallacia

Prepared For:	Gateway Developments Pty Ltd Greenfields Resource Recovery Facility
Approval body Council:	Penrith City Council
Prepared By:	Carlo Ranieri Projects Manager
Document:	Draft Operation Management Plan for consideration as part of the Development Approvals phase

Report ID: 284202-CPDOC
Issue: A
Issue date: 13/5/2020

Contents

1 Plan Objectives

The objectives of this plan in its operation are to ensure the health and safety of all employees and to respect the surrounding environment by strict compliance with the current statutory regulations and Development Consent and EPA Licence conditions.

It is the objective of the owners and managers of this facility to:

- Operate a state-of-the-art Resource Recovery Facility which has clear outcomes for both the environment and safety of employees and other associated personnel.
- To recover the maximum percentage of reusable resource materials from the incoming waste stream.
- To continuously improve the plant performance and achieve quality products that can be readily reused in all aspects of construction and manufacturing.
- To develop alternative solutions for waste reuse and significantly assist state and local government in their overall objects to reduce the amount of waste sent to landfill.
- To provide a sound sustainable recycling facility which provides long term employment to the local community.
- Provide ongoing training for all its employees.
- Stay ahead of emerging resource recovery technologies to ensure the plant is run to its optimum at all times.
- To be a good corporate citizen and ensure resource recovery and recycling is readily available in the local community.

2 Environmental Policy

Greenfields Resource Recovery Facility (Gateway Developments P/L)

At **Greenfields RRF,** we are committed to meeting the needs of our customers in an environmentally sound and sustainable manner, through continuous improvements in environmental performance of all our activities.

To do this, we will work with our customers, suppliers and community to ensure proper consideration is given to all environmental aspects which may be affected by our activities. We will strive in our operations to achieve the highest waste recovery rates for waste reuse and reduce the amount of usable materials going to landfill.

Within our operation, we will:

- As a minimum standard ensure our activities comply with relevant environmental legislation and standards;
- Identify and manage any relevant environmental risks within our operation and apply best practice principles to the prevention of pollution;
- Promote environmental awareness among all company personnel to increase understanding of environmental matters; and
- Identify and implement ways to improve the efficiency with which we use energy, water, raw materials and other resources.

Environmental leadership and adherence to this policy is the responsibility of all company personnel, sub-contractors and suppliers.

This policy will be period reviewed to ensure it remains relevant and appropriate at all times.

.....	.....	...../...../.....
Company Director	Signature	Date

3 Safety Policy

Greenfields Resource Recovery Facility
Work Health & Safety Policy

At **Greenfields RRF** our Work Health and Safety (WH&S) Policy is based on a belief that the well-being of people at work, or people affected by our work, is a major priority and must be considered during all work performed on our behalf.

The objectives of our WH&S Policy are:

- To achieve an accident free workplace;
- To make health and safety an integral part of every managerial and supervisory position;
- To ensure health and safety is considered in all planning and work activities;
- To involve our employees in the decision-making processes through regular communication, consultation and training;
- To provide a continuous program of education and learning to ensure that our employees work in the safest possible manner;
- To identify and control all potential hazards in the workplace through hazard identification and risk analysis;
- To ensure all potential accidents/incidents are controlled and prevented; and
- To provide effective injury management and rehabilitation for all employees.

The success of our WH&S management is dependent on:

1. Pro-active planning of all work activities with due consideration given to implementing occupational health and safety controls (WHS) that are suitable to each given situation.
2. Understanding the total work process and associated WHS risk.
3. Ensuring the work team is totally committed to achieving our objectives.
4. Ensuring that open and honest communication exists between management and all employees and sub-contractors.

.....	.....	...../...../.....
Director	Signature	Date

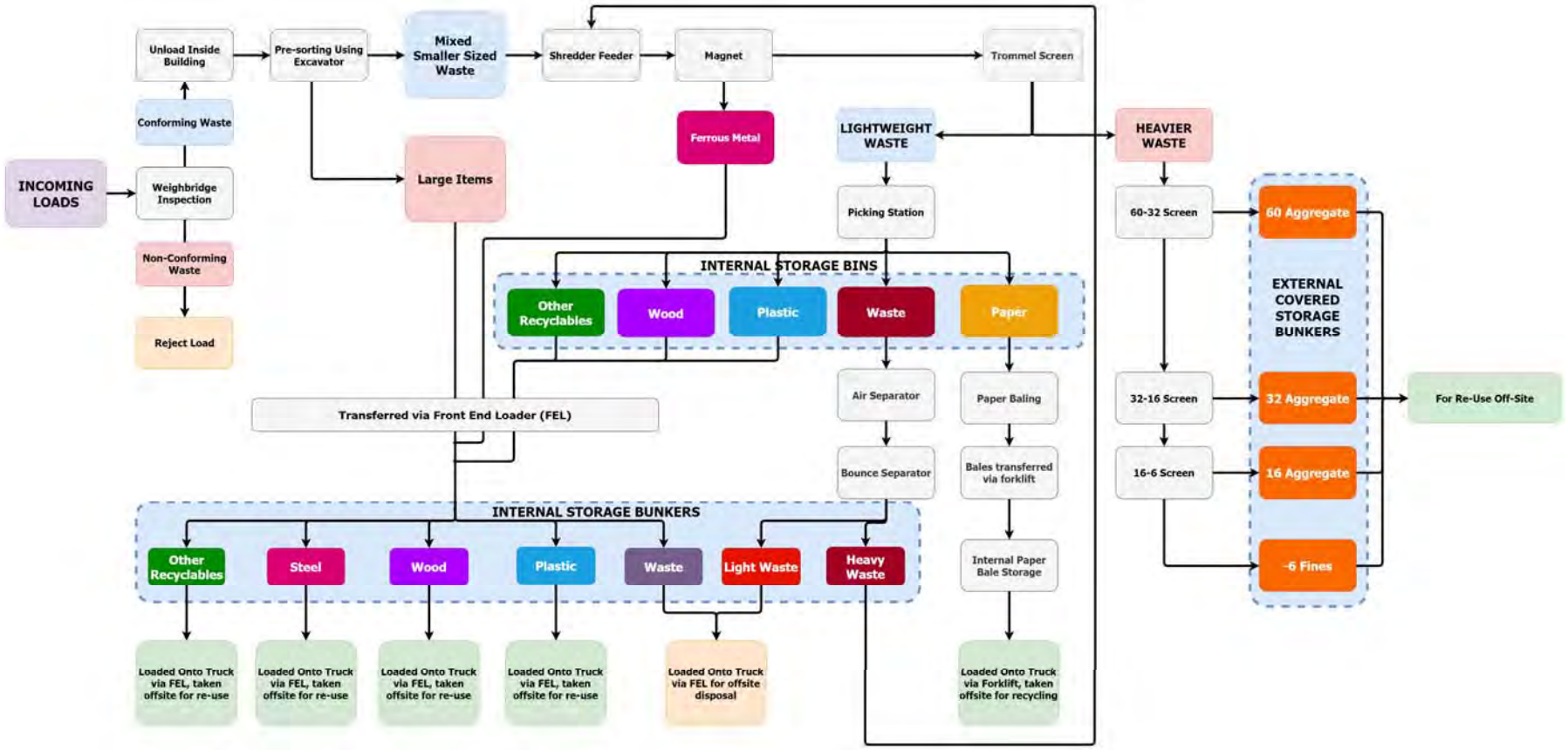
4 Roles and Responsibilities

Operational Personnel and Responsibilities

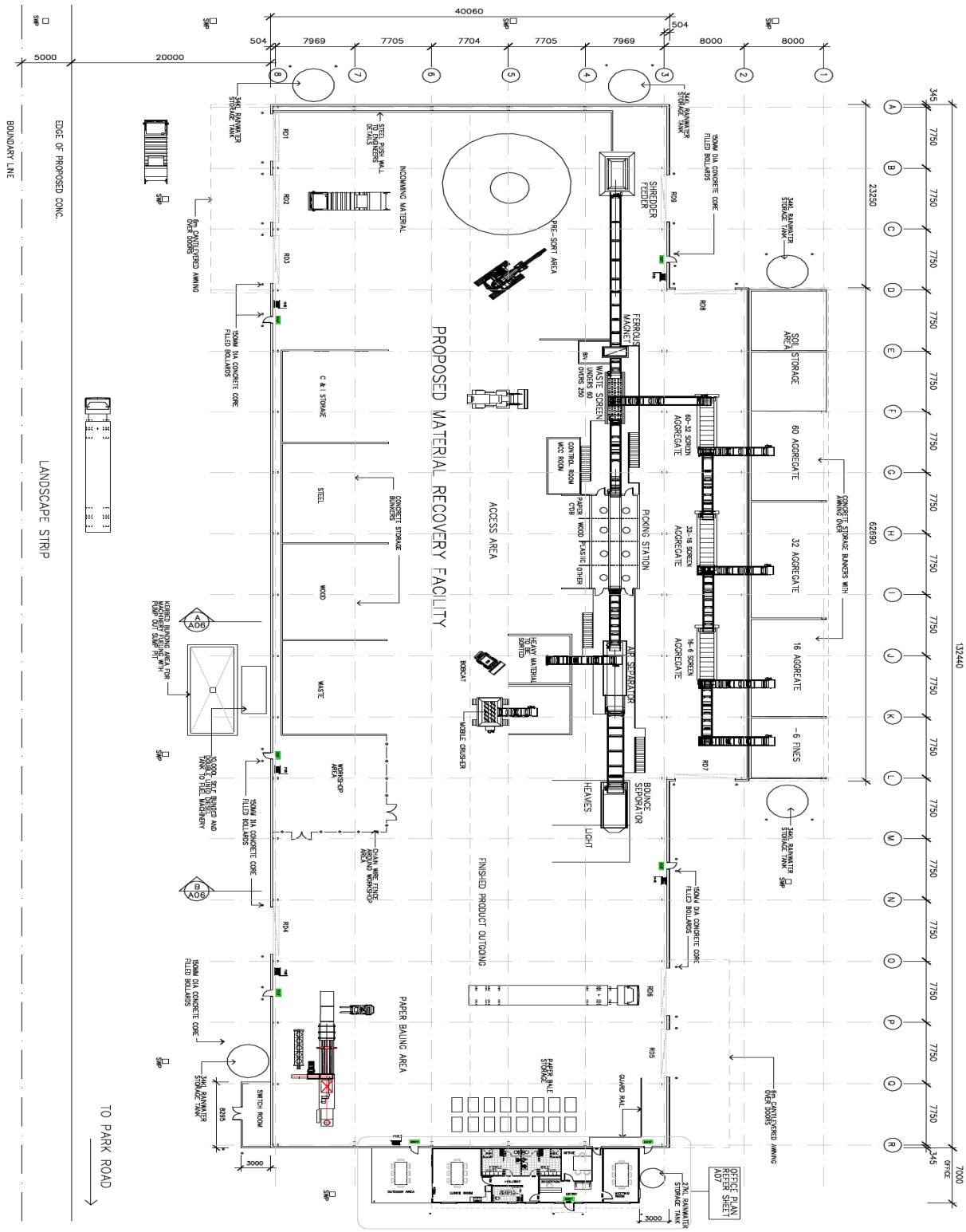
Table of Responsibilities

Item	Position	Level of Responsibility
1	General Manager	Overall site management responsibilities Including; 1. Legislative requirements management 2. Plant operation strategies 3. Site environment and safety procedures 4. Overall site management 5. Management of clerical staff 6. Accounts 7. Sales
2	Plant Supervisor	1. Site and plant operations management 2. General site activities and incoming material specifications compliance. 3. Plant personnel management 4. Quality control
3	Supervisor Assistant	1. Assist the plant supervisor where necessary 2. Safety and environment site controls and implementation of procedures 3. EPA Licence compliance control 4. Site traffic and vehicle movement compliance
4	Leading hand	1. Directly assisting plant operators 2. Working with operational personnel 3. Maintaining plant operations
5	Weighbridge Operator	1. Load inspection and compliance controls 2. Manage non-compliant loads 3. Load reporting 4. EPA Licence controls
6	Maintenance Supervisor	1. Maintaining plant reliability 2. Management of spare parts 3. General site and building maintenance 4. Sub-contractors
7	Operations Personnel	1. Plant operations 2. House keeping 3. Equipment operations

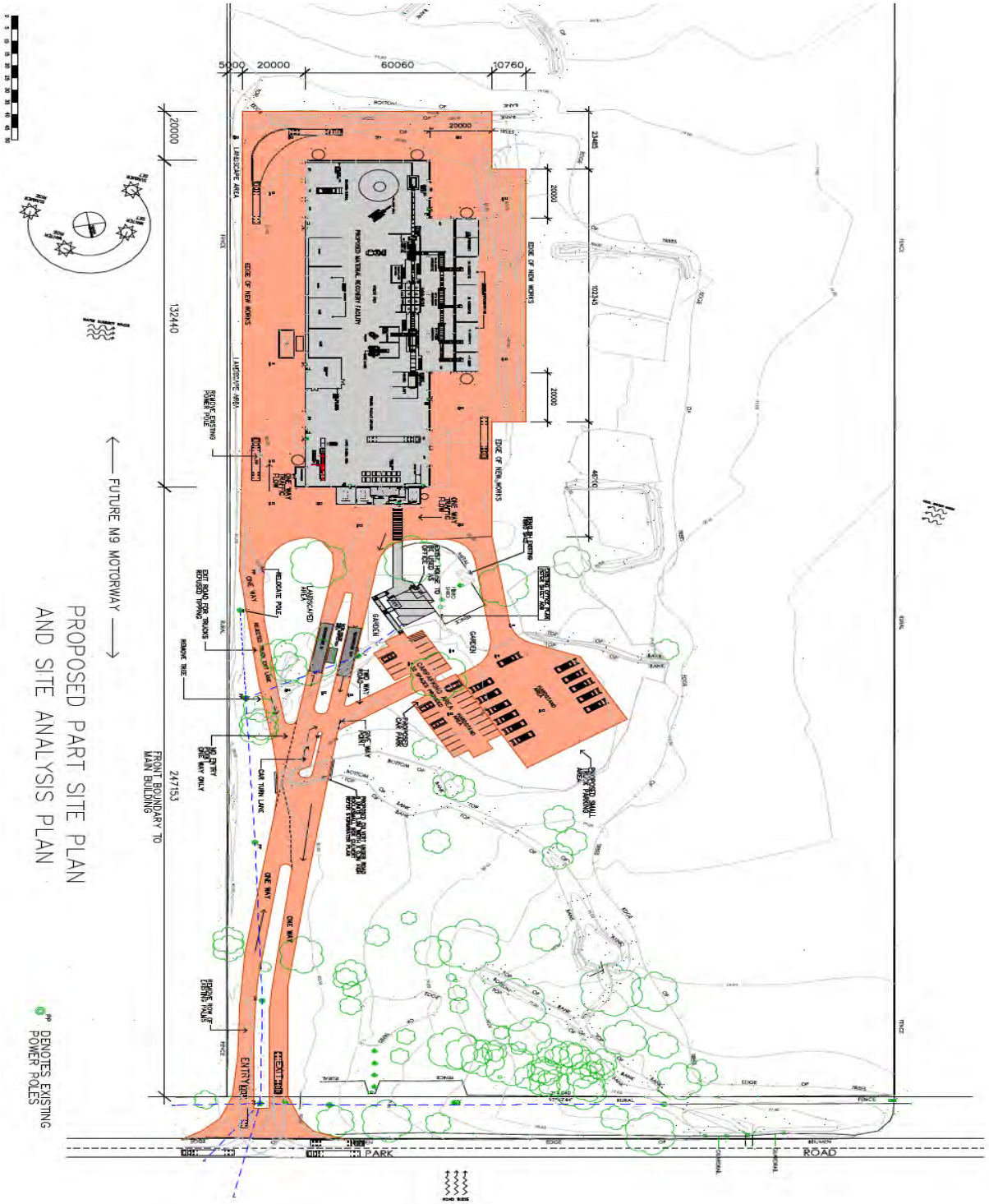
5 Facility Operation Procedure



6 Plant Layout



7 Part Site Plan



8 Other Documentation

Other documentation to be added to this plan;

1. Site Traffic Management
2. Weighbridge operations
3. Site Security
4. Operational Risk Management
5. Emergency Response Management
6. Emergency Evacuation Plan
7. Emergency Services Access Plan
8. Sub-Contractor Management
9. Visitor Management

EIS Appendix 14: Access Statement

Access Statement

Greenfields Resource Recovery Facility

Proposed Resource Recovery Facility

344 Park Road Wallacia

Prepared For:	Gateway Developments Pty Ltd Greenfields Resource Recovery Facility
Approval body Council:	Penrith City Council
Prepared By:	Carlo Ranieri Projects Manager B.Eng (Civil), Dip.Build Surv, Dip. Apl Sc Build
Document:	Draft Operation Management Plan for consideration as part of the Development Approvals phase

Report ID:

805220-CPDOC
Issue: A
Issue date: 8/5/2020

Contents

1 Introduction

1.1 The proposal

This Access Statement is to accompany the Development Application to Penrith City Council for the development of a Resource Recovery Facility and demonstrate that all aspects of general access and access for people with disability have been considered in the design of this facility.

1.2 Purpose of the Access Statement

The purpose of this Access Statement is to outline how the project has been designed to deliver an accessible and inclusive environment for all. It is intended to be read in conjunction with the other documents and drawings that support the proposed development. The Applicant hereby makes a commitment to ensure that all aspects of access including but not limited to General Access, Access for People with Disability and Emergency Access is considered and will be implemented in the course of design and construction.

1.3 Overview

The proposal will be subject to and required to comply with the appropriate building regulations covering accessibility, movement and navigation throughout site and proposed buildings.

This statement demonstrates strategies adopted from The Building Code of Australia and Australian Standards and General good practice.

1.4 Policy

There has been a commitment by all stakeholders from the outset to ensure that the philosophy of inclusive design and consideration of all user needs, now and in the future, will be included within the project.

The proposal review process has incorporated a suitable approach for meeting the relevant duties under the Environmental Planning & Assessment Act 1979, The Building Code of Australia, which incorporates Australian Standard AS 1428. Access for People with Disabilities. Draft Policies for Safety and Environment have also been developed for the proposal. See Appendix A. The Applicant has committed to policies that promote inclusive management of the public realm, office buildings and associated facilities at post occupancy stages as well as consultation and collaboration to meet the needs of staff and visitors where applicable.

1.5 Consultation

Consultation for this report has been limited to the Environmental Planning & Assessment Act, The Buildings Code of Australia and the Relevant Australian Standards.

1.7 Scope

This Access Statement describes how the design has adopted strategies with specific regard to disabled people as staff and visitors to the development.

The Access Statement will also make comment on operational and management considerations as necessary.

2 Criteria for inclusive design standards

2.1 Access Aims

- To maximize access to all parts of the development, facilities and services to staff or visitors regardless of ability
- To ensure that where possible and feasible, appropriate accessibility standards can be met from the start of development going forward into detailed design
- To meet the Building Regulations, Building Code of Australia and the Australian Standards
- To meet the aims of the Penrith Development Control Plan 2014
- To follow best practice site design

2.2 Regulations and other standards

Building Code of Australia Volume 1 – Class 8 and Class 5 Buildings
Building Code Section D – Access and Egress Section D1 – Provision for Escape D2 Construction of Exits and D3 – Access for People with Disability and Australian Standard AS 1428- 2009. It is vital that it is understood that these standards require building approval in the form of a Construction Certificate issued in accordance with the Environmental Planning and Assessment Act 1979. Approval confirms acceptance that the buildings will meet the relevant standards for physical access and egress.

The regulations are a best practice guidance documents that explains how the built environment can be designed to anticipate and overcome, restrictions that prevent disabled people making full use of premises and their surroundings. Where relevant and practical it is recommended that other relevant standards be applied.

3 Access Provisions

3.1 Overview

The proposed resource recovery facility is primarily a large single storey open factory structured building which will separate and recycle construction and demolition waste through a mechanical plant separation system.

The proposal has been designed to provide a high level of accessibility and inclusion externally and internally. Clear walk way paths will be marked and signed posted to give a clear and safe passage to all staff and visitors. All doors and access points will be marked on a site plan which will be located at each egress door providing important evacuation information.

The facility will adopt and implement an emergency evacuation plan which will be prepared prior to the facility operation. Training in the procedure will be provided to all staff.

The facility will also accommodate an operations office and amenities block as shown on the architectural plans. All aspects of access have been considered in the office and amenities design both with regards to general staff and also for people with disability.

The design has provided for ample carparking for all staff, visitors and also parking for people with disability. Access ramps and suitable walkways for wheel chair access has been allowed for in the design to and from offices and factory areas and will be constructed to meet the requirements of the Australian Standards.

3.2 Site Constraints

There are no significant external level changes within the proposed site which would cause access restrictions. All outside gardens and staff amenities will be suitably accessible.

3.3 Pedestrian Access Routes, Landscaping, Public Areas and Open Space

All external areas will be designed using the principals of accessibility and inclusivity.

3.4 Public Transport

Public transport is limited to the site.

A safe drop off point will be provided in the carparking area which is well away from the main facility, this will allow for cars to maneuver on and off the site without interfering with operational traffic around the facility. The intention is to allow disabled staff / visitors / customers arriving by taxi or car to be dropped off in a safe location.

3.5 Parking Arrangements

Ample standard parking will be provided (refer to the site plans), truck parking has also been provided for away from the general carparking area so the larger vehicles do not cause unnecessary safety issues with pedestrians accessing their cars and moving between buildings.

3.6 Entrances and Reception Area

- Then main entrance to the site will be at the management office at the southern end of the carpark attendance at the reception area will be mandatory prior to entering the operational site area.
- Immediate external routes and entrances are level or are provided with suitably specified level access, door opening forces, lighting, signage and weather protection.
- Level access will be provided over the threshold for each entrance.
- Entrance Doors –Accessible entrance doors will be provided in accordance with the requirements of Volume 1 - Section D of the Building Code of Australia and Australian Standard 1428 – 2009.
- Any internal pass doors within the reception / foyer will also comply with the relevant standards.
- The reception desk provision and associated furniture will be developed to meet the Building Regulations as a minimum with induction loop provision and accessible height counters.

3.7 Internal Circulation

- Corridors will follow the relevant guidance Building Regulations with all core access corridors having a width that will ensure a high level of access for wheelchair users.
- Careful consideration of colour scheme, surfaces, signage and lighting requirements will be developed as in the detailed design progress.
- Corridor door sets will provide adequate effective clear width and appropriate opening force.

3.8 Factory Sanitary Facilities

- Male, Female and Accessible WC facilities will be located in the Operational office at the front of the main facility building refer to the architectural plans.
- Provision has been included for fully accessible shower and changing facilities for disabled people.

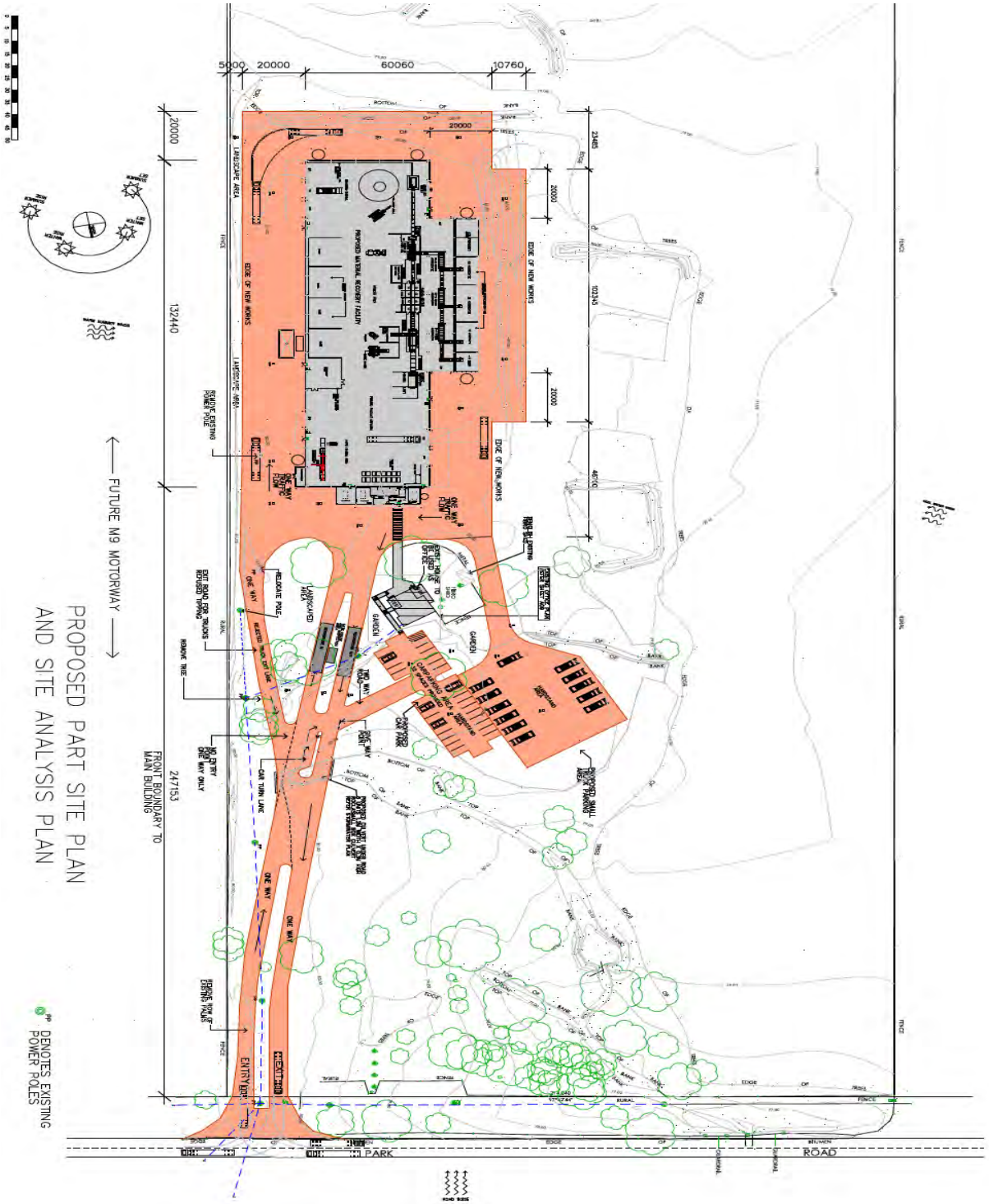
3.10 Main Office Facilities

The main office will also provide toilets and wash basins for disabled and will be designed in accordance with the Australian Standards for access and mobility.

3.11 Means of Escape

An Emergency Evacuation Plan will be developed and implemented this will also including specific provisions for disabled people.

4 Part Site Plan



5 Appendix A

- Safety Policy (Draft)
- Environmental Policy (Draft)

5.1 Safety Policy

Greenfields Resource Recovery Facility
Work Health & Safety Policy

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.....	.....	...../...../.....
Director	Signature	Date

5.2 Environmental Policy

Greenfields Resource Recovery Facility *(Gateway Developments P/L)*

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.....	.....	...../...../.....
Company Director	Signature	Date

ATTACHMENTS

EIS Attachment 1: NSW SEARs

Industry Assessments
Contact: John Booth
Phone: (02) 8275 1281
Email: john.booth@planning.nsw.gov.au

Mr Nicolas Israel
Environmental Risk Assessors Pty Ltd
PO Box 150
Seven Hills NSW 1730

EF18/7941
SEAR 1227

Dear Mr Israel

Resource Recovery Facility
344 Park Road, Wallacia, Penrith LGA (Lot 5 DP 655046)
Secretary's Environmental Assessment Requirements (SEAR) 1227

Thank you for your request for the Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the above development proposal. I have attached a copy of these requirements.

In support of your application, you indicated that your proposal is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979* and requires an approval under the *Protection of the Environment Operations Act 1997*. In preparing the SEARs, the Department has consulted with the Environment Protection Authority (EPA), Rural Fire Service (RFS), WaterNSW, the Office of Environment and Heritage (OEH) and the Roads and Maritime Service (RMS). Unfortunately, WaterNSW, OEH and the RMS were unable to respond in time. You must undertake direct consultation with them and address their requirements in the EIS. The Department has also consulted with.

If other integrated approvals are identified before the Development Application (DA) is lodged, you must undertake direct consultation with the relevant agencies, and address their requirements in the EIS.

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact the Commonwealth Department of the Environment and Energy on (02) 6274 1111.

Should you have any further enquiries, please contact John Booth, Planning Services, at the Department on the details above.

Yours sincerely

C. Ritchie 5/6/18.

Chris Ritchie
Director
Industry Assessments
as delegate of the Secretary

Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979.*

Designated Development

SEAR Number	1227
Proposal	Construction and operation of a resource recovery facility, to process up to 95,000 tonnes per year of building and demolition waste and VENM.
Location	344 Park Road, Wallacia (Lot 5 DP 655046), in the Penrith Local Government Area
Applicant	Environmental Risk Assessors Pty Ltd
Date of Issue	05/06/2018
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.
Key Issues	The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed: • **strategic context** – including: – a detailed justification for the proposal and suitability of the site for the development; – a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies; and – a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out. • **suitability of the site** – including: – a detailed justification that the site can accommodate the proposed processing capacity, having regard to the scope of the operations and its environmental impacts and relevant mitigation measures; and – floor plans depicting the proposed internal layout including the location of machinery and equipment. • **waste management** – including: – details of the type, quantity and classification of waste to be received at the site; – details of the resource outputs and any additional processes for residual waste; – details of waste handling including, transport, identification, receipt, stockpiling and quality control; – details of the machinery and waste processing to be used; and – the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*. • **hazards and risk** – including: – a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and *Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry*

	Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011); and – an assessment of the risk of bushfire, including addressing the requirements of *Planning for Bush Fire Protection 2006* (RFS). Any proposed Asset Protection Zones must not adversely affect environmental objectives (e.g. buffers). Provision is to be made for their appropriate management into the future. • **air quality** – including: – a description of all potential sources of air and odour emissions; – an air quality impact assessment in accordance with relevant Environment Protection Authority guidelines; and – a description and appraisal of air quality impact mitigation, management and monitoring measures. • **noise and vibration** – including: – a description of all potential noise and vibration sources during construction and operation, including road traffic noise; – a noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines; and – a description and appraisal of noise and vibration mitigation, management and monitoring measures. • **soil and water** – including: – a description of local soils, topography, drainage and landscapes; – details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*; – an assessment of potential impacts on floodplain and stormwater management and any impact to flooding in the catchment; – details of sediment and erosion controls; – a detailed site water balance; – an assessment of potential impacts on the quality and quantity of surface and groundwater resources; – details of the proposed stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts; – characterisation of the nature and extent of any contamination on the site and surrounding area; and – a description and appraisal of impact mitigation, management and monitoring measures. • **traffic and transport** – including: – details of road transport routes and access to the site; – details of car parking required on site; – road traffic predictions for the development during construction and operation; and – an assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development. • **fire and incident management** – an assessment of bushfire risk and asset protection zones (APZ) in accordance with the NSW Rural Fire Service guidelines; – identification of any aggregate quantities of combustible waste products to be stockpiled at any one time; – identification of foreseeable on-site and off-site fire events and other emergency incidents; and – technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including management of fire water, location of fire hydrants and water flow rates at the hydrant) management and containment measures. • **biodiversity** – including: – accurate predictions of any vegetation clearing on site or for any road

	upgrades; – an assessment of the proposal in accordance with the *Biodiversity Assessment Method* (BAM) including an assessment of any potential impacts on aquatic and riparian vegetation and groundwater dependent ecosystems; • **visual** – including an impact assessment at private receptors and public vantage points. • **heritage** – including Aboriginal and non-Aboriginal cultural heritage.
Environmental Planning Instruments and other policies	The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to: • *State Environmental Planning Policy (Infrastructure) 2007*; • *State Environmental Planning Policy No 33–Hazardous and Offensive Development*; • *State Environmental Planning Policy No 55–Remediation of Land*; • *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*; • *State Environmental Planning Policy No 20—Hawkesbury-Nepean River (No 2—1997)* • *Penrith Local Environmental Plan 2010*; and • relevant development control plans and section 94 plans.
Guidelines	During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at planning.nsw.gov.au under Development Proposals/Register of Development Assessment Guidelines. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development.
Consultation	During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment Protection Authority; • Office of Environment and Heritage; • Department of Primary Industries; • Roads and Maritime Services; • WaterNSW; • Rural Fire Service; • Penrith Council; and • the surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.
Further consultation after 2 years	If you do not lodge an application under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* within 2 years of the issue date of these SEARs, you must consult with the Secretary in relation to any further requirements for lodgement.

NSW RURAL FIRE SERVICE

The General Manager OR Secretary
Department of Planning & Environment
(Sydney Offices)
GPO Box 39
Sydney NSW 2001

Your reference: SEAR 1227
Our reference: D18/5462

18/05/2018

Attention: John Booth

Dear Sir/Madam,

Request for Secretary's Environmental Assessment Requirements- Waste Processing Facility at Lot 5 DP 655046- 344 Park Road, Wallacia, Penrith LGA

Reference is made to correspondence dated 04/05/2018 seeking input regarding the preparation of Secretary's environmental assessment requirements for the above State Significant Development in accordance with the *Environmental Planning and Assessment Act 1979.*

The New South Wales Rural Fire Service (NSW RFS) has reviewed the information provided and advises that a bush fire assessment report shall be prepared which identifies the extent to which the proposed development conforms with or deviates from the relevant provisions of *Planning for Bush Fire Protection 2006.*

The subject site is mapped bushfire prone and the development can be classified under 'Other developments' as per Section 4.3 of the *Planning for Bush Fire Protection-2006*. The bush fire assessment report shall include a classification of the vegetation on and surrounding the development (out to a distance of 140 metres from the boundaries of the property) and an assessment of the slope of the land on and surrounding the development (out to a distance of 100 metres).

If you have any queries regarding this advice, please contact Rohini Belapurkar, Development Assessment and Planning Officer, on 1300 NSW RFS.

Yours sincerely,

Nika Fomin
Manager, Planning and Environment Services (East)

Postal address
NSW Rural Fire Service
Planning and Environment Services
Locked Bag 17
GRANVILLE NSW 2141

T 1300 NSW RFS
F (02) 8741 5433
E records@rfs.nsw.gov.au
www.rfs.nsw.gov.au

Industry Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: John Booth

Notice Number	1564622
Date	21-May-2018

RE: Waste Processing, Recovery and Storage Facility - 334 Park Road, Wallacia - Australasean Group Pty Ltd

I refer to your request for the Environment Protection Authority's (**EPA**) requirements for the environmental impact statement (**EIS**) in regard to the above proposal received by the EPA on 4 May 2018.

The EPA understands that Australasean Group Pty Ltd (**the Proponent**) proposes to construct and operate a waste processing facility, receiving and processing up to 95,000 tonnes per year of building and demolition waste and virgin excavated natural material at 334 Park Rd, Wallacia (**the Premises**).

The EPA notes that the proposal relates to 95,000 tpa of waste being received and processed at the site. The EPA notes that this is close to the trigger for State Significant Development under the State Environmental Planning Policy (State & Regional Development) 2011. Should the Proponent be granted an environment protection licence for this proposal, the EPA will formalise the maximum quantity to be received per year as a condition of the licence. Failure to comply with a licence condition carries serious penalties. The EPA recommends that the Proponent undertake due diligence to ensure that the proposed activities are certain to remain under the SSD trigger, and apply through the SSD process if appropriate.

The EPA has considered the details of the proposal as provided by the Department of Planning and Environment and has identified the information it requires to issue its general terms of approval in Attachment A. In summary, the EPA's key information requirements for the proposal include an adequate assessment of the following:

1. The Facility must be enclosed – The EPA requires that all waste and materials are stored and processed inside an enclosed building. All waste handling activities, including receival, sorting, processing, sampling, quarantine, storage and loading must be conducted within an enclosed building. All surfaces inside the enclosed building must be sealed hardstand.

No waste, including finished products, may be stored outside. Any external haulage areas or roads must be sealed hardstand. Any unused external surfaces must be sealed hardstand or vegetated.

The EPA will not consider the storage of waste (including finished product) outside.

2. Waste Management – the environmental impact statement (EIS) must include a detailed assessment of the waste management processes to be undertaken at the Premises. This includes but is not limited to:

- details of the sources of waste to be received at the Premises;
- details of the types and quantities of each type of waste to be received at the Premises;
- details of the maximum volume of waste to be stored on the Premises at any one time;
- details of the maximum annual throughput of waste for be processed at the Premises;
- a description of waste processing procedures for each waste type;
- the PEA indicates that the proposal will trigger the scheduled activities of resource recovery and waste processing. The EPA is unable to issue a licence for both these activities simultaneously. Resource recovery applies to activities which dispose of less than 50% of waste after processing, while waste processing applies to activities that dispose of more than 50% of waste after processing;
- a description of how the proponent will meet the EPA's record keeping and reporting requirements, including weighing material in and out of the Premises (refer to the EPA's Waste Levy Guidelines for more information – available at http://www.epa.nsw.gov.au/your-environment/waste/waste-levy;
- a detailed site plan(s) identifying areas for:
    - haulage;
    - waste receival, processing, storage and loading (for each waste type)
    - quarantine;
    - infrastructure for environmental controls including dust, noise, water and wheelwash;
    - weighbridge;
    - site boundaries;
    - stormwater drainage areas; and
    - unused stabilised areas;
- details of the type and quantities of materials to be produced and their intended fate;
- details of any materials produced under a Resource Recovery Order, and the controls in place for meeting the conditions of that order; and
- a description of procedures for dealing with non-conforming waste (i.e. waste not permitted to be received at the Premises).

It is noted that the Proponent wishes to accept both VENM and building & demolition waste to the Premises. The Proponent is reminded that VENM certificates must be retained for all loads of VENM received at the site.

It is noted that the Proponent stated that less than 10% of the waste received at site will be building and demolition waste. The Proponent should be aware that the EPA will formalise this as a condition of an Environment Protection Licence, should it be issued for this proposal.

3. Waste types – the EPA requires detailed information on the waste types proposed to be received at the Premises. For each waste type the Proponent must detail the physical and chemical content of the waste, the types of pollution which may result from the storage and processing of that waste and mitigation measures for managing any such impacts. The list of waste types to be received at the Premises must be made clear.

Please note that the EPA will not consider including the following waste types on the licence:

- Excavated Natural Material or other wastes listed under a resource recovery exemption –resource recovery exemptions apply to the application of waste to land. It is not appropriate to list these on an environment protection licence.
- General Solid Waste (Non-putrescible) – this classification is too broad. The applicant must specify which types of General Solid Waste it proposes to receive at the Premises.

4. Water Management – the EPA expects that assessment of the impacts to water be included in the application. This must include as a minimum characterisation of any proposed discharges from the premises (both volume and quality), assessment of the potential impacts from these discharges and proposed mitigation measures to manage any impacts.

Please refer to Attachment A for detail of what is to be included in water impact assessments. Details of stormwater management during both construction and operation must be included in the EIS.

The EPA would expect that the building be constructed to exclude all stormwater and that internal surfaces be graded inwards to contain any contaminated water (being any water that has come into contact with waste). The EPA notes that even where all waste storage and processing is conducted within an enclosed building, waste may be tracked on to external surfaces leading to the generation of contaminated water. Any external areas where waste vehicles travel or wait for loading/unloading must drain to a stormwater quality treatment device sufficient to remove any contaminants, both solid and dissolved, prior to discharge offsite.

5. Wheelwash - Best practice waste management facilities contain a wheelwash to reduce risk of contaminants being tracked out onto public roads. The EPA notes that the Report does not contain reference to a wheelwash for the site. The Proponent should set out in the EIS whether a wheelwash will be installed and if not, justification as to why a wheelwash will not be installed. If the Proponent does not intend to put in a wheelwash, the EPA requires details on how contaminates are to be kept from leaving the Premises.

6. Water flow diagram & water balance - The EIS should include details of how surface water flows across the site and locations of any drains or storage tanks for stormwater or waste contaminated water. This will include how much water is required for dust suppression and how adequately the site is set up to hold this quantity of water.

Please provide further details about the system, including dust suppression methods, the source of the water and the receptacles for the resulting water from the system. Provide any details of trade waste agreements.

5. Air Quality – the EIS should include an air quality assessment that identifies all potential air emission from the Premises, including but not limited to coarse particulates, PM10, PM2.5 and odour. The Proponent must assess the impact of these discharges and demonstrate effective control of all identified air emissions from the Premises. Please refer to Attachment A for detail of what is to be included in the air quality impact assessment.

6. Noise - the proponent must assess noise impacts and demonstrate effective controls to manage noise impacts, including from traffic, at all receptors. Please refer to Attachment A for detail of what is to be included in the noise impact assessment.

7. Fit and proper person – in accordance with section 45 of the POEO Act the EPA must take into consideration whether the person concerned is a fit and proper person (as defined in section 83 of the Act). The EPA requires the applicant to demonstrate it is fit and proper to hold a licence.

8. Occupier of the Premises - the EPA can only issue an environment protection licence to a person who is the lawful occupier of a Premises. The EPA understands that the Proponent is not the same entity that owns the land. The EPA requires evidence that the Proponent is the lawful occupier of the Premises, such as a lease agreement or other permission of the land owner.

9. Other – the EPA requires:

- details of any workshop or garaging of waste vehicles. All vehicle repair or washing must be conducted in an area that excludes rainwater, is sufficiently bunded to contain all fluids within and is sealed to be impervious to those fluids; and
- details of any fuel storage areas on the Premises. The EIS should demonstrate that these areas comply with the Australian Standard AS 1940:2017 - The storage and handling of flammable combustible liquids. The Proponent should also consider constructing or installing any necessary infrastructure to the diesel tanks and surrounds to prevent spill, leaks, impact and penetration. This may include barriers to protect against impact and/or penetration from heavy vehicles, leak detection, automatic cut-off mechanisms to filling points and hoses used for the transfer of fuel and positioned within a bunded, impervious hardstand.

In carrying out the assessment, the proponent should refer to the relevant guidelines as listed in Attachment B and any relevant industry codes of practice and best practice management guidelines.

Please note that this response does not cover biodiversity or Aboriginal cultural heritage issues, which are the responsibility of the Office of Environment and Heritage.

The Proponent should be made aware that any commitments made in the EA may be formalised as approval conditions and may also be placed as formal licence conditions.

The Proponent should be made aware that, consistent with provisions under Part 9.4 of the *Protection of the Environment Operations Act 1997* ("the Act") the EPA may require the provision of a financial assurance and/or assurances. The amount and form of the assurance(s) would be determined by the EPA and required as a condition of an Environment Protection Licence ("EPL").

In addition, as a requirement of an EPL, the EPA will require the Proponent to prepare, test and implement a Pollution Incident Response Management Plan and/or Plans in accordance with Section 153A of the Act.

Yours sincerely

Celeste Forestal

Unit Head

Waste & Resource Recovery

(by Delegation)

ATTACHMENT A: EIS REQUIREMENTS

Waste processing facility - 334 Park St Wallacia

How to use these requirements

The EPA requirements have been structured in accordance with the DIPNR EIS Guidelines, as follows. It is suggested that the EIS follow the same structure:

A. Executive summary

B. The proposal

C. The location

D. Identification and prioritisation of issues

E. The environmental issues

F. List of approvals and licences

G. Compilation of mitigation measures

H. Justification for the proposal

A Executive summary

The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.

B The proposal

1. Objectives of the proposal

- The objectives of the proposal should be clearly stated and refer to:
  a) the size and type of the operation, the nature of the processes and the products, by-products and wastes produced
  b) a life cycle approach to the production, use or disposal of products
  c) the anticipated level of performance in meeting required environmental standards and cleaner production principles
  d) the staging and timing of the proposal and any plans for future expansion
  e) the proposal's relationship to any other industry or facility.

2. Description of the proposal

General

- Outline the production process including:
  a) the environmental "mass balance" for the process – quantify in-flow and out-flow of materials, any points of discharge to the environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill etc)
  b) any life-cycle strategies for the products.
- Outline cleaner production actions, including:
  a) measures to minimise waste (typically through addressing source reduction)
  b) proposals for use or recycling of by-products
  c) proposed disposal methods for solid and liquid waste
  d) air management systems including all potential sources of air emissions, proposals to re-use or treat emissions, emission levels relative to relevant standards in regulations, discharge points
  e) water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged, discharge points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge.
  f) soil contamination treatment and prevention systems.
- Outline construction works including:
  a) actions to address any existing soil contamination
  b) any earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site)
  c) construction timetable and staging; hours of construction; proposed construction methods
  d) environment protection measures, including noise mitigation measures, dust control measures and erosion and sediment control measures.

- Include a site diagram showing the site layout and location of environmental controls.

Air

- Identify all sources or potential sources of air emissions from the development.
  Note: emissions can be classed as either:
    - *point (e.g. emissions from stack or vent) or*
    - *fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).*
- Provide details of the project that are essential for predicting and assessing air impacts including:
  a) the quantities and physio-chemical parameters (e.g. concentration, moisture content, bulk density, particle sizes etc) of materials to be used, transported, produced or stored
  b) an outline of procedures for handling, transport, production and storage
  c) the management of solid, liquid and gaseous waste streams with potential to generate emissions to air.

Noise and vibration

- Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.
- Specify the times of operation for all phases of the development and for all noise producing activities.
- For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.

Water

- Provide details of the project that are essential for predicting and assessing impacts to waters including:
  a) the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http://www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from *the Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC 2000)
  b) the management of discharges with potential for water impacts
  c) drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal.
- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts e.g. effluent ponds) and showing potential areas of modification of contours, drainage etc.

- Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

Waste and chemicals

Provide details of the quantity and type of both liquid waste and non-liquid waste generated, handled, processed or disposed of at the premises. Waste must be classified according to the EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*

- Provide details of liquid waste and non-liquid waste management at the facility, including:
  a) the transportation, assessment and handling of waste arriving at or generated at the site
  b) any stockpiling of wastes or recovered materials at the site
  c) any waste processing related to the facility, including reuse, recycling, reprocessing (including composting) or treatment both on- and off-site
  d) the method for disposing of all wastes or recovered materials at the facility
  e) the emissions arising from the handling, storage, processing and reprocessing of waste at the facility
  f) the proposed controls for managing the environmental impacts of these activities.
- Provide details of spoil disposal with particular attention to:
  a) the quantity of spoil material likely to be generated
  b) proposed strategies for the handling, stockpiling, reuse/recycling and disposal of spoil
  c) the need to maximise reuse of spoil material in the construction industry
  d) identification of the history of spoil material and whether there is any likelihood of contaminated material, and if so, measures for the management of any contaminated material
  e) designation of transportation routes for transport of spoil.
- Provide details of procedures for the assessment, handling, storage, transport and disposal of all hazardous and dangerous materials used, stored, processed or disposed of at the site, in addition to the requirements for liquid and non-liquid wastes.
- Provide details of the type and quantity of any chemical substances to be used or stored and describe arrangements for their safe use and storage.

- Reference should be made to the guidelines: EPA's *Waste Classification Guidelines 2014 (as amended from time to time)*

ESD

- Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for achieving ESD, including:
  a) an assessment of a range of options available for use of the resource, including the benefits of each option to future generations

  proper valuation and pricing of environmental resources

  b) identification of who will bear the environmental costs of the proposal.

3. Rehabilitation

- Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).

4. Consideration of alternatives and justification for the proposal

- Consider the environmental consequences of adopting alternatives, including alternative:
  a) sites and site layouts
  b) access modes and routes
  c) materials handling and production processes
  d) waste and water management
  e) impact mitigation measures
  f) energy sources
- Selection of the preferred option should be justified in terms of:
  a) ability to satisfy the objectives of the proposal
  b) relative environmental and other costs of each alternative
  c) acceptability of environmental impacts and contribution to identified environmental objectives
  d) acceptability of any environmental risks or uncertainties
  e) reliability of proposed environmental impact mitigation measures
  f) efficient use (including maximising re-use) of land, raw materials, energy and other resources.

C The location

1. General

- Provide an overview of the affected environment to place the proposal in its local and regional environmental context including:
  a) meteorological data (e.g. rainfall, temperature and evaporation, wind speed and direction)
  b) topography (landform element, slope type, gradient and length)
  c) surrounding land uses (potential synergies and conflicts)
  d) geomorphology (rates of landform change and current erosion and deposition processes)
  e) soil types and properties (including erodibility; engineering and structural properties; dispersibility; permeability; presence of acid sulfate soils and potential acid sulfate soils)
  f) ecological information (water system habitat, vegetation, fauna)
  g) availability of services and the accessibility of the site for passenger and freight transport.

2. Air

- Describe the topography and surrounding land uses. Provide details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.
- Describe surrounding buildings that may effect plume dispersion.
- Provide and analyse site representative data on following meteorological parameters:
  a) temperature and humidity
  b) rainfall, evaporation and cloud cover
  c) wind speed and direction
  d) atmospheric stability class
  e) mixing height (the height that emissions will be ultimately mixed in the atmosphere)
  f) katabatic air drainage
  g) air re-circulation.

3. Noise and vibration

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals. Typically the location of any noise sensitive locations in relation to the site should be included on a map of the locality.
- Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.

4. Water

- Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: http://www.environment.nsw.gov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help with the description of the local and regional area.

5. Soil Contamination Issues

- Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination, for example if the site was previously a landfill site or if irrigation of effluent has occurred.

- The EPA has had communications in the past with the previous owner of the land and more recently with State Road Constructions in regards to the illegal storage of asbestos waste and wood pallets at the site. The EPA will require proof that all this waste has been lawfully disposed of before the submission of the EIS. This includes all receipts proving that the waste has been removed lawfully.

D Identification and prioritisation of issues / scoping of impact assessment

- Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:
  a) relevant NSW government guidelines
  b) industry guidelines
  c) EISs for similar projects
  d) relevant research and reference material
  e) relevant preliminary studies or reports for the proposal
  f) consultation with stakeholders.
- Provide a summary of the outcomes of the process including:
  a) all issues identified including local, regional and global impacts (e.g. increased/ decreased greenhouse emissions)
  b) key issues which will require a full analysis (including comprehensive baseline assessment)
  c) issues not needing full analysis though they may be addressed in the mitigation strategy
  d) justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).

E The environmental issues

1. General

- The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution.
- Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements.

Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.

Describe baseline conditions

- Provide a description of existing environmental conditions for any potential impacts.

Assess impacts

- For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers.
- Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts.
- The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.
- The assessment needs to consider impacts at all phases of the project cycle including: exploration (if relevant or significant), construction, routine operation, start-up operations, upset operations and decommissioning if relevant.
- The level of assessment should be commensurate with the risk to the environment.

Describe management and mitigation measures

- Describe any mitigation measures and management options proposed to prevent, control, abate or mitigate identified environmental impacts associated with the proposal and to reduce risks to human health and prevent the degradation of the environment. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.
- Proponents are expected to implement a ‘reasonable level of performance’ to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identify good practice for this type of activity or development. A ‘reasonable level of performance’ involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically

viable operations. Technology-based criteria evolve gradually over time as technologies and practices change.

- Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.
- Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:

  a) operational procedures to manage environmental impacts

  b) monitoring procedures

  c) training programs

  d) community consultation

  e) complaint mechanisms including site contacts

  f) strategies to use monitoring information to improve performance

  g) strategies to achieve acceptable environmental impacts and to respond in event of exceedences.

4. Air

Describe baseline conditions

- Provide a description of existing air quality and meteorology, using existing information and site representative ambient monitoring data.

Assess impacts

- Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source and discharge point.
- Estimate the resulting ground level concentrations of all pollutants. Where necessary (e.g. potentially significant impacts and complex terrain effects), use an appropriate dispersion model to estimate ambient pollutant concentrations. Discuss choice of model and parameters with the EPA.
- Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.
- Describe the contribution that the development will make to regional and global pollution, particularly in sensitive locations.
- For potentially odorous emissions provide the emission rates in terms of odour units (determined by techniques compatible with EPA procedures). Use sampling and analysis techniques for individual or complex odours and for point or diffuse sources, as appropriate.

  Note: With dust and odour, it may be possible to use data from existing similar activities to generate emission rates.

- Reference should be made to *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2016)*; Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC, 2007)*; Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2006)*;*

Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC, 2006) .

Describe management and mitigation measures

- Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.

5. Noise and vibration

Describe baseline conditions

- Determine the existing background (LA90) and ambient (LAeq) noise levels in accordance with the *NSW Industrial Noise Policy*.
- Determine the existing road traffic noise levels in accordance with the *NSW Environmental Criteria for Road Traffic Noise*, where road traffic noise impacts may occur.
- The noise impact assessment report should provide details of all monitoring of existing ambient noise levels including:
  a) details of equipment used for the measurements
  b) a brief description of where the equipment was positioned
  c) a statement justifying the choice of monitoring site, including the procedure used to choose the site, having regards to the definition of 'noise sensitive locations(s)' and 'most affected locations(s)' described in Section 3.1.2 of the *NSW Industrial Noise Policy*
  d) details of the exact location of the monitoring site and a description of land uses in surrounding areas
  e) a description of the dominant and background noise sources at the site
  f) day, evening and night assessment background levels for each day of the monitoring period
  g) the final Rating Background Level (RBL) value
  h) graphs of the measured noise levels for each day should be provided
  i) a record of periods of affected data (due to adverse weather and extraneous noise), methods used to exclude invalid data and a statement indicating the need for any re-monitoring under Step 1 in Section B1.3 of the *NSW Industrial Noise Policy*
  j) determination of LAeq noise levels from existing industry.

Assess impacts

- Determine the project specific noise levels for the site. For each identified potentially affected receiver, this should include:
  a) determination of the intrusive criterion for each identified potentially affected receiver

b) selection and justification of the appropriate amenity category for each identified potentially affected receiver

c) determination of the amenity criterion for each receiver

d) determination of the appropriate sleep disturbance limit.

- Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible affects on sleep. Where LA1(1min) noise levels from the site are less than 15 dB above the background LA90 noise level, sleep disturbance impacts are unlikely. Where this is not the case, further analysis is required. Additional guidance is provided in Appendix B of the *NSW Environmental Criteria for Road Traffic Noise*.
- Determine expected noise level and noise character (e.g. tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during:

  a) site establishment

  b) construction

  c) operational phases

  d) transport including traffic noise generated by the proposal

  e) other services.

  Note: The noise impact assessment report should include noise source data for each source in 1/1 or 1/3 octave band frequencies including methods for references used to determine noise source levels. Noise source levels and characteristics can be sourced from direct measurement of similar activities or from literature (if full references are provided).

- Determine the noise levels likely to be received at the most sensitive locations (these may vary for different activities at each phase of the development). Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is not the most adverse condition.
- The noise impact assessment report should include:

  a) a plan showing the assumed location of each noise source for each prediction scenario

  b) a list of the number and type of noise sources used in each prediction scenario to simulate all potential significant operating conditions on the site

  c) any assumptions made in the predictions in terms of source heights, directivity effects, shielding from topography, buildings or barriers, etc

  d) methods used to predict noise impacts including identification of any noise models used. Where modelling approaches other than the use of the ENM or SoundPlan computer models are adopted, the approach should be appropriately justified and validated

  e) an assessment of appropriate weather conditions for the noise predictions including reference to any weather data used to justify the assumed conditions

  f) the predicted noise impacts from each noise source as well as the combined noise level for each prediction scenario under any identified significant adverse weather conditions as well as calm conditions where appropriate

  g) for developments where a significant level of noise impact is likely to occur, noise contours for the key prediction scenarios should be derived

  h) an assessment of the need to include modification factors as detailed in Section 4 of the *NSW Industrial Noise Policy*.

- Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures.
- The noise impact assessment report should include details of any mitigation proposed including the attenuation that will be achieved and the revised noise impact predictions following mitigation.
- Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying:
  a) locations where the noise level exceeds the criteria and extent of exceedence
  b) numbers of people (or areas) affected
  c) times when criteria will be exceeded
  d) likely impact on activities (speech, sleep, relaxation, listening, etc)
  e) change on ambient conditions
  f) the result of any community consultation or negotiated agreement.
- For the assessment of existing and future traffic noise, details of data for the road should be included such as assumed traffic volume; percentage heavy vehicles by time of day; and details of the calculation process. These details should be consistent with any traffic study carried out in the EIS.
- Where blasting is intended an assessment in accordance with the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC, 1990) should be undertaken. The following details of the blast design should be included in the noise assessment:
  a) bench height, burden spacing, spacing burden ratio
  b) blast hole diameter, inclination and spacing
  c) type of explosive, maximum instantaneous charge, initiation, blast block size, blast frequency.

Describe management and mitigation measures

- Determine the most appropriate noise mitigation measures and expected noise reduction including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.
- For traffic noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects from barriers. Appropriate ameliorative measures may include:
  a) use of alternative transportation modes, alternative routes, or other methods of avoiding the new road usage
  b) control of traffic (eg: limiting times of access or speed limitations)
  c) resurfacing of the road using a quiet surface
  d) use of (additional) noise barriers or bunds
  e) treatment of the façade to reduce internal noise levels buildings where the night-time criteria is a major concern
  f) more stringent limits for noise emission from vehicles (i.e. using specially designed ‘quite’ trucks and/or trucks to use air bag suspension

g) driver education

h) appropriate truck routes

i) limit usage of exhaust breaks

j) use of premium muffles on trucks

k) reducing speed limits for trucks

l) ongoing community liaison and monitoring of complaints

m) phasing in the increased road use.

4. Water

Describe baseline conditions

- Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

  Note: Methods of sampling and analysis need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004) *or be approved and analyses undertaken by accredited laboratories).*

- Provide site drainage details and surface runoff yield.
- State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient waters. These environmental values are published on the website: http://www.environment.nsw.gov.au/ieo/index.htm. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice.
- State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 *Guidelines for Fresh and Marine Water Quality* (http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECC Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANCECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater.
- State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy Rivers Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government/nswstrategy.htm).
- Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained.

- Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?). Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality / river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving waters could include:
  a) lake or estuary flushing characteristics
  b) specific human uses (e.g. exact location of drinking water offtake)
  c) sensitive ecosystems or species conservation values
  d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc
  e) an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment
  f) historic river flow data where available for the catchment.

Assess impacts

- No proposal should breach clause 120 of the *Protection of the Environment Operations Act* 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations).
- Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented.
- Include a rationale, along with relevant calculations, supporting the prediction of the discharges.
- Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater).
- Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and magnitude of stream flow).
- Identify any potential impacts on quality or quantity of groundwater describing their source.
- Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.
- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.
- Containment of spills and leaks shall be in accordance with EPA's guidelines section 'Bunding and Spill Management' at http://www.epa.nsw.gov.au/mao/bundingspill.htm and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge.
- The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:
  a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and

b) will the proposal contribute towards the achievement of Water Quality and River Flow Objectives over time, where they are not currently achieved in the ambient waters.

- Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment.

  Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.

- Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines.
- Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact.
- Reference should be made to *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Guidelines for Fresh and Marine Water Quality* ANZECC 2000).

Describe management and mitigation measures

- Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.
- Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies.
- Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements.
- Outline pollution control measures relating to storage of materials, possibility of accidental spills (e.g. preparation of contingency plans), appropriate disposal methods, and generation of leachate.
- Describe hydrological impact mitigation measures including:

  a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition)

  b) minimising runoff

  c) minimising reductions or modifications to flow regimes

  d) avoiding modifications to groundwater.

- Describe groundwater impact mitigation measures including:

  a) site selection

  b) retention of native vegetation and revegetation

  c) artificial recharge

d) providing surface storages with impervious linings

e) monitoring program.

- Describe geomorphological impact mitigation measures including:
  a) site selection
  b) erosion and sediment controls
  c) minimising instream works
  d) treating existing accelerated erosion and deposition
  e) monitoring program.
- Any proposed monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC 2004).

5. Soils and contamination

Describe baseline conditions

- Provide any details (in addition to those provided in the location description - Section C) that are needed to describe the existing situation in terms of soil types and properties and soil contamination.

Assess impacts

- Identify any likely impacts resulting from the construction or operation of the proposal, including the likelihood of:
  a) disturbing any existing contaminated soil
  b) contamination of soil by operation of the activity
  c) subsidence or instability
  d) soil erosion
  e) disturbing acid sulfate or potential acid sulfate soils.

Describe management and mitigation measures

- Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:
  a) erosion and sediment control measures
  b) proposals for site remediation – see *Managing Land Contamination, Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)
  c) proposals for the management of these soils – see *Acid Sulfate Soil Manual* (Acid Sulfate Soil Advisory Committee 1998) and *Acid Sulfate Soils Assessment Guidelines* (Acid Sulfate Soil Advisory Committee 1998).

6. Waste and chemicals

Describe baseline conditions

- Describe any existing waste or chemicals operations related to the proposal.

Assess impacts

- Assess the adequacy of proposed measures to minimise natural resource consumption and minimise impacts from the handling, transporting, storage, processing and reprocessing of waste and/or chemicals.
- Reference should be made to: the EPA's *Waste Classification Guidelines 2014 (as in force from time to time)*
- If the proposal is an energy from waste facility it must:
    - demonstrate that the proposed operation will comply with the NSW EPA's Energy from Waste Policy Statement;
    - describe of the classes and quantities of waste that would be thermally treated at the facility;
    - demonstrate that waste used as a feedstock in the waste to energy plant would be the residual from a resource recovery process that maximises the recovery of material;
    - detail procedures that would be implemented to control the inputs to the waste to energy plant, including contingency measures that would be implemented if inappropriate materials are identified;
    - detail the location and size of stockpiles of unprocessed and processed recycled waste at the site;
    - demonstrate any waste material (e.g. biochar, ash) produced from the waste to energy facility for land application is fit-for-purpose and poses minimal risk of harm to the environment in order to meet the requirements for consideration of a resource recovery order and /or exemption by the EPA;
    - detail procedures for the management of other solid, liquid and gaseous waste streams;
    - describe how waste would be treated, stored, used, disposed and handled on site, and transported to and from the site, and the potential impacts associated with these issues, including current and future offsite waste disposal methods; and
    - identify the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*.

Describe management and mitigation measures

- Outline measures to minimise the consumption of natural resources.
- Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.
- Outline measures to support any approved regional or industry waste plans.

7. Cumulative impacts

- Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.
- Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region.
- Identify infrastructure requirements flowing from the proposal (e.g. water and sewerage services, transport infrastructure upgrades).
- Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (e.g. travel demand management strategies).

F. List of approvals and licences

- Identify all approvals and licences required under environment protection legislation including details of all scheduled activities, types of ancillary activities and types of discharges (to air, land, water).

G. Compilation of mitigation measures

- Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under EPA licences or approvals (e.g. outline of an environmental management plan).
- The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.

H. Justification for the Proposal

- Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts.

ATTACHMENT B: GUIDANCE MATERIAL

Title	Web address
Relevant Legislation	
Contaminated Land Management Act 1997	http://www.legislation.nsw.gov.au/#/view/act/1997/140
Environmentally Hazardous Chemicals Act 1985	http://www.legislation.nsw.gov.au/#/view/act/1985/14
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/#/view/act/1979/203
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/#/view/act/1997/156
Water Management Act 2000	http://www.legislation.nsw.gov.au/#/view/act/2000/92
Licensing	
Guide to Licensing	www.epa.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
Air Quality	
Approved methods for modelling and assessment of air pollutants in NSW (2016)	http://www.epa.nsw.gov.au/air/appmethods.htm
POEO (Clean Air) Regulation 2010	http://www.legislation.nsw.gov.au/#/view/regulation/2010/428
Noise and Vibration	
Interim Construction Noise Guideline (DECC, 2009)	http://www.epa.nsw.gov.au/noise/constructnoise.htm
Assessing Vibration: a technical guideline (DEC, 2006)	http://www.epa.nsw.gov.au/noise/vibrationguide.htm
Industrial Noise Policy Application Notes	http://www.epa.nsw.gov.au/noise/applicnotesindustnoise.htm
Environmental Criteria for Road Traffic Noise (EPA, 1999)	http://www.epa.nsw.gov.au/resources/noise/roadnoise.pdf
Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (DECC, 2007)	http://www.epa.nsw.gov.au/noise/railinfranoise.htm
Environmental assessment requirements for rail traffic-generating developments	http://www.epa.nsw.gov.au/noise/railnoise.htm

Human Health Risk Assessment	
Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards (enHealth, 2012)	http://www.eh.org.au/documents/item/916
Waste, Chemicals and Hazardous Materials and Radiation	
Waste	
Environmental Guidelines: Solid Waste Landfills (EPA, 2016)	http://www.epa.nsw.gov.au/waste/landfill-sites.htm
Draft Environmental Guidelines - Industrial Waste Landfilling (April 1998)	http://www.epa.nsw.gov.au/resources/waste/envguidlns/industrialfill.pdf
EPA's Waste Classification Guidelines 2014	http://www.epa.nsw.gov.au/wasteregulation/classify-guidelines.htm
Resource recovery orders and exemptions	http://www.epa.nsw.gov.au/wasteregulation/orders-exemptions.htm
European Union's Waste Incineration Directive 2000	http://ec.europa.eu/environment/archives/air/stationary/wid/legislation.htm
EPA's Energy from Waste Policy Statement	http://www.epa.nsw.gov.au/wastestrategy/energy-from-waste.htm
NSW Waste Avoidance and Resource Recovery Strategy 2014-2021	http://www.epa.nsw.gov.au/wastestrategy/warr.htm
Chemicals subject to Chemical Control Orders	
Chemical Control Orders (regulated through the EHC Act)	http://www.epa.nsw.gov.au/pesticides/CCOs.htm
National Protocol - Approval/Licensing of Trials of Technologies for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries
National Protocol for Approval/Licensing of Commercial Scale Facilities for the Treatment/Disposal of Schedule X Wastes - July 1994	Available in libraries
Water and Soils	
Acid sulphate soils	
Coastal acid sulfate soils guidance material	http://www.environment.nsw.gov.au/acidsulfatesoil/ and http://www.epa.nsw.gov.au/mao/acidsulfatesoils.htm
Acid Sulfate Soils Planning Maps	http://www.environment.nsw.gov.au/acidsulfatesoil/riskmaps.htm
Contaminated Sites Assessment and Remediation	

Managing land contamination: Planning Guidelines – SEPP 55 Remediation of Land	http://www.epa.nsw.gov.au/clm/planning.htm
Guidelines for Consultants Reporting on Contaminated Sites (EPA, 2000)	http://www.epa.nsw.gov.au/resources/clm/20110650consultantsglines.pdf
Guidelines for the NSW Site Auditor Scheme - 2nd edition (DEC, 2006)	http://www.epa.nsw.gov.au/resources/clm/auditorglines06121.pdf
Sampling Design Guidelines (EPA, 1995)	http://www.epa.nsw.gov.au/resources/clm/95059sampgdlne.pdf
National Environment Protection (Assessment of Site Contamination) Measure 1999 (or update)	http://www.scew.gov.au/nepms/assessment-site-contamination
Soils – general	
Managing land and soil	http://www.environment.nsw.gov.au/soils/landandsoil.htm
Managing urban stormwater for the protection of soils	http://www.environment.nsw.gov.au/stormwater/publications.htm
Landslide risk management guidelines	http://australiangeomechanics.org/admin/wp-content/uploads/2010/11/LRM2000-Concepts.pdf
Site Investigations for Urban Salinity (DLWC, 2002)	http://www.environment.nsw.gov.au/resources/salinity/booklet3siteinvestigationsforurbansalinity.pdf
Local Government Salinity Initiative Booklets	http://www.environment.nsw.gov.au/salinity/solutions/urban.htm
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	Contact the EPA on 131555
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

REQUEST FOR INPUT INTO SECRETARY'S ENVIRONMENTAL ASSESSSMENT REQUIREMENTS

Development Proposal:	Resource Recovery Facility		
To:	Sydney West Region	**File:**	SEAR 1227
From:	Industry Assessment	**Date:**	04/05/2018
Office of Sustainable Development Contact Officer: John Booth		**Name:**	John Booth
		Phone No:	8275 1281

Secretary's Environmental Assessment Requirements or relevant information has been requested for the preparation of the following (tick applicable):

X	Environmental Impact Statement		Statement of Environmental Effects		Review of Environmental Factors

Date Information Required By: **18/05/2018**

[Note: Only fill out responses relevant to your section]

1. LEGISLATIVE FRAMEWORK

Please provide advice on whether the proposed development requires approval/concurrence under one or more of the following:

X	E P & A Act Part 4 Consent		Native Vegetation Conservation Act
	E P & A Act Part 5 Approval		Heritage Act
	POEO Act		EPBC Act (Cwth)
	Water Management Act		Roads Act
	Coastal Protection Act		Mine Subsidence Act
	Hunter Water (Special Areas) Regs		Rural Fires Act
	NPWS Act		

2. PLANNING INSTRUMENTS, POLICIES & STRATEGIES

2.1. List applicable State, Regional & Local EPIs, DCPs, Policies, or Strategies (including drafts), Water Sharing Plans, Regional Vegetation Management Plans that apply and any particularly relevant provisions

SEPP 33 – Hazardous and Offensive Development

SEPP 55 – Remediation of Land

SEPP (Infrastructure) 2007

SEPP (Vegetation in Non-Rural Areas) 2017

SEPP 20 - Hawkesbury Nepean River (No 2 – 1997)

2.2. Is the proposal permissible?

X	Yes		No

Provide details on the relevant zoning provisions or permissibility. Also, where a project is not clearly in one category, please provide details:

Zoned RU1 – Primary Production under the Penrith LEP 2010

The use is permitted under the Infrastructure SEPP under Clause 121 identified as a "waste or resource management facility" where located in a prescribed zone which includes RU1 – Primary Production.

The proposal constitutes designated development as it is considered to be captured in Clauses 32(1)(b)(iii) and potentially 32(1)(d) under Schedule 3, Part 1 of the Environmental Planning and Assessment Regulation 2000, as the proposal fits the description of a 'waste management facility'

Note: a zoning map showing the site should be attached

2.3. List any relevant concurrence / consultation requirements? (If yes, please identify the instrument and provisions):

Environmental Protection License under the Protection of the Environment Operation Act 1997 (POEO) & The Protection of the Environment Operations (General) Regulation 2009 (POEO Regulation 2009)

2.4. List any relevant Planning Strategies / Studies or relevant current work items:

A Metropolis of Three Cities - The Greater Sydney Region Plan

Western City District Plan

3. NATURAL RESOURCE STRATEGIES & PLANS

3.1. List applicable NSW State Natural Resource Management Policies, Strategies, & Plans (eg Catchment BluePrints, Estuary Management Plans, Coastal Management Plans & Flood Prone Risk Management Plans), NSW Coastal Policy & Flood Prone Land Policy that may apply to the proposal or any relevant provisions:

Managing contaminated land – Planning Guidelines – SEPP 55 Remediation of Land

Hazardous and Offensive Development Application Guidelines - Applying SEPP 33 – January 2011

4. KEY ISSUES

4.1. What are likely to be the key issues? Prioritise – high, important, other, and list any specific information including modelling, maps, plans and data collection, that should be considered to address the issue. Information may be attached to this form.

Note: The Office of Sustainable Development has prepared a number of EIS Guidelines for certain types of proposals, activities and issues. A list of the current EIS Guidelines is provided at the end of this Form. If this Form relates to a type of proposal, activity or issue that has an EIS Guideline, it is not necessary for your requirements to duplicate the

information covered in the Guideline. However you may still provide a list of the key issues you consider as being important for the proposal or activity to address.

Air quality, traffic and noise

Stormwater and Groundwater

Visual amenity and aesthetics – Scenic and landscape values under the Penrith LEP 2010

Flora and fauna

4.2. In your opinion, is the proposal likely to be of local, regional or State interest? Please provide details.

State – the site is within a SEPP

4.3. For Part 5, where DIPNR is a determining authority, has it considered the need for an EIS

[X] Yes [ ] No

If yes, please detail:

N/a

4.4. Does the site have a history that is of relevance to this proposal?

[ ] Yes [ ] No

If yes, please detail:

unknown

5. CONSULTATION

5.1. Please list any agencies, councils, community group, or other interested parties with whom the proponent should consult.

Consultation with OEH, EPA, Sydney Water, RMS, DPI – Water and relevant Electricity suppliers. Penrith Council,

6. CONTACT

6.1. Please provide the name and contact details of a nominated officer for ongoing liaison with your office.

Name	Ryan Klingberg	Contact No.	9860 1561
Position	Senior Planner	Date	09/05/2018

EIS GUIDELINES

Section A: Chemical, Petroleum, Manufacturing and Materials Processing
- Chemical facilities
- Bitumen works
- Concrete works

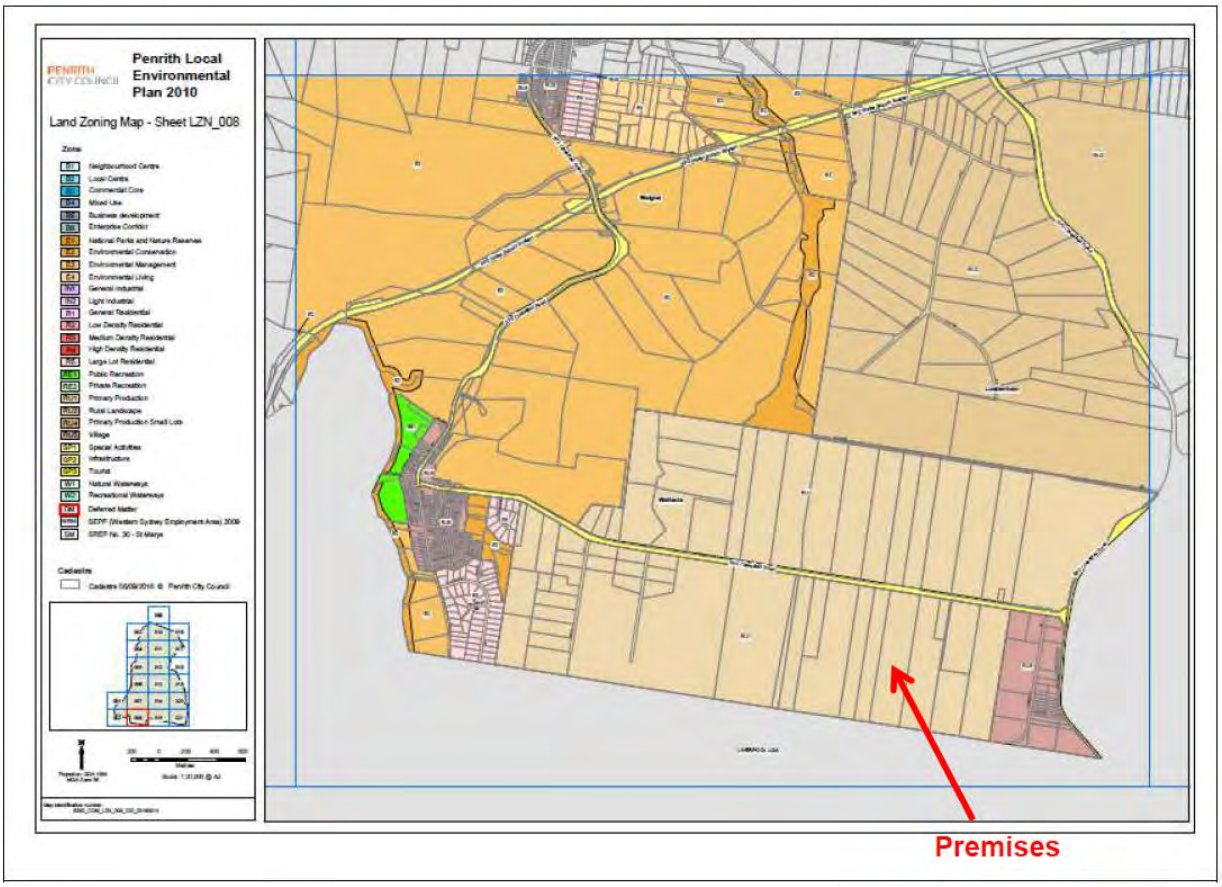
Section B: Extractive Industries, Mining and Mineral Processing
- Extractive industries – Quarries
- Extractive industries – Dredging and other extraction in riparian and coastal areas
- Coal Mines and Associated Infrastructure

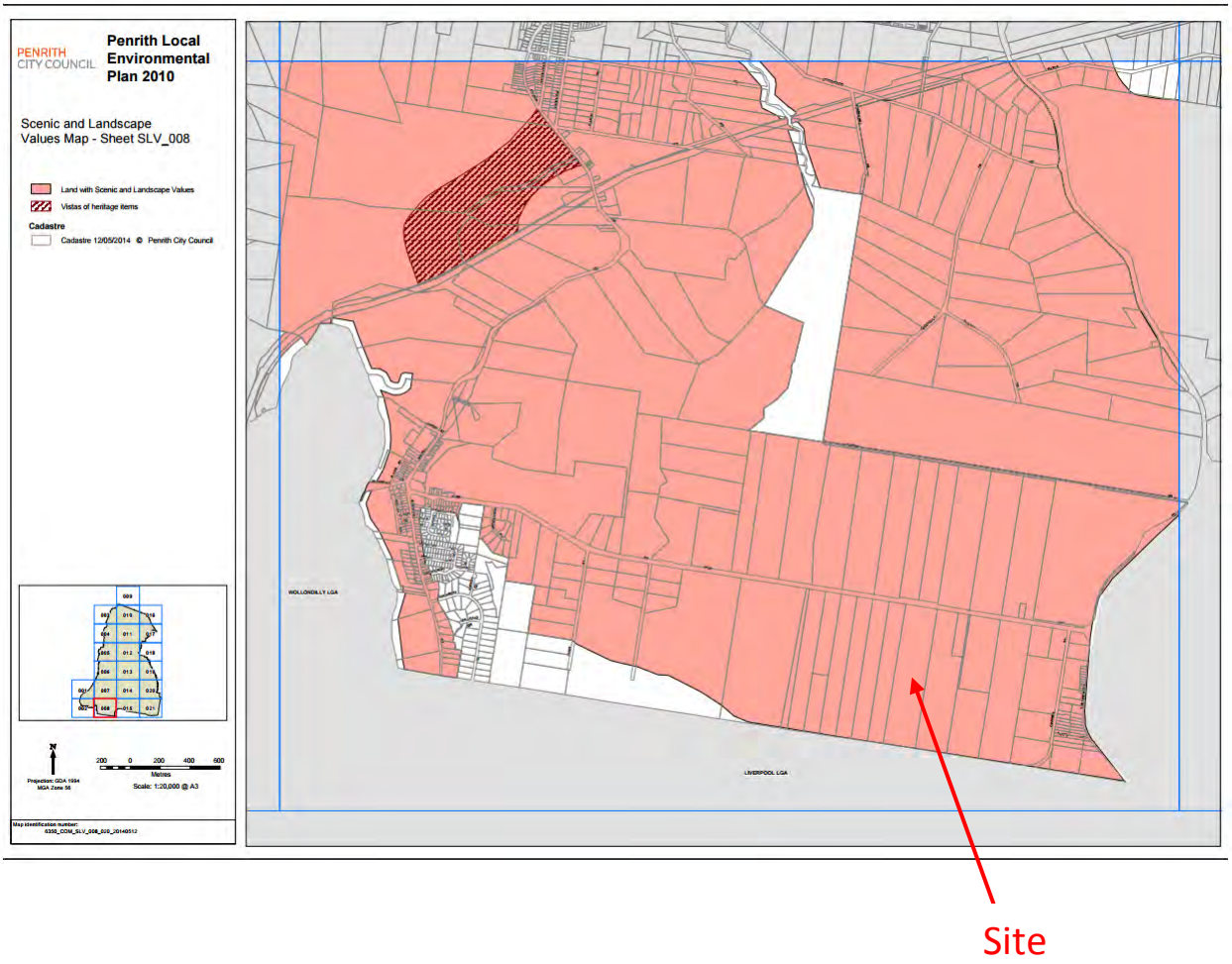
Section C: Livestock, Agriculture, Aquaculture and Forestry Industries
- Cattle feedlots
- Piggeries
- Poultry farms
- Large Scale Irrigation in the Murray, Murrumbidgee and Darling Basin (Draft)

Section D: Transport and Energy
- Roads and related facilities
- Marinas and related facilities
- NSW Wind Energy (Draft)
- Network Electricity Systems and Related Facilities
- Railway Facilities (Draft)

Section E: Water and Waste
- Landfilling
- Composting and related facilities
- Sewerage systems
- Irrigation of sewage effluent
- Aquatic Ecology
- Aquaculture in Natural Waterbodies
- Aquaculture in Land-based Activities

Figure 2-2: Location of the premises within the Zone RU1 – Primary Production





Form A

Request for Secretary's Requirements
for the preparation of an Environmental Impact Statement

Please provide the following information so that we can advise you promptly.

1. Provide details of the proponent

Proponent's name: Australasean Group Pty Ltd

Postal address: PO Box 4004 Penrith Plaza

State: NSW Postcode: 2750

Contact name: Greg Evans

Telephone: 0468 330 059 Fax

ACN 619 202 916

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2. Describe the land to which the proposal relates

No. 344 Street/ road: Park Road

Suburb/ town/ locality: Wallacia

Local government area: Penrith

Real property description (e.g. lot, DP/ MPS, vol/ fol, parish, portion): Lot 5 DP 655046

Refer to attached supporting report for comprehensive details about the proposal

Include a locality map clearly showing the location and boundary of the site and identifying features in the locality (e.g. roads, town, river).

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3. Briefly describe the proposal

Purpose: Resource recovery facility to sort, recycle materials such as VENM, demolition waste, construction and building waste such as soil, bricks, tiles, paper, plastic, metals, etc…

Components: Operational equipment such as crusher, screen, excavator, front end loader, trucks, etc….

Size 50.000 m^2 which is equivalent to 25% of the total land area being 200,732 m^2

Employment: Direct 6-8 FTE indirect: 15 FTE being truck drivers

Other (including approximate value) Refer to the attached supporting report

CIV approximately $1.0 million

4. The proposal is (tick one of the boxes)

√	permissible with development consent	*Go to question 5*
☐	permissible without development consent	*Go to question 8*
☐	prohibited development	*Go to question 8*
☐	project to which Part 3A of the Act applies (Major Project)	*this form should not be used and you should contact the Department*

DEVELOPMENT WITH CONSENT

5. a) Which environmental planning instrument(s) apply to the proposal?

(ie Council local environmental plan, regional environmental plan or State environmental planning policy)

Penrith Local Environmental Plan 2010

State Environmental Planning Policy (Infrastructure) 2007

b) Who is the consent authority?

Penrith City Council or JRPP

c) Is the proposal 'designated development'?

√ Yes ☐ No ☐ Do not know

If yes, what is the basis for designation?

(e.g. Sch. 3 of the *Environmental Planning and Assessment Regulation 2000* or an environmental planning instrument)

Schedule 3, Part 1 of the Environmental Planning and Assessment Regulation 2000 (Clauses 32(1)(b)(iii) and 32(1)(d) process more than 30,000 tonnes per year of waste and being a waste management facility that is located within 250 m of a dwelling

What is the category of designated development?

(e.g. extractive industry, artificial waterbody)

Waste management facilities or works

You should check this with the local council.

6. Is the proposal Crown development?

√	No	*Go to question 7*
☐	Yes. If yes, the proposal is not integrated development.	*Go to question 8*

7. Mark the relevant boxes next to the approvals which you may require in order to carry out the proposal. If any box is marked, the proposal is integrated development.

☐ *Roads Act 1993* s. 138 (Council, Land & Property Information or RMS)	Consent to: a) erect a structure or carry out a work in, on or over a public road, or b) dig up or disturb the surface of a public road, or c) remove or interfere with a structure, work or tree on a public road, or d) pump water into a public road from any land adjoining the road, or e) connect a road (whether public or private) to a classified road	√ *Protection of the Environment Operations Act 1997* s. 43, 47, 48, 55, 122 (NSW EPA)	Environment Protection Licence to: a) authorise the carrying out of scheduled development work at any premises (scheduled development work is listed in Schedule 1 of the *POEO Regulation* b) authorise the carrying out of scheduled activities at any premises (excluding an activity described as a 'waste activity' but including any activity described as 'waste facility') c) control carrying out of non-scheduled activities for the purposes of regulating water pollution from the activity
Tick the relevant approval body for the Roads Act: ☐ the road works affect a freeway or tollway = RMS ☐ the road works affect a Crown road = Lands Department ☐ other road works = Council ☐ the road works affect a classified road = Council with RMS concurrence Note: If an approval is required from the Council under the Roads Act, the approval is not integrated if Council is also the consent authority		☐ *Rural Fires Act 1997* s. 100B (NSW Rural Fire Service)	Bushfire Safety Authority for: a) The subdivision of bushfire prone land* that could lawfully be used for residential or rural residential purposes b) The development of bushfire prone land* for a special fire protection purpose as defined in s. 100B of the *Rural Fires Act 1997*. * bushfire prone land is identified by a 'Bushfire Prone Land Map' prepared under s.146 of the *EP&A Act*.
☐ *Water Management Act 2000* s. 89, 90, 91 (DPI Water)	Water use approval, water management work approval or activity approval under Part 3 of Chapter 3	☐ *Fisheries Management Act 1994* s. 144 (DPI Fisheries NSW)	Aquaculture Permit
☐ *Heritage Act 1977* s. 58 (Office of Environment and Heritage)	Approval in respect of the doing or carrying out of an act, matter or thing referred to in s.57(1) of the *Heritage Act 1977*	☐ *Fisheries Management Act 1994* s. 201 (DPI Fisheries NSW)	Permit to carry out dredging or reclamation work
☐ *Mine Subsidence Compensation Act 1961* s. 15 (Mine Subsidence Board)	Approval to alter or erect improvements or to subdivide land within a Mine Subsidence District	☐ *Fisheries Management Act 1994* s. 205 (DPI Fisheries NSW)	Permit to cut, remove, damage or destroy marine vegetation on public water, land, an aquaculture lease, or on the foreshore of any such land or lease
☐ *Mining Act 1992* s. 63, 64 (DPI Resources & Energy)	Grant of mining lease	☐ *Fisheries Management Act 1994* s. 219 (DPI Fisheries NSW)	Permit to: a) set a net, netting or other material, or b) construct or alter a dam, floodgate, causeway or weir, or c) otherwise create an obstruction, across or within a bay, inlet, river or creek, or across or around a flat
☐ *National Parks and Wildlife Act 1974* s. 90 (Office of Environment and Heritage)	Grant of Aboriginal heritage impact permit	☐ *Petroleum (Onshore) Act 1991* s. 9 (DPI Resources & Energy)	Grant of production lease

8. In your opinion, is the proposed development a 'potentially hazardous industry' or a 'potentially offensive industry'?

(Refer to the Department's guideline *Applying SEPP 33*)

☐ Yes ☑ No ☐ Do not know

DEVELOPMENT WITHOUT CONSENT - Only answer the following question if you answered 'permissible WITHOUT development consent' in question 4.

9. Does the proposal include an 'activity' (as defined under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act))?

☐ Yes ☐ No ☐ Do not know

If yes, what is the basis of this proposal being an 'activity'?

_____

_____

Name all determining authorities, as defined under section 110B of the EP&A Act.

_____

_____

_____

ALL DEVELOPMENT - Provide the following information for all proposals.

10. Provide details of the person requesting the Secretary's requirements, if it is not the proponent

Name: Environmental Risk Assessors Pty Ltd_____

Postal address: PO Box 150 Seven Hills_____

_____ State: NSW_____Postcode: 1730_____

Contact name: Nicolas Israel_____

Telephone: 0421 776 003_____ Fax_____

ACN: 159 899 000_____

---

11. Signature of person requesting the Secretary's requirements

Name: Nicolas Israel_____

Signature  Date: 02/05/2018_____

Enquires (02) 9228 6111

Please email a scanned copy of this form to: information@planning.nsw.gov.au
Attention: Director, Industry Assessments

Or post to:
The Executive Director, Key Sites and Industry Assessments, Department of Planning
GPO Box 39, Sydney NSW 2001
Attention: Director, Industry Assessments

NSW GOVERNMENT Planning & Environment

AUSTRALASEAN GROUP PTY LTD

REQUEST FOR SECRETARY ENVIRONMENTAL ASSESSMENT REQUIREMENTS AUSTRALASEAN GROUP PTY LIMITED 344 PARK ROAD WALLACIA NSW 2745

Prepared for: NSW Department of Planning and Environment
Australasean Group Pty Ltd

Prepared by: Nicolas Israel, Director
Reviewed by: Kieran Horkan, Scientific Director

Report No: 171901_SEARs_REV01.doc
Report Date: March 2018
Release Date: 31 March 2018

Environmental Risk Assessors Pty Ltd.
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DOCUMENT CONTROL

Prepared by:	Position:	Date:
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Reviewed by:	Position:	Date:
Kieran Horkan	Scientific Director	31 March 2018

Approved by:	Position:	Date:
Greg Evans	Director	31 March 2018

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Rev01	31/03/2018	Australasean Group Pty Ltd	Environmental Risk Assessors Pty Ltd
Rev02			

ABBREVIATIONS & GLOSSARY OF TERMS

AHD	Australian Height Datum
Appropriate Regulatory Authority (ARA)	Generally, the appropriate regulatory authority is the EPA for licensed premises and local Council for non-licensed premises. There are exceptions to this definition as stated in Clause 6 of the POEO Act.
AS	Australian Standard
AWS	Automatic Weather Station
BCA	Building Code of Australia
Council	Penrith City Council
Australasean Group	Australasean Group Pty Ltd which is the occupier of the premises and future operator of the business subject to this report – It is also referred to as the proponent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	NSW Department of the Environment and Conservation
DECC	NSW Department of Environment and Climate Change
DPE	Department of Planning and Environment
Environment	As defined in the POEO Act, *"environment" means components of the earth, including:* *(a) land, air and water, and* *(b) any layer of the atmosphere, and* *(c) any organic or inorganic matter and any living organism, and* *(d) human-made or modified structures and areas,* *and includes interacting natural ecosystems that include components referred to in paragraphs (a)-(c).*
EPA	NSW Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
Harm	As defined in the POEO Act, *"harm" to the environment includes any direct or indirect alteration of the environment that has the effect of degrading the environment and, without limiting the generality of the above, includes any act or omission that results in pollution.*
Immediately	Promptly and without delay.
Material risk of harm	"Material risk of harm to the environment" is defined under Section 147 of the POEO Act as: *(a) harm to the environment is material if:* *(i) It involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or* *(ii) It results in actual or potential loss or property damage of an amount, or amounts in aggregate,*

exceeding $10,000 (or such other amount as is prescribed by the regulations), and

(b) *loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.*

NHMRC	National Health and Medical Research Council
Occupier	As defined under the POEO Act, *"occupier" of premises means the person who has the management or control of the premises.*
POEO Act	Protection of the Environment Operations Act 1997
Pollution	As defined under the POEO Act*, "pollution" means:* *(a) water pollution, or* *(b) air pollution, or* *(c) noise pollution, or* *(d) land pollution.*
Premises	As defined under the POEO Act*, "premises" includes:* *(a) a building or structure, or* *(b) land or a place (whether enclosed or built on or not), or* *(c) a mobile plant, vehicle, vessel or aircraft.*
Premises	Northern part of 344 Park Road, Wallacia NSW 2745 as described within this report
Prevention of pollution	Use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution. Note: The potential benefits of prevention of pollution include the reduction of adverse environmental impacts, improved efficiency and reduced costs.
Scheduled activity	"scheduled activity" means an activity listed in Schedule 1 of the POEO Act. Scheduled activities must be licensed under the POEO Act.

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1. INTRODUCTION

Environmental Risk Assessors Pty Ltd in collaboration with Stimson and Baker Planning were instructed by Australasean Group Pty Ltd (Australasean Group) (also referred to as the proponent) to prepare the application for the Secretary Environmental Assessment Requirements (SEARs) for a proposed resource recovery facility at the northern part of 344 Park Road, Wallacia NSW. The proposed processing capacity is 95,000 tonnes per year for all activities to be undertaken on the premises. This proposal is urgently required due to the significant increase in demand for such facilities as many growth centres are being established in the western, north western and southern western areas of Sydney. In addition the construction of Western Sydney Airport has already commenced and this has resulted in the commencement ofsignificant upgrades to all major roads leading to the airport from most Motorways. This facility is less than 10 km from the western boundary of the airport footprint.

The proposed premises is located within the Zone RU1 – Primary Production under Penrith Local Environmental Plan 2010 (BLEP).

The proposed development includes the installation of a weighbridge, storage containers, a small weighbridge office, a car park, access road, operation of a resource recovery facility, high fencing around the perimeter of the relevant section of the property and premises screening involving tree planting. The existing dwelling will be transformed to accommodate the site office and associated staff amenities. The premises will be used to perform the recovery of materials that are predominantly classified under the NSW Environment Protection Authority' Waste Classification Guidelines as General Solid Waste (non-putrescible). However, to avoid any confusion, the materials to be received on site will be limited to these listed in this document. Virgin Excavated Natural Materials (VENM) and materials that are covered by relevant Resource Recovery orders will be form more than 80% of the total materials received on site. Most materials will be crushed, screened and blended to provide a range of materials for use mainly in the construction industry and civil works. The balance of materials will be sold without being processed.

This document presents a brief description of the existing premises and its various activities, including the surrounding environment, the proposed activities, and a preliminary, mostly qualitative assessment of potential environmental impacts of the proposed development

1.1 THE PROPONENT

The proponent is Australasean Group Pty Ltd with an ABN 59 619 202 916. The Company was incorporated on 19 May 2017, for the purpose of operating the recycling facility. However, the Company's director and his associates have been directly and indirectly involved in handling the same or similar materials for over ten (10) years and have had experience in undertaking some medium and large civil works related projects around NSW.

The proponent's details are provided below.

Australasean Group Pty Ltd is an Australian owned and operated family company which was established in 2018.

Physical address:	344 Park Road, Wallacia NSW 2745
Postal address:	344 Park Road, Wallacia NSW 2745
Current proponent contact details are:	
Phone:	TBD
Fax:	TBD
Mobile:	0468 330 059
Email:	australasean@gmail.com

The details of the premises are provided below.

Grid reference:	285056E and 6248948N (Middle of premises)
(DGA94 – MGA 56)	285225E and 6249519N (Street address)
Zone:	56
Elevation:	78-81 m
Local Government Area:	Penrith City Council
Land Use Zoning:	RU1 – Primary Production

2. PREMISES DESCRIPTION

A brief outline of the subject premises has been provided below.

2.1 DESCRIPTION OF THE PREMISES AND SURROUNDS

The premises the subject of this application which is the north eastern part of 344 Park Road, Wallacia in the State of New South Wales and in the Local Government Area of Penrith City Council.

The property of which the premises forms part is also legally known as Lot 5 DP 655046.

The property of which the premises form part is located on the Southern side of Park Road and access to the premises is via Park Road which connects with the Old Northern Road, Luddenham.

The premises will be divided into two (2) parts; the first part is the main active working area where all activities associated with the business will occur and the second which will be left as per its original condition (non-active working area) and will be fenced off for that purpose. The premises is located to the north eastern part of the property.

The premises is approximately 84,960 m^2 which is mostly the active working area for this development. The total land area of the property is approximately 200,732 m^2.

The property is surrounded by the following sites:

- North – Park Road then Lots 71 & 72 DP 594632
- South – Lot 3 DP 248069
- West – Lot 1 DP 1145597
- East – Lot 4 DP 653236

The premises' driveway starts at street level atan approximate elevation of 81 m. The driveway has a slight decline of about 1 m along its entire length.

The active working area is reasonably flat with a slope from South East and North East to South West of between 1-3 m depending of the location of the measurement.

The premises also has an overall slope from east to west of approximately 2.5 m. This topography is extremely important for the management of surface water runoff within the premises where water will be easily contained within the active working area and be directed to the western side where it is proposed to install an appropriately designed sediment pond as it will be outlined in the Site Water Management Plan. A summary of premises details are provided in **Table 2-1**.

Table 2-1: Summary of Property and Premises Details

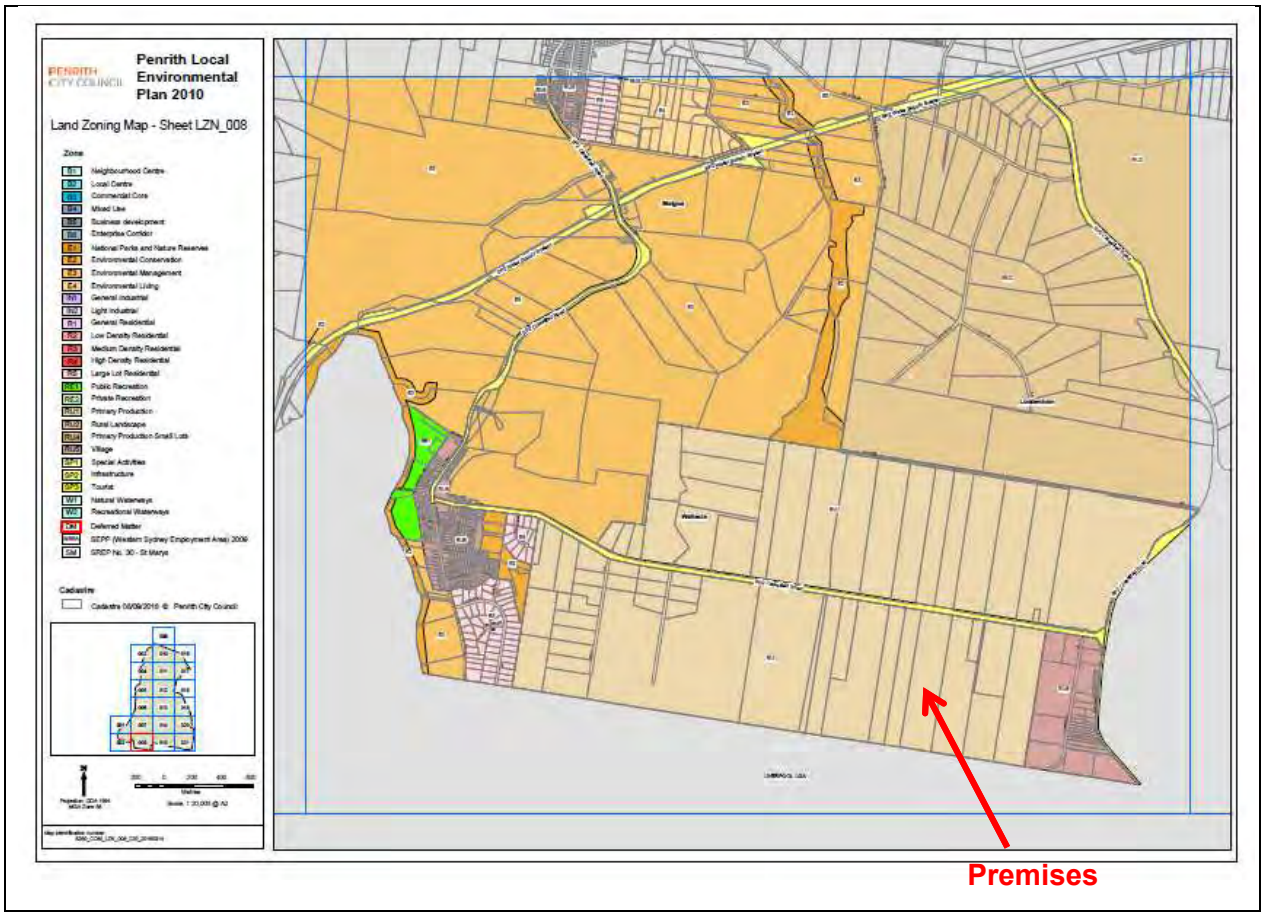
Location of Premises	The north eastern portion of 344 Park Road, Wallacia – Also know as Lot 4 in DP 655046
Land Dimensions of Property (Approximate)	Northern Boundary: 214 m Eastern Boundary: 938 m Southern Boundary: 214 m Western Boundary: 938 m
Total Area of Property	Approximately 20.0732 hectares or 200,732 m^2
Premises Land Dimensions (Approximate)	Northern Boundary: 140 m Eastern Boundary: 390 m Southern Boundary: 140 m Western Boundary: 390 m
Premises Land Area (Approximate)	Approximately 5.00 hectares or 50,000 m^2 which is approximately 25% of the total property size
Grid Reference (GDA94 – MGA56)	Middle of Premises=Easting: 285174 Northing: 6249318 Elevation: 80 Street Address = Easting: 285225 Northing: 6249519 Elevation: 81 Entry/Exit = Easting: 285225 Northing: 6249519 Elevation: 60
Local Government Area	Penrith City Council
Existing Land Use	The environment of the premises and surrounding properties is modified rural, consisting of grazing, crops in hot house environments and some dwellings, some waste processing facilities, resource recovery facilities. Western Sydney Airport is being constructed at the Southern side of Elizabeth Drive in the suburb of Badgerys Creek which is east of this premises
Current Land Zoning	RU1 – Primary Production
Proposed Development	The establishment of a resource recovery facility and associated structures (i.e. site office, weighbridge with a small office)

To give the reader a better understanding of the location of the premises, **Figure 2-1** shows an aerial view of the premises in the local context including the surrounding activities/developments.

Extract from the land zoning map showing the subject premises location is presented in **Figure 2-2**.

Figure 2-1: Aerial View of the premises including Surrounding Areas – Closer View

Figure 2-2: Location of the premises within the Zone RU1 – Primary Production



2.2 POTENTIALLY SENSITIVE RESIDENTIAL RECEPTORS

As previously stated, the premises is located within a mainly rural residential area. The activities will be well shielded from the surrounding rural residential environment by the existing built environment plus the topography of the premises, the bushlands located within and in the vicinity of the premises including the large trees and shrubs. In addition to the proposed fencing of the whole premises, large earth mounds (or equivalent structures) will be constructed to provide additional shielding of the activities as detailed in the Preliminary Environmental Assessment. These earth mounds or equivalent structures will assist further in protecting humans and the environment from any potential impact.

Based on the EPA's document "*NSW DEC (EPA) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales – August 2005*", the following definition of a sensitive receptor is provided: "***Sensitive receptor*** *A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. ……".* However, as the premises is located within a RU1 – Primary Production land zone where a variety of activities are permitted, it was considered appropriate to pay greater attention to the location of the premises relative to the residential zoned areas under the PLEP and to the rural residential dwelling. The approximate locations of the closest potentially sensitive residential receptors are included in **Table 2-2** and **Figure 2-3**. It is possible that more potentially sensitive residential receivers would be identified during the environmental impact assessments such as noise and air quality.

In any case, based on our assessment during our inspections of the premises and surrounding environment, we confirm that the proposed activities are unlikely to have any adverse impact on any sensitive residential receptor when appropriate mitigation measures are implemented and maintained, as they will be, at all times.

Table 2-2: Closest Potentially Sensitive Residential Receptors – Approximate Locations

No	Direction	Location (m)			
		Easting	Northing	Elevation	Distance to Boundary[1]
0	Premises (Middle)	285174	6249318	80	0
R1	E	285400	6249471	85	110
R2	E	285470	6249471	86	170
R3	W	285016	6249429	79	110
R4	E	285640	6249301	96	355
R5	W	284926	6249504	78	195
R6	N	285291	6249743	83	213
R7	N	285129	6249708	77	169
R8	NE	285478	6249576	89	201
R9	NW	285034	6249644	78	167
R10	S	285046	6248546	79	561
R11	SW	284836	6248479	75	730
R12	SE	285451	6248935	86	324

[1] **– Distance to closest boundary of the premises**

Figure 2-3: Closest Potentially Sensitive Residential Receptors

Ref: NICS_17190_FIG06 REV01	Environmental Risk Assessors Pty Ltd PO Box 150 Seven Hills Mobile: 0421776003 Nicolas Israel – 24/03/2018	Scale: Not to Scale	Australasean Group Pty Ltd 344 Park Road, Wallacia NSW 2745 Potentially Sensitive Receptors

3. PROJECT DESCRIPTION

3.1 PROPOSED ACTIVITIES

3.1.1 Resource Recovery facility

The proposed activities will include the receipt, sorting, blending, and recycling within the existing active working area of waste materials including building, construction, demolition, excavation, concrete, metal, and other similar non-putrescible materials. It is noted though that a majority of these materials will be received partially sorted and sourced from within the Greater Sydney Metropolitan area only. The premises will be used, also, for the receipt and storage of products capable of immediate use in the building, construction and infrastructure industries. Examples of these materials are listed below. Sandstone, for example, may be received and sold without the need for processing, being readily available for recycling. No retail sales will take place on the premises, and the public will have no access to the premises.

In addition to the above, the Australasean Group will receive materials that are Virgin Excavated Natural Materials (VENM) as defined in the EPA's Waste Classification Guidelines ("**finished product**"). These materials will be extracted from quarries across NSW and transported to the premises for either direct sale or further processing, by blending other recyclable products, to obtain more refined products.

The majority of activities to be undertaken by Australasean Group are the supply of recycled and natural materials to individuals, government and non-government organisations for landscaping, agriculture, construction and civil works. These include: gardens, extensive agricultures, professional and non-professional landscaping organisations, roads, pavements, footpaths, stormwater systems, drainage, driveways, car parks and other related works.

None of the following products will be received on the premises:

- Putrescible or liquid wastes,
- Green wastes,
- Hazardous wastes,
- Special wastes,
- Restricted solid wastes,
- Potentially flammable wastes.

In addition, the proponent will not conduct any composting activities on the premises.

For most of the finished products, trucks will unload the products into the relevant stockpiles dedicated to that finished product.

The process is outlined below.

- The premises will not be open to the general public,

- The feed materials will be brought onto the premises from known sources only. Most materials will be VENM, comply with a Resource Recovery Order or Construction & Demolition materials. Only a small percentage of the materials will be classified as Construction and Demolition waste (less than 10%),
- All vehicles will be weighed on the weighbridge,
- While vehicles are on the weighbridge, the truck covers will be removed and the loads inspected by the resource recovery manager and checked against the documentation submitted from the source of the materials to ensure that the materials are the same as described in the waste classification report or validation certificate. Special attention will be paid to the identification of any contaminants such as asbestos, tyres, etc.…,
- If the feed materials pass the visual inspection, the driver will be directed to the specific area for those feed materials for unloading inside the existing (to be upgraded) shed,
- The resource recovery manager or his/her delegate will inspect the unloaded materials for a second time to ensure that the materials comply with the waste classification report or validation certificate. Special attention is paid to the identification of any contaminants such as asbestos, tyres, etc.…,
- If hazardous or special wastes are found in the unloaded materials, the resource recovery manager will segregate (fence off, cover and sign post) the stockpile, containing same, call the company where the materials were transported from and inform them that the materials are not acceptable on the premises and must be removed immediately. The resource recovery manager or a delegate will record all relevant details in the "Rejected Load Register" and notify the EPA of the notifiable event.

For all the VENM materials, the following process will be followed:

- When sufficient quantities of materials of this particular type are available, the materials will be loaded onto a screen to produce different sizes of VENM materials. If the materials contain large sizes of rocks or stones, they will be loaded into the crusher first, then onto the screen,
- These finished products will be stockpiled in the finished products areas ready for dispatch.

For the construction and demolition materials, the following process will be followed:

- As soon as the materials are unloaded, the materials will be sorted into recyclables and non-recyclables,
- The recyclables, which are not to become a finished product, will be stockpiled in smaller stockpiles depending on the type of these recyclables such as glass, plastics, metals, etc. These will be transported to lawfully licensed recycling facilities for further processing,
- The non-recyclable materials will be stockpiled separately and transported to a lawfully licensed landfill for disposal.

It is extremely difficult to predict the quantities and types of materials that will be required at any stage in the building and construction industry. Sometimes sandstone will be required in very large quantities for the construction or upgrading of a road. At other times, crushed concrete and road-millings will be required for use as road base. Accordingly, physical barriers, differentiating different types of materials in the working area on the premises, are not practical

for this resource recovery facility since they would limit the quantities of materials to be received on the premises and the finished products of each type of materials.

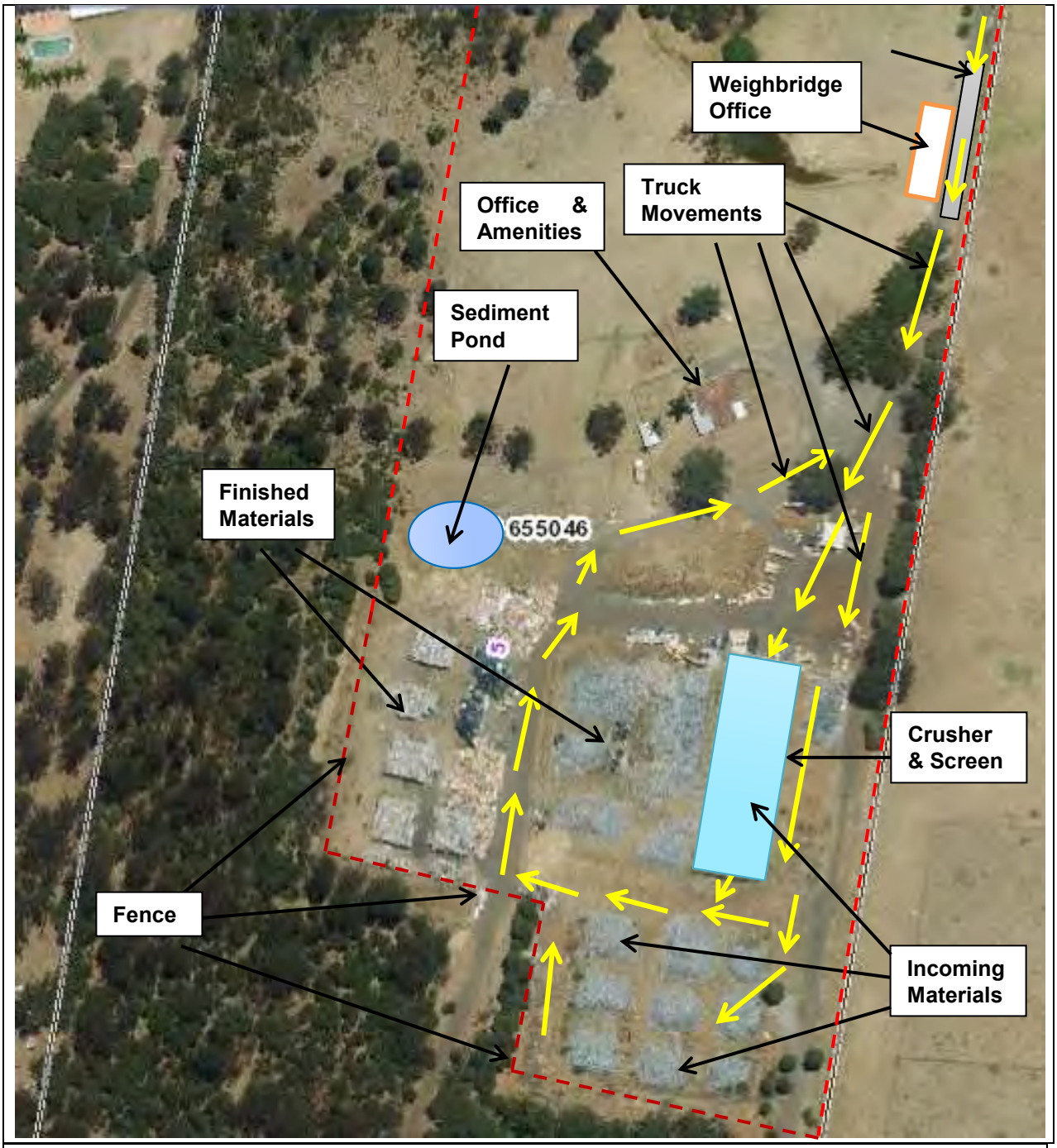
Again, on occasions some clients may request different mixes of finished products to suit their particular jobs (specifications that are governed by a Government Department or a Civil Works Contractor) or to suit the characteristics of the soil where landscaping work is undertaken. This does not change the chemical characteristics of the finished products since it is only a mix of two (2) or more dry finished products together without any change or reaction.

There is no wastewater generated as a result of processing of waste materials. In addition, there is no thermal treatment of the waste on the premises at any stage of the process. There are no furnaces or other heat generating equipment required as part of these activities.

For this development, the active working area is approximately 25% of the total land area. The majority of the premises will be made of partially impervious and compacted materials to assist in surface water management and reduction of dust generation. The non-impervious areas are mainly at the southern section of the property and other sections as recommended by the Flora & Fauna experts. The latter sections will be signposted as “No Go Zones”. These sections will not be used for any purpose associated with the proposed activities. These sections will be segregated from the active working area to assist in better management of surface water, waste and dust minimisation by installing appropriate mitigation measures between these sections such as fences and barriers.

To give the reader a better understanding of the proposed facilities to be installed on the premises and the proposed activities to be undertaken within the active working area, a concept design premises layout has been included in **Figure 3-1**. This premises layout may be amended following the implementation of all recommendations made by the experts in the field of Flora & Fauna, Noise, Air, Water as well as any other recommendations made by the Government Authorities. However, the final design will include all features presented in this premises layout as presented in **Figure 3-1**.

Figure 3-1: Concept Design Layout of the Proposed Facility



Ref: 171901_FIG01 REV02	Environmental Risk Assessors Pty Ltd PO Box 150 Seven Hills Mobile: 0421 776 003 Nicolas Israel – 24/03/2018	Scale: Not to Scale	Australasean Group Pty Ltd 344 Park Road, Wallacia NSW 2745 Proposed premises Layout

3.2 IMPORTED MATERIALS

The materials to be received on the premises include VENM materials, material that are pre-classified, pre-validated, or compliant with existing Resource Recovery Orders. Furthermore, all materials will be received from known sources such as approved quarries/mines, government projects, etc.

Following discussions with the proponent we understand that the waste materials to be received at the premises are:

1 Clay
2 Shale
3 Sand
4 Sandstone
5 Cracked concrete
6 Construction and demolition materials (except timber)
7 Top soil
8 Road profiling/road-milling - aggregate
9 Hard rock
10 Recovered asphalt
11 Bricks
12 Tiles

3.3 FINISHED GOODS

The finished products are chemically and physically identical to the materials used prior to being received on the premises with the difference being that the materials are now sorted into stockpiles in accordance with their final uses, or imported materials may be blended to create the finished product. Also a large percentage of the imported materials to create the finished products are simply crushed and screened to the required sizes. In addition to the above, on occasion, some clients may request a mixture of for example sand and soil (30/70). This can be accommodated as it does not alter the chemical characteristics of the finished product; it is simply a mixture of sand and soil. It will be the responsibility of either the clients or Australasean Group to transport the finished product off the premises.

The proposed list of possible finished products and the processes to which the imported materials will be subjected to is included in **Table 3-1.**

Table 3-1: List of possible Finished Products

Finished Product	Process	Proposed Use
Clay	screened and blended	landscaping
Shale	crushing and screening	civil works
Sand	Sand Washing, crushing and screening	Civil works
Blended Materials	Pug Mill	Concrete Works
Sandstone	crushing and screening	civil works

Finished Product	Process	Proposed Use
Crushed concrete	crushing and screening	civil works
Crushed bricks	crushing and screening	civil works
Top soil	Screening and blending	landscaping
Road-milling	crushing and screening	civil works
Crusher dust	by-product of crushing	civil works
Sydney sand	crushing and screening	civil works + landscaping
20mm river stone	crushing and screening	civil works + landscaping
Soil conditioner	Crushing, screening and blending	Landscaping

In relation to soil conditioners, they are made out of a mix of two or more dry products such as soil and sand. Gypsum is also used as a soil conditioner. Soil conditioning will not include green waste.

The list of machinery that will potentially be used for the proposed facility is presented below. It should be noted that these machines will not all be used at the same time but rather a combination of only a few machines will be used depending on the activities for a particular day.

1 Machinery List For Resource Recovery Activity

- 50T Jaw Crusher
- 35T Triple Deck Material sizing screener
- 30T Excavator
- 20T Excavator
- 5T Excavator
- 35T Front end loader
- Backhoe
- Trucks and trailers
- Water truck

2 The premises Infrastructure

- Site office (including staff amenities) (existing dwelling)
- Facilities for management of greywater
- Car park
- Earth mounds
- Shed
- Storage containers
- Weighbridge
- Weighbridge office
- Rumble grid – wheel wash
- Driveway to the premises office, weighbridge and other sections of the premises
- Security compound fencing around infrastructure (including lockable access gate to Park Road)
- Electricity extension to the premises office (Existing on site)

- Telephone extension to the premises office (Existing on site)
- Potable water to the premises office (Existing on site)
- Water supply – proposed sediment pond on the premises

3.4 HOURS OF OPERATION

Under normal circumstances, the hours of operation would depend on demand with some periods when activity is limited to the occasional loading of haulage trucks. The proposed hours of operation are:

- Monday to Saturday 7:00am - 6.00pm
- Sunday 8:00am - 4.00pm
- Public holidays No work

3.5 EMPLOYMENT

The proposed development is expected to generate employment for 6-8 people at the subject the premises, as well as many additional employment opportunities for trucking contractors, once operational. Construction of the facility will also result in the generation of temporary employment for approximately 20 people.

4. STATUTORY CONTEXT

This section will focus on all statutory requirements under current NSW planning and environmental legislation to ensure that there is a clear understanding of these requirements for the proposed development.

4.1 PLANNING

The *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000* provide the framework for environmental planning in NSW. The Act and the Regulation include Provisions to ensure that proposals, which have the potential to impact on the environment, are subject to detailed assessment. Under this legislation the proposed development could be as defined as both Integrated and Designated.

4.1.1 Environmental Planning and Assessment Act 1979

As part of this application, it is considered appropriate to include some information about the most relevant planning legislation including the *Environmental Planning and Assessment Act 1979* (EP&A Act).

General

The main objects of the EP&A Act are included in Clause 5 of the EP&A Act and are outlined below.

The objects of this Act are:

(a) to encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(iii) the protection, provision and co-ordination of communication and utility services,

(iv) the provision of land for public purposes,

(v) the provision and co-ordination of community services and facilities, and

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and

(vii) ecologically sustainable development, and

(viii) the provision and maintenance of affordable housing, and

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

It is clear that the activities proposed to be conducted on the premises are consistent with the objects of the EP&A Act.

4.1.2 State Environmental Planning Policy (Infrastructure) 2007 (SEPP 2007)

The aim of this Policy is to facilitate the effective delivery of infrastructure across the State by:

(a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and
(b) providing greater flexibility in the location of infrastructure and service facilities, and
(c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and
(d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and
(e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and
(f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Clause 121 of this SEPP 2007 permits certain activities such as "***waste or resource management facilities"*** which includes resource recovery facilities, to be undertaken by any person with development consent on land in a prescribed zone. Clause 120 provides a definition of prescribed zone which includes **RU1- Primary Production.**

Under the same Clause 120 the following definition is also provided:
"resource recovery facility" *means a facility for the recovery of resources from waste, including such works or activities as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from waste gases and water treatment, but not including re-manufacture of material or goods or disposal of the material by landfill or incineration.*

4.1.3 Penrith Local Environmental Plan 2010

(1) This Plan aims to make local environmental planning provisions for land in Penrith in accordance with the relevant standard environmental planning instrument under section 33A of the Act.

(2) The particular aims of this Plan are as follows:
(a) to provide the mechanism and planning framework for the management, orderly and economic development, and conservation of land in Penrith,
(b) to promote development that is consistent with the Council's vision for Penrith, namely, one of a sustainable and prosperous region with harmony of urban and rural qualities and with a strong commitment to healthy and safe communities and environmental protection and enhancement,
(c) to accommodate and support Penrith's future population growth by providing a diversity of housing types, in areas well located with regard to services, facilities and

transport, that meet the current and emerging needs of Penrith's communities and safeguard residential amenity,

(d) to foster viable employment, transport, education, agricultural production and future investment opportunities and recreational activities that are suitable for the needs and skills of residents, the workforce and visitors, allowing Penrith to fulfil its role as a regional city in the Sydney Metropolitan Region,

(e) to reinforce Penrith's urban growth limits by allowing rural living opportunities where they will promote the intrinsic rural values and functions of Penrith's rural lands and the social well-being of its rural communities,

(f) to protect and enhance the environmental values and heritage of Penrith, including places of historical, aesthetic, architectural, natural, cultural, visual and Aboriginal significance,

(g) to minimise the risk to the community in areas subject to environmental hazards, particularly flooding and bushfire, by managing development in sensitive areas,

(h) to ensure that development incorporates the principles of sustainable development through the delivery of balanced social, economic and environmental outcomes, and that development is designed in a way that assists in reducing and adapting to the likely impacts of climate change.

As previously stated the premises are located within the zone ***RU1 – Primary Production*** under the current Penrith Local Environmental Plan 2010 (PLEP). Zone RU1 Objectives and other details associated with the permissible activities are outlined below.

4.1.4 Zone RU1 – Primary Production

1 Objectives of zone

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To protect and enhance the existing agricultural landscape character of the land.*
- *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*
- *To preserve and improve natural resources through appropriate land management practices.*

2 Permitted without consent

Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent

Agricultural produce industries; Agriculture; Animal boarding or training establishments; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cellar door premises; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Open cut mining; Roads; Roadside stalls; Rural supplies; Secondary dwellings; Stock and sale yards

4 Prohibited

Any other development not specified in item 2 or 3

4.2 DESIGNATED DEVELOPMENT

The proposed development constitutes designated development as it is captured by Clauses 32(1)(b)(iii) and potentially 32(1)(d) under Schedule 3, Part 1 of the *Environmental Planning and Assessment Regulation 2000,* reported below.

32 Waste management facilities or works

(1) Waste management facilities or works that store, treat, purify or dispose of waste or sort, process, recycle, recover, use or reuse material from waste and:

(a) that dispose (by landfilling, incinerating, storing, placing or other means) of solid or liquid waste:

(i) that includes any substance classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or

(ii) that comprises more than 100,000 tonnes of "clean fill" (such as soil, sand, gravel, bricks or other excavated or hard material) in a manner that, in the opinion of the consent authority, is likely to cause significant impacts on drainage or flooding,

or

(iii) that comprises more than 1,000 tonnes per year of sludge or effluent, or (iv) that comprises more than 200 tonnes per year of other waste material, or

(b) that sort, consolidate or temporarily store waste at transfer stations or materials recycling facilities for transfer to another the premises for final disposal, permanent storage, reprocessing, recycling, use or reuse and:

(i) that handle substances classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste, or

(ii) that have an intended handling capacity of more than 10,000 tonnes per year of waste containing food or livestock, agricultural or food processing industries waste or similar substances, or

(iii) that have an intended handling capacity of more than 30,000 tonnes per year of waste such as glass, plastic, paper, wood, metal, rubber or building demolition material, or

(c) that purify, recover, reprocess or process more than 5,000 tonnes per year of solid or liquid organic materials, or

(d) that are located:

(i) in or within 100 metres of a natural waterbody, wetland, coastal dune field or environmentally sensitive area, or

(ii) in an area of high watertable, highly permeable soils, acid sulphate, sodic or saline soils, or

(iii) within a drinking water catchment, or

(iv) within a catchment of an estuary where the entrance to the sea is intermittently open, or

(v) on a floodplain, or

(vi) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, visual impacts, air pollution (including odour, smoke, fumes or dust), vermin or traffic.

(2) This clause does not apply to:

(a) development comprising or involving any use of sludge or effluent if:

(i) the dominant purpose is not waste disposal, and

(ii) the development is carried out in a location other than one listed in subclause (1) (d), above, or

(b) development comprising or involving waste management facilities or works specifically referred to elsewhere in this Schedule, or

(c) development for which State Environmental Planning Policy No 52—Farm Dams and Other Works in Land and Water Management Plan Areas requires consent.

The proposed development would fit the description of a waste management facility, with an intended handling capacity of more than 30,000 tonnes per year of building demolition material, and which processes more than 5,000 tonnes per year of solid organic materials.

4.3 INTEGRATED DEVELOPMENT

Clause 91 of the *Environmental Planning and Assessment Act 1979* defines that integrated development is development (not being State significant development or complying development) that, in order for it to be carried out, requires development consent and one or more approvals, including approvals under the *Protection of the Environment Operations Act 1997* (POEO Act).

The proponent will be required to hold an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* and, therefore, it constitutes integrated development. Further details on the requirement for an EPL are provided in the following section.

4.4 STATE ENVIRONMENTAL PLANNING POLICIES (SEPPS)

4.4.1 SEPP No. 33 – Hazardous and Offensive Development

The proposed development is expected to have only minimal amounts of chemicals and dangerous goods stored on the premises for short periods of time before they are taken to appropriate EPA licensed premises and, therefore, it is highly unlikely to trigger the thresholds

listed in SEPP No. 33 – Hazardous and Offensive Development and would not fit the definition of 'potentially hazardous industry' or 'hazardous storage establishment'. However, a formal screening/assessment process will be followed in accordance with the Department's guidelines "*Hazardous and Offensive Development Application Guidelines - Applying SEPP 33 – January 2011*".

4.4.2 SEPP No. 55 – Remediation of Land

The construction and installation of the resource recovery facility will require very little, if any, excavation works of a virgin land and therefore the proposal could potentially be assessable under SEPP No. 55 – Remediation of Land.

We are aware that some activities were undertaken on the premises and that the land may have been slightly disturbed, therefore we believe that a Stage 1 - Preliminary Site Investigation (contamination assessment report) would be required as part of the environmental assessment process.

4.5 STATE SIGNIFICANT

Under Clause 8 (1) of the *State Environmental Planning Policy (State and Regional Development) 2011*, development is potentially a state significant development if it is specified in Schedule 1 or Schedule 2. Clause 23(3) of Schedule 1 is relevant to the proposed activities:

23 Waste and resource management facilities

(1) Development for the purpose of regional putrescible landfills or an extension to a regional putrescible landfill that:

(a) has a capacity to receive more than 75,000 tonnes per year of putrescible waste, or

(b) has a capacity to receive more than 650,000 tonnes per year of putrescible waste over the life of the site, or

(c) is located in an environmentally sensitive area of State significance.

(2) Development for the purpose of waste or resource transfer stations in metropolitan areas of the Sydney region that handle more than 100,000 tonnes per year of waste.

(3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.

(4) Development for the purpose of waste incineration that handles more than 1,000 tonnes per year of waste.

(5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.

(6) Development for the purpose of any other liquid waste depot that treats, stores or disposes of industrial liquid waste and:

(a) handles more than 10,000 tonnes per year of liquid food or grease trap waste, or

(b) handles more than 1,000 tonnes per year of other aqueous or non-aqueous liquid industrial waste.

The proposed development is not State Significant as it involves the handling of less than 100,000 tonnes per year of waste. Hence, Penrith City Council would be the consent authority.

4.6 ENVIRONMENTAL

Under current NSW environmental legislation, in addition to the waste related Acts and Regulations, two statutory instruments are considered to be relevant for the proposed activities; the *Protection of the Environment Operations Act 1997* (POEO Act) and the *Protection of the Environment Operations Regulation 2009* (POEO Regulation 2009). The following sub-sections include the requirements under these two statutory instruments.

4.6.1 *Protection of the Environment Operations Act 1997* & *Protection of the Environment Operations (General) Regulation 2009*

The Protection of the Environment Operations Act 1997 (POEO Act) establishes the NSW environmental regulatory framework and includes a licensing requirement for certain activities.

The Protection of the Environment Operations (General) Regulation 2009 (POEO Regulation 2009) includes provisions for licensing and notices fees, load based licensing requirements and fees, national pollutant inventory requirements, etc.…

The POEO Act contains a list of activities that are classified as scheduled activities and those that require an environment protection licence. These activities are listed in Schedule 1 of the POEO Act.

Environment Protection Licences are a central means to control the localised, cumulative and acute impacts of pollution in NSW.

The proposed activities will be considered as premises-based activities and are classified as scheduled activities under the provisions of the POEO Act. Hence, the activities do require an Environment Protection Licence possibly for three (3) classifications of scheduled activities as outlined below.

In preparing this report and particularly this Section, many sections of NSW environmental legislation (i.e. POEO Act) were used to demonstrate that the proposed activities will be considered under the provisions of these statutory requirements.

Based on the amended schedule 1 of the POEO Act, three (3) scheduled categories may apply to the activities intended to be undertaken on the premises. These scheduled activities are outlined below.

34 Resource Recovery

(1) This clause applies to the following activities:
"recovery of general waste"*, meaning the receiving of waste (other than hazardous waste, restricted solid waste, liquid waste or special waste) from off site and its processing, otherwise than for the recovery of energy.*
"recovery of hazardous and other waste"*, meaning the receiving of hazardous*

waste, restricted solid waste or special waste (other than asbestos waste or waste tyres) from off site and its processing, otherwise than for the recovery of energy.

***"recovery of waste oil"**, meaning the receiving of waste oil from off site and its processing, otherwise than for the recovery of energy.*

***"recovery of waste tyres"**, meaning the receiving of waste tyres from off site and their processing, otherwise than for the recovery of energy.*

(2) However, this clause does not apply to the recovery of stormwater or the processing of any of the following:

(a) contaminated soil,

(b) contaminated groundwater,

(c) sewage within a sewage treatment system (whether or not that system is licensed).

(3) Each activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if:

(a) it meets the criteria set out in Column 2 of that Table, and

(b) either:

(i) less than 50% by weight of the waste received in any year requires disposal after processing, or

(ii) an exemption granted under Part 9 of the Protection of the Environment Operations (Waste) Regulation 2014 exempts the person carrying out the activity from the requirements of section 48 (2) as they apply to waste disposal (application to land), waste disposal (thermal treatment), waste processing (non-thermal treatment) and waste storage.

41: Waste processing (non-thermal treatment)

(1) This clause applies to the following activities:

(2)

***"non-thermal treatment of general waste"**, meaning the receiving of waste (other than hazardous waste, restricted solid waste, liquid waste or special waste) from off site and its processing otherwise than by thermal treatment.*

***"non-thermal treatment of hazardous and other waste"**, meaning the receiving of hazardous waste, restricted solid waste or special waste (other than asbestos waste or waste tyres) from off site and its processing otherwise than by thermal treatment.*

***"non-thermal treatment of liquid waste"**, meaning the receiving of liquid waste (other than waste oil) from off site and its processing otherwise than by thermal treatment.*

***"non-thermal treatment of waste oil"**, meaning the receiving of waste oil from off site and its processing otherwise than by thermal treatment.*

***"non-thermal treatment of waste tyres"**, meaning the receiving of waste tyres from off site and their processing otherwise than by thermal treatment.*

(2) However this clause does not apply to the processing of any of the following:

(a) stormwater,

(b) contaminated soil,

(c) contaminated groundwater,

(d) sewage within a sewage treatment system (whether or not that system is licensed).

(2A) The activity of non-thermal treatment of liquid waste is declared to be a scheduled activity if it meets the criteria for that activity set out in Column 2 of the Table to this clause.

(3) Each other activity referred to in Column 1 of the Table to this clause is declared to be a scheduled activity if:

(a) it meets the criteria set out in Column 2 of that Table, and

(b) 50% or more by weight of the total amount of waste received per year requires disposal after processing.

(4) For the purposes of this clause, 1 litre of waste is taken to weigh 1 kilogram.

42: Waste storage

*(1) This clause applies to **"waste storage"**, meaning the receiving from off site and storing (including storage for transfer) of waste.*

(2) However, this clause does not apply to any of the following:

(a) the storage of stormwater,

(b) the storage of up to 60 tonnes at any time of any of the following kinds of waste (but not when accompanied by any other kind of waste):

(i) drilling mud,

(ii) grease trap waste,

(iii) waste lead acid batteries,

(iv) waste oil,

(c) the storage of sewage within a sewage treatment system,

(d) the storage and transfer of liquid waste that is generated and treated on site prior to sewer discharge, or lawful discharge to waters.

(3) The activity to which this clause applies is declared to be a scheduled activity if:

(a) more than 5 tonnes of hazardous waste, restricted solid waste, liquid waste or special waste (other than waste tyres) is stored on the premises at any time, or

(b) more than 5 tonnes of waste tyres or 500 waste tyres is stored on the premises at any time (other than in or on a vehicle used to transport the tyres to or from the premises), or

(c) more than the following amounts of waste (other than waste referred to in paragraph (a) or (b)) are stored on the premises at any time:

(i) in the case of premises in the regulated area--more than 1,000 tonnes or 1,000 cubic metres,

(ii) in the case of premises outside the regulated area--more than 2,500

tonnes or 2,500 cubic metres, or

(d) more than the following amounts of waste (other than waste referred to in paragraph (a) or (b)) is received per year from off site:

(i) in the case of premises in the regulated area--6,000 tonnes,

(ii) in the case of premises outside the regulated area--12,000 tonnes.

(4) For the purposes of this clause, 1 litre of waste is taken to weigh 1 kilogram.

5. KEY ISSUES

As part of this SEARs request, it is considered appropriate to include brief information associated with the potential environmental and other related assessments as well as potential impacts on human health and the environment. All assessments will pay additional attention to rural residential receivers and other potentially sensitive receptors as identified for each particular assessment.

5.1 AIR QUALITY

Due to the proposed processing capacity of 95,000 tonnes per year, it is expected that there will be air emissions (mainly dust emissions, odours are unlikely) from the proposed activities within the premises. A comprehensive Air quality Impact Assessment will be undertaken by a suitably qualified environmental consultant in accordance with current NSW environmental legislation, policies and guidelines to ensure that the activities could be undertaken with full compliance with the relevant documents. These documents will be referenced to assist in gauging the potential impacts on the nearest sensitive residential receptors that have already been identified. Based on the Air Quality Impact Assessment which will determine the extent of the impact of the activities, appropriate recommended actions and mitigation measures will be included, if required, to minimise the air emission impact on the surrounding environment.

5.2 NOISE IMPACT

Due to the proposed processing capacity of 95,000 tonnes per year, it is expected that there will be noise emissions associated with both the activities undertaken within the premises and the additional trucks entering and leaving the premises. A Noise Impact Assessment will be referenced to assist in gauging the potential impacts on the potentially sensitive residential receptors that have already been identified. A comprehensive Noise Impact Assessment will be undertaken to determine the extent of the impact of the activities and appropriate recommended actions and mitigation measures will be included, if required, to minimise the noise emission impact on the surrounding environment

5.3 TRAFFIC AND ACCESS

A Traffic Impact Assessment will be undertaken by a suitably qualified traffic engineer for the proposed processing capacity of 95,000 tonnes per year as it is expected that potentially there would be a relatively high increase in traffic movements to and from the premises. The Traffic Impact Assessment will be undertaken to determine the extent of the impact of the activities in traffic movements appropriate recommended actions and mitigation measures will be included, if required, to minimise the traffic impact on the surrounding environment.

5.4 STORMWATER AND GROUNDWATER

Due to the activities proposed for the premises and the processing capacity of 95,000 tonnes per year, it is expected that there will be a significant water demand for the processing of materials as well as the proposed facilities. A stormwater management assessment will be undertaken to ensure that firstly, no water is discharged from the premises to the outside environment downstream and secondly there will be sufficient water stored on the premises to feed and supply all the proposed facilities as well as fully supply all relevant mitigation measures.

It should be noted that based on the latest values of rainfalls versus evapotranspiration for that specific area as obtained from the nearest Bureau of Meteorology Automated Weather Station, there have been water deficit in most recent years.

5.5 VISUAL AMENITY AND AESTHETICS

The proposed premises are well placed further away from Park Road and The Norther Road, and well shielded from the public with the existing relatively dense bushland and existing topography. The proposed landscaping strip and earth mounds to be constructed around most of the perimeter of the premises as part of the main mitigation measures will provide great visual protection to all potentially affected receptors.

5.6 FLORA & FAUNA

A comprehensive Flora and Fauna survey and assessment will be undertaken by a highly qualified and experienced Company. The report will include all findings and recommended actions to ensure that the proposed development will have no impact on any flora and fauna species that are covered by any State or Federal legislation. These areas will be fenced off and signposted with "**No Go Zones**" to ensure that these areas are well protected and that the s activities and people undertaking those activities do not interfere with these areas/zones.

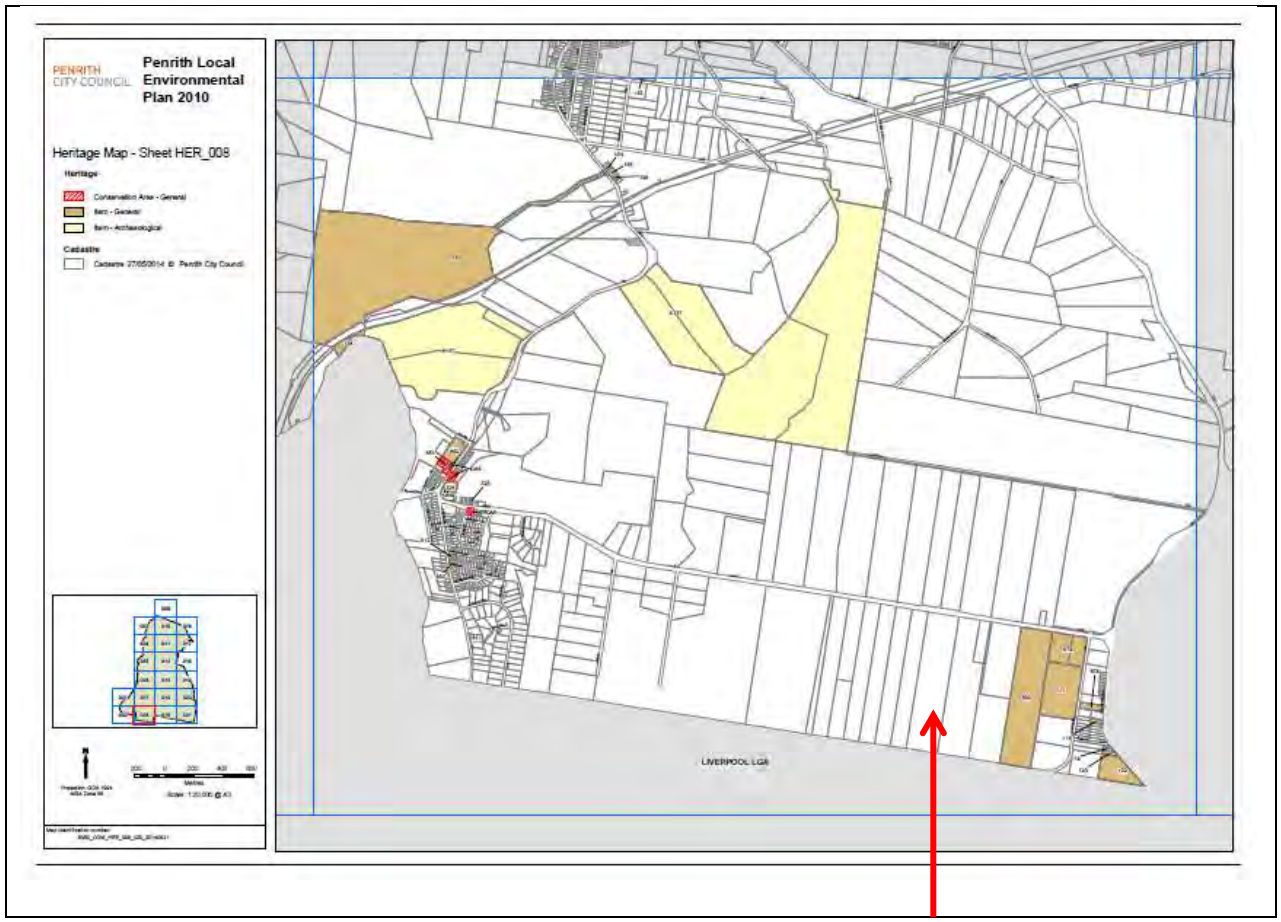
5.7 HERITAGE AND ARCHAEOLOGY

As part of this report, it was considered appropriate to undertake a preliminary review to determine whether there are any Heritage-related (European or Aboriginal) issues associated with the premises. Based on ***Schedule 5 – Part 1 Heritage Items*** of Penrith Local Environmental Plan 2010 (PLEP) titled *"**Environmental Heritage**"***,*** it was clearly evident that there are no sites or objects of heritage values found or identified within the premises. However, it was unclear whether there are any sites or objects of heritage values found or identified immediately adjacent to premises.

Notwithstanding the above and based on the same PLEP's, we reviewed the Heritage Map for the area surrounding the site and found that there are some sites that are of some heritage values. Any environmental assessment should include the potential impacts of the proposed activities on these sites. The Heritage Map extract for that area is included below for completeness.

In any case, a formal comprehensive Heritage and Archaeology assessment will be undertaken to qualify all potential sites that may have any cultural heritage significance.

Figure 5-1: PLEP Heritage Map relevant to the area surrounding the premises



Schedule 5 – Part 3 Archaeological Sites does not include any archaeological sites within or adjacent the proposed premises.

Based on the above table, the following findings are noted:

- *No sites or objects of heritage values were found or identified within or adjacent to the site,*
- *No sites or objects of archaeological values were found or identified within or adjacent to the site.*

The activities conducted on the premises will have no impact on the identified heritage-related sites since they are too far away.

In relation to Heritage value matters, a comprehensive assessments will be undertaken to determine whether there are any Aboriginal sites identified within or adjacent to the premises. In addition, a field survey will be undertaken by qualified persons to determine whether any Aboriginal artefacts are found within or adjacent to the premise. .

5.8 CONSULTATION

Consultation with government departments and the local community plays an important role in ensuring all potential environmental impacts are evaluated. The consultation process provides the opportunity to identify and prioritise issues. Key aspects identified through both the government and community consultation process are addressed in varying degrees throughout this report.

The three (3) items listed are considered to be extremely important in the consultation process for most proposals included this one:

- Liaison with relevant Local, State and Federal government authorities regarding the proposed development and requirements of the report;
- Consultation with relevant stakeholders including community and industry in the vicinity of the subject premises; and
- Compilation of issues of concern raised and outcomes of any meetings undertaken during the consultation process.

We believe that Penrith City Council will undertake consultation and notification in accordance with its own planning legislation, guidelines and policies.

An Integrated and Designated Development will require comprehensive and formal consultation in accordance with the Department of Planning and Environment's consultation related documents as updated from time to time.

6. CONCLUSIONS

Based on the information presented in this document, we believe that we have qualified the proposed development and addressed all aspects of concern.

Therefore, Environmental Risk Assessors Pty Ltd requests on behalf of Australasean Group Pty Ltd the Secretary's Environmental Assessment Requirements (SEARs) applicable to the proposed development as outlined in this document.

7. LIMITATIONS

Our services for this report are carried out in accordance with our current professional standards for the preparation of similar reports. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Australasean Group Pty Ltd (Australasean Group), as per our agreement for providing environmental services. Only Australasean Group is entitled to rely upon the information provided in this report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this report, no warranty is given, nor liability accepted (except what otherwise is required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Australasean Group for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

8. REFERENCES

1. Protection of the Environment Operations Act 1997
2. Protection of the Environment Operations (General) Regulation 2009
3. Protection of the Environment Operations (Waste) Regulation 2014
4. Environmental Planning & Assessment Act 1979
5. Environmental Planning and Assessment Regulation 2000
6. Penrith Local Environmental Plan 2010
7. Penrith Development Control Plan 2010

12 March 2020

TfNSW Reference: SYD18/00724/02
DPIE Reference: SSD-1227
Applicant Reference: 191318_Let2_RMS

Attn: Belinda Middleton
Benbow Environmental
belinda@benbowenviro.com.au

Dear Ms Middleton

RESPONSE TO SUBMISSION FOR PROPOSED RESOURCE RECOVERY FACILITY – 344 PARK ROAD, WALLACIA

Reference is made to the applicant's correspondence dated 2 March 2020 on the proposed resource recovery facility in Wallacia which was referred to Transport for NSW (TfNSW) for comment.

TfNSW provided a response to the Department of Planning, Industry and Environment (DPIE) (formerly Department of Planning and Environment) on 7 June 2018 which outlined TfNSW had reviewed the applicant's request for Secretary's Environmental Assessment Requirements (SEARs) and provided advice around points which should be addressed within the Environmental Impact Statement (EIS).

The previously provided advice has been included as an attachment (Attachment A) to this response and should be referred to when completing the EIS.

If you have any further questions, Laura van Putten, Land Use Planner, would be pleased to take your call on (02) 9563 8651 or please email development.sydney@rms.nsw.gov.au. I hope this has been of assistance.

Yours sincerely

Pahee Rathan
Senior Land Use Assessment Coordinator

Transport for NSW
27 Argyle Street, Parramatta NSW 2150 | Locked Bag 5085, Parramatta NSW 2124
P (02) 8849 2666 | W transport.nsw.gov.au | ABN 18 804 239 602

Attachment A

Transport
Roads & Maritime
Services

7 June 2018

Our Reference: SYD18/00724/01
Department Ref: SEAR 1227

Industry Assessments
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: John Booth (Para-Planner)

Dear Mr Booth,

REQUEST FOR INPUT TO SEARS FOR RESOURCE REVOVERY PARK
344 PARK ROAD, WALLACIA NSW 2745

Reference is made to your email received 4 May 2018 requesting Roads and Maritime Services (Roads and Maritime) to provide details of key issues and assessment requirements regarding the abovementioned development for inclusion in the Secretary's Environmental Assessment Requirements (SEARs).

Roads and Maritime has reviewed the Applicant's request for SEARs and advises that the following should be addressed within the Environmental Impact Statement (EIS):

- A Transport Impact Assessment which details all daily and peak traffic and transport movements likely to be generated (light and heavy vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development
- Details of the proposed operating hours and days for the development
- Details of the proposed staffing numbers along with shifts and numbers at different times of the day
- Details of the current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development
- An assessment of the operation of existing and future known transport networks including public transport, pedestrian and bicycle provisions and their ability to accommodate the forecast number of trips to and from the development
- Details the type of heavy vehicles likely to be used (e.g. B-doubles) during the operation of the development and the impacts of heavy vehicles on nearby intersections
- Details of access to, from and within the site from the road network including intersection location, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements)
- Impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site

- An assessment of the existing and future performance of key intersections providing access to the site (at a minimum, the intersection of Park Road / The Northern Road should be assessed), and any upgrades (road / intersections) required as a result of the development. The assessment needs to be supported by appropriate modelling and analysis to the satisfaction of Roads and Maritime Services
- An assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development
- Plans of any road upgrades or new roads required for the development, if necessary
- Demonstrate the measures to be implemented to encourage users of the development to make sustainable travel choices, including walking, cycling, public transport and car sharing
- Appropriate provision, design and location of on-site bicycle parking, and how bicycle provision will be integrated with the existing bicycle network
- Details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on the site
- Details of access and parking arrangements for emergency vehicles
- Detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards
- Details of any likely dangerous goods to be transported on arterial and local roads to/from the site, if any, and the preparation of an incident management strategy, if necessary
- The existing and proposed pedestrian and bicycle routes and end of trip facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principle.
- Preparation of a draft Construction Traffic Management Plan which includes:
    - details of vehicle routes, number of trucks, hours of operation, access management and traffic control measures for all stages of construction
    - assessment of cumulative impacts associated with other construction activities
    - an assessment of road safety at key intersections in the vicinity of the site
    - details of anticipated peak hour and daily truck movements to and from the site
    - details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements
    - details of temporary cycling and pedestrian access during constructions
    - an assessment of traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrians, cyclists and public transport operations.

Should you have any further inquiries in relation to this matter, please do not hesitate to contact the undersigned by email at development.sydney@rms.nsw.gov.au.

Yours sincerely,

Aleks Tancevski
Senior Land Use Planner
South East Precinct, Sydney Division

EIS Attachment 2: Section 10.7 Certificate

PENRITH CITY COUNCIL

Civic Centre
601 High Street, Penrith

PO Box 60 Penrith NSW 2751

Telephone: 02 4732 7777
Facsimile: 02 4732 7958

Email: pencit@penrithcity.nsw.gov.au

PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Property No: 464107
Your Reference: Park Road Wallacia
Contact No:

Issue Date: 06 March 2020
Certificate No: 20/01065

Issued to: Ms L Claron Consulting
PO Box 542
LINDFIELD NSW 2070

PRECINCT 2010

DESCRIPTION OF LAND

County: CUMBERLAND **Parish: BRINGELLY**

Location: 344 Park Road WALLACIA NSW 2745
Land Description: Lot 5 DP 655046

- PART 1 PRESCRIBED MATTERS –

In accordance with the provisions of Section 10.7(2) of the Act the following information is furnished in respect of the abovementioned land:

1 NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPs

1(1) The name of each environmental planning instrument that applies to the carrying out of development on the land:

Penrith Local Environmental Plan 2010, published 22nd September 2010, as amended, applies to the land.

Sydney Regional Environmental Plan No.9 - Extractive Industry (No.2), gazetted 15 September 1995, as amended, applies to the local government area of Penrith.

Sydney Regional Environmental Plan No. 20 - Hawkesbury-Nepean River (No. 2 - 1997), gazetted 7 November 1997, as amended, applies to the local government area of Penrith (except land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies).

The following State environmental planning policies apply to the land (subject to the exclusions noted below):

State Environmental Planning Policy No.19 - Bushland in Urban Areas. (Note: This policy does not apply to certain land referred to in the National Parks and Wildlife Act 1974 and the Forestry Act 1916.)
State Environmental Planning Policy No.21 - Caravan Parks.
State Environmental Planning Policy No.33 - Hazardous and Offensive Development.
State Environmental Planning Policy No.50 - Canal Estate Development. (Note: This policy does not apply to the land to which State Environmental Planning Policy (Penrith Lakes Scheme) 1989 applies.
State Environmental Planning Policy No.55 - Remediation of Land.
State Environmental Planning Policy No.64 - Advertising and Signage.

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State Environmental Planning Policy No.65 - Design Quality of Residential Apartment Development.
State Environmental Planning Policy No.70 - Affordable Housing (Revised Schemes).
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 (Note: This policy applies to land within New South Wales that is land zoned primarily for urban purposes or land that adjoins land zoned primarily for urban purposes, but only as detailed in clause 4 of the policy.)
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004.
State Environmental Planning Policy (State Significant Precincts) 2005.
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2013.
State Environmental Planning Policy (Infrastructure) 2007.
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
State Environmental Planning Policy (Affordable Rental Housing) 2009.
State Environmental Planning Policy (State and Regional Development) 2011.
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
State Environmental Planning Policy (Education Establishments and Child Care Centre Facilities) 2017.
State Environmental Planning Policy (Primary Production and Rural Development) 2019.

1(2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act:

(Information is provided in this section only if a proposed environmental planning instrument that is or has been the subject of community consultation or on public exhibition under the Act will apply to the carrying out of development on the land.)

Draft State Environmental Planning Policy (Western Sydney Corridors) may apply to the land. Further information is available here: https://www.transport.nsw.gov.au/corridors.

On 22 June 2018, the NSW Government announced changes to the recommended alignments for the Western Sydney corridors, including continuing with the previously gazetted 1951 corridor for the Bells Line of Road Castlereagh Connection.

Draft State Environmental Planning Policy (Environment) applies to the land.

Draft State Environmental Planning Policy (Remediation of Land) applies to the land.

Draft State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 applies to the land.

Draft State Environmental Planning Policy (Infrastructure) 2007 applies to the land.

Draft State Environmental Planning Policy (State and Regional Development) 2011 applies to the land.

1(3) The name of each development control plan that applies to the carrying out of development on the land:

Penrith Development Control Plan 2014 applies to the land.

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2 ZONING AND LAND USE UNDER RELEVANT LEPs

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

2(a)-(d) the identity of the zone; the purposes that may be carried out without development consent; the purposes that may not be carried out except with development consent; and the purposes that are prohibited within the zone. Any zone(s) applying to the land is/are listed below and/or in annexures.

(Note: If no zoning appears in this section see section 1(1) for zoning and land use details (under the Sydney Regional Environmental Plan or State Environmental Planning Policy that zones this property).)

Zone RU1 Primary Production
(Penrith Local Environmental Plan 2010)

1 Objectives of zone

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To protect and enhance the existing agricultural landscape character of the land.
- To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.
- To preserve and improve natural resources through appropriate land management practices.

2 Permitted without consent

Extensive agriculture; Home occupations; Intensive plant agriculture

3 Permitted with consent

Agricultural produce industries; Agriculture; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cellar door premises; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Extractive industries; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Home-based child care; Home businesses; Home industries; Information and education facilities; Intensive livestock agriculture; Open cut mining; Roads; Roadside stalls; Rural supplies; Secondary dwellings; Stock and sale yards

4 Prohibited

Any other development not specified in item 2 or 3

Flood planning

All or part of the subject land is identified in Penrith Local Environmental Plan 2010 (PLEP 2010) Clause 7.2 Flood Planning. Development consent is required for any development on land to which Clause 7.2 of PLEP 2010 applies.

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Rural subdivision

Under the terms of Clause 4.2 of Penrith Local Environmental Plan 2010 land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU4 Primary Production Small Lots or Zone RU6 Transition may, with development consent, be subdivided for the purpose of primary production to create a lot of a size that is less than the minimum size shown on the Penrith Local Environmental Plan 2010 Lot Size Map in relation to that land. Such a lot cannot be created if an existing dwelling would, as a result of the subdivision, be situated on the lot; and a dwelling cannot be erected on such a lot.

Residential development and subdivision prohibited in certain rural, residential and environment protection zones

Under the terms of Clause 4.2A of Penrith Local Environmental Plan 2010 (PLEP 2010) on land within Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU4 Primary Production Small Lots, Zone RU5 Village, Zone R5 Large Lot Residential, Zone E3 Environmental Management or Zone E4 Environmental Living development consent must not be granted for the erection of a dwelling house on a lot resulting from the closure of part or all of a road, whether before or after the commencement of this Plan. This requirement does not apply to a lot created by the consolidation of a lot resulting from a road closure with an adjoining lot that did not result from a road closure.

Additional information relating to Penrith Local Environmental Plan 2010

Note 1: Under the terms of Clause 2.4 of Penrith Local Environmental Plan 2010 development may be carried out on unzoned land only with development consent.

Note 2: Under the terms of Clause 2.6 of Penrith Local Environmental Plan 2010 land may be subdivided but only with development consent, except for the exclusions detailed in the clause.

Note 3: Under the terms of Clause 2.7 of Penrith Local Environmental Plan 2010 the demolition of a building or work may be carried out only with development consent.

Note 4: A temporary use may be permitted with development consent subject to the requirements of Clause 2.8 of Penrith Local Environmental Plan 2010.

Note 5: Under the terms of Clause 4.1A of Penrith Local Environmental Plan 2010, despite any other provision of this plan, development consent must not be granted for dual occupancy on an internal lot in Zone R2 Low Density Residential.

Note 6: Under the terms of Clause 5.1 of Penrith Local Environmental Plan 2010 development on land acquired by an authority of the State under the owner-initiated acquisition provisions may, before it is used for the purpose for which it is reserved, be carried out, with development consent, for any purpose.

Note 7: Under the terms of Clause 5.3 of Penrith Local Environmental Plan 2010 development consent may be granted to development of certain land for any purpose that may be carried out in an adjoining zone.

Note 8: Clause 5.10 of Penrith Local Environmental Plan 2010 details when development consent is required/not required in relation to heritage conservation.

Note 9: Under the terms of Clause 5.11 of Penrith Local Environmental Plan 2010 bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.

Note 10: Under the terms of Clause 7.1 of Penrith Local Environmental Plan 2010 (PLEP 2010) development consent is required for earthworks unless the work is exempt development under PLEP 2010 or another applicable environmental planning instrument, or the work is ancillary to other development for which development consent has been given.

Note 11: Sex services premises and restricted premises may only be permitted subject to the requirements of Clause 7.23 of Penrith Local Environmental Plan 2010.

2(e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed:

(Information is provided in this section only if any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed.)

2(f) whether the land includes or comprises critical habitat:

(Information is provided in this section only if the land includes or comprises critical habitat.)

2(g) whether the land is in a conservation area (however described):

(Information is provided in this section only if the land is in a conservation area (however described).)

2(h) whether an item of environmental heritage (however described) is situated on the land:

(Information is provided in this section only if an item of environmental heritage (however described) is situated on the land.)

2A ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

(Information is provided in this section only if the land is within any zone under State Environmental Planning Policy (Sydney Region Growth Centres) 2006.)

3 COMPLYING DEVELOPMENT

HOUSING CODE

(The Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

RURAL HOUSING CODE

(The Rural Housing Code only applies if the land is within Zones RU1, RU2, RU3, RU4, RU6 or R5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Rural Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

LOW RISE MEDIUM DENSITY HOUSING CODE

(The Low Rise Medium Density Housing Code only applies if the land is within Zones R1, R2, R3 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Low Rise Medium Density Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones.

Please note that Council has been deferred from the application of Part 3B of the Low Rise Medium Density Housing Code until 1 July 2020. That Part will not apply to Penrith Local Government Area during this time.

GREENFIELD HOUSING CODE

(The Greenfield Housing Code only applies if the land is within Zones R1, R2, R3, R4 or RU5 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.)

Complying development under the Greenfield Housing Code **may** be carried out on the land if the land is within one of the abovementioned zones, and if the land is identified as a Greenfield Housing Code Area by the Greenfield Housing Code Area Map.

HOUSING ALTERATIONS CODE

Complying development under the Housing Alterations Code **may** be carried out on the land.

GENERAL DEVELOPMENT CODE

Complying development under the General Development Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL ALTERATIONS CODE

Complying development under the Commercial and Industrial Alterations Code **may** be carried out on the land.

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SUBDIVISIONS CODE

Complying development under the Subdivisions Code **may** be carried out on the land.

DEMOLITION CODE

Complying development under the Demolition Code **may** be carried out on the land.

COMMERCIAL AND INDUSTRIAL (NEW BUILDINGS AND ADDITIONS) CODE

(The Commercial and Industrial (New Buildings and Additions) Code only applies if the land is within Zones B1, B2, B3, B4, B5, B6, B7, B8, IN1, IN2, IN3, IN4 or SP3 under Penrith Local Environmental Plan 2010 or an equivalent zone in a non standard template planning instrument.)

Complying development under the Commercial and Industrial (New Buildings and Alterations) Code **may** be carried out on the land if the land is within one of the abovementioned zones.

FIRE SAFETY CODE

Complying development under the Fire Safety Code **may** be carried out on the land.

(NOTE: (1) Council has relied on Planning and Infrastructure Circulars and Fact Sheets in the preparation of this information. Applicants should seek their own legal advice in relation to this matter with particular reference to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.
(2) Penrith Local Environmental Plan 2010 (if it applies to the land) contains additional complying development not specified in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.)

4 COASTAL PROTECTION

The land is not affected by the operation of sections 38 or 39 of the Coastal Protection Act 1979, to the extent that council has been so notified by the Department of Public Works.

5 MINE SUBSIDENCE

The land is not proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

6 ROAD WIDENING AND ROAD REALIGNMENT

The land is not affected by any road widening or road realignment under:
(a) Division 2 of Part 3 of the Roads Act 1993, or
(b) an environmental planning instrument, or
(c) a resolution of council.

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7 COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

(a) Council Policies

The land is affected by the Asbestos Policy adopted by Council.
The land is not affected by any other policy adopted by the council that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

(b) Other Public Authority Policies

The Bush Fire Co-ordinating Committee has adopted a Bush Fire Risk Management Plan that covers the local government area of Penrith City Council, and includes public, private and Commonwealth lands.
The land is not affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council, that restricts the development of the land because of the likelihood of land slip, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

7A FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

(1) Development on the land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) (if such uses are permissible on the land) is subject to flood related development controls.

(2) Development on the land or part of the land for industrial or commercial purposes (if such uses are permissible on the land) is subject to flood related development controls.
Development on the land or part of the land for purposes other than industrial or commercial, or for purposes other than those referred to in (1) above, will be considered on a merits based approach and flood related development controls may apply.

Note: The land is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. On application and payment of the prescribed fee Council may be able to provide in writing a range of advice in regard to the extent of flooding affecting the property.

8 LAND RESERVED FOR ACQUISITION

No environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 3.15 of the Act.

9 CONTRIBUTIONS PLANS

The Cultural Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith.

The Penrith City Local Open Space Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, excluding industrial areas and the release areas

identified in Appendix B of the Plan (Penrith Lakes, Cranebrook, Sydney Regional Environmental Plan No. 30 - St Marys, Waterside, Thornton, the WELL Precinct, Glenmore Park and Erskine Park).

The Penrith City District Open Space Facilities Development Contributions Plan applies anywhere residential development is permitted within the City of Penrith, with the exclusion of industrial lands and the Penrith Lakes development site.

9A BIODIVERSITY CERTIFIED LAND

(Information is provided in this section only if the land is biodiversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*.)

10 BIODIVERSITY STEWARDSHIP SITES

(Information is provided in this section only if Council has been notified by the Chief Executive of the Office of Environment and Heritage that the land is land to which a biobanking stewardship agreement under Part 5 of the *Biodiversity Conservation Act 2016* relates.)

10A NATIVE VEGETATION CLEARING SET ASIDES

(Information is provided in this section only if Council has been notified of the existence of a set aside area by Local Land Services or it is registered in the public register under which section 60ZC of the *Local Land Services Act 2013* relates).

11 BUSH FIRE PRONE LAND

All of the land is identified as bush fire prone land according to Council records. Guidance as to restrictions that may be placed on the land as a result of the land being bush fire prone can be obtained by contacting Council. Such advice would be subject to further requirements of the NSW Rural Fire Services.

12 PROPERTY VEGETATION PLANS

(Information is provided in this section only if Council has been notified that the land is land to which a property vegetation plan approved under the *Native Vegetation Act 2003* applies and continues in force.)

13 ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

(Information is provided in this section only if Council has been notified that an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.)

14 DIRECTIONS UNDER PART 3A

(Information is provided in this section only if there is a direction by the Minister in force under section 75P(2)(c1) of the Act (repealed on 1st October 2011) that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect.)

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15 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS AFFECTING SENIORS HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (seniors housing), of which the council is aware, issued under State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 18(2) of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.)

16 SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

(Information is provided in this section only if there is a valid site compatibility certificate (infrastructure), of which council is aware, in respect of proposed development on the land.)

17 SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

(Information is provided in this section only if:

(a) there is a current site compatibility certificate (affordable rental housing), of which the council is aware, in respect of proposed development on the land; and/or

(b) any terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 have been imposed as a condition of consent to a development application in respect of the land.)

18 PAPER SUBDIVISION INFORMATION

(Information is provided in this section only if a development plan adopted by a relevant authority applies to the land or is proposed to be subject to a consent ballot, or a subdivision order applies to the land.)

19 SITE VERIFICATION CERTIFICATES

(Information is provided in this section only if there is a current site verification certificate, of which council is aware, in respect of the land.)

NOTE: The following matters are prescribed by section 59(2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate

(a) (Information is provided in this section only if, as at the date of this certificate, the land (or part of the land) is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997.)

(b) (Information is provided in this section only if, as at the date of this certificate, the land is subject to a management order within the meaning of the Contaminated Land Management Act 1997.)

(c) (Information is provided in this section only if, as at the date of this certificate, the land is the subject of an approved voluntary management proposal within the meaning of the Contaminated Land Management Act 1997.)

(d) (Information is provided in this section only if, at the date of this certificate, the land subject to an ongoing maintenance order within the meaning of the Contaminated Land Management Act 1997.)

(e) (Information is provided in this section only if the land is the subject of a site audit statement within the meaning of the Contaminated Land Management Act 1997 - a copy of which has been provided to Council.)

Note: Section 10.7(5) information for this property may contain additional information regarding contamination issues.

20 LOOSE FILL ASBESTOS INSULATION

(Information is provided in this section only if there is a residential premises listed on the register of residential premises that contain or have contained loose-fill asbestos insulation (as required by Division 1A of Part 8 of the Home Building Act 1989))

21 AFFECTED BUILDING NOTICES AND BUILDING PRODUCT RECTIFICATION ORDERS

(Information is provided in this section only if Council is aware of any "affected building notice" and/or a "building product rectification order" in force for the land).

Note: The Environmental Planning and Assessment Amendment Act 2017 commenced operation on the 1 March 2018. As a consequence of this Act the information contained in this certificate needs to be read in conjunction with the provisions of the Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017, and Environmental Planning and Assessment Regulation 2000.

Information is provided only to the extent that Council has been notified by relevant government departments.

10.7(5) Certificate
This Certificate is directed to the following
relevant matters affecting the land

When information pursuant to section 10.7(5) is requested the Council is under no obligation to furnish any of the information supplied herein pursuant to that section. Council draws your attention to section 10.7(6) which states that a council shall not incur any liability in respect of any advice provided in good faith pursuant to sub-section (5). The absence of any reference to any matter affecting the land shall not imply that the land is not affected by any matter not referred to in this certificate.

Note:

- Council's 10.7(5) information does not include development consent or easement information. Details of development consents may be obtained by making enquiries with Council's Development Services Department pursuant to section 12 of the Local Government Act 1993 or (for development applications lodged after January

2007) by viewing the Online Services area at www.penrithcity.nsw.gov.au . Details of any easements may be obtained from a Title Search at Land and Property Information New South Wales.

- This certificate does not contain information relating to Complying Development Certificates.
- This certificate may not provide full details of development rights over the land.

* Biodiversity Conservation Act 2016

When considering any development application Council must have regard to the Biodiversity Conservation Act 2016. Please note that this legislation may have application to any land throughout the city. Interested persons should make their own enquiries in regard to the impact that this legislation could have on this land.

* Agricultural Activities Within Rural Areas

This property is located in a rural area and there may be certain agricultural activities occurring that some people may find offensive (for example noise, dust and odours). This should be considered if you purchase the subject property or build a dwelling thereon.
If you do purchase the subject property or build a dwelling, the potential impact that your activities (for example pets, inadequate fencing, drainage, litter and poor weed control) might have on the agricultural activities in the area should also be considered.

* Scenic and Landscape Values

The land is identified as "Land with Scenic and Landscape Values" on the Penrith Local Environmental Plan 2010 Scenic and Landscape Values Map. See Clause 7.5 of Penrith Local Environmental Plan 2010 and Chapter C1 Site Planning and Design of Penrith Development Control Plan 2014.

* Preservation of Trees and Vegetation

See Chapter C2 of Penrith Development Control Plan 2014 for specific controls relating to the preservation of trees and vegetation.

* Dual Occupancy and Secondary Dwellings Controls

See Clause 7.10 of Penrith Local Environmental Plan 2010 for specific controls relating to dual occupancy and secondary dwellings in Zones RU1, RU2, RU4, E3 and E4.

* Development Control Plan General Information

Penrith Development Control Plan 2014 which applies to the land, sets out requirements for a range of issues that apply across the Penrith Local Government Area, including:

- Site Planning and Design Principles
- Vegetation Management
- Water Management
- Land Management
- Waste Management
- Landscape Design
- Culture and Heritage
- Public Domain
- Advertising and Signage
- Transport, Access and Parking
- Subdivision
- Noise and Vibration, and

- Infrastructure and Services.

The Development Control Plan also specifies requirements relating to various types of land uses including:

- Rural Land Uses
- Residential Development
- Commercial and Retail Development, and
- Industrial Development

as well as for a number of specific activities, including child care centres; health consulting rooms; educational establishments; parent friendly amenities; places of public worship; vehicle repair stations; cemeteries, crematoria and funeral homes; extractive industries; and telecommunication facilities.

The Development Control Plan also details requirements relating to key precincts within the Penrith Local Government Area, including:

- Caddens
- Claremont Meadows Stage 2
- Cranebrook
- Emu Heights
- Emu Plains
- Erskine Business Park
- Glenmore Park
- Kingswood
- Mulgoa Valley
- Orchard Hills
- Penrith
- Penrith Health and Education Precinct
- Riverlink Precinct
- St Clair,
- St Marys / St Marys North, and
- Sydney Science Park.

Penrith Development Control Plan 2014 may be accessed at https://www.penrithcity.nsw.gov.au/Building-and-Development/Planning-and-Zoning/Planning-Controls/Development-Control-Plans/

Warwick Winn
General Manager

PER

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PLANNING CERTIFICATE UNDER SECTION 10.7

Environmental Planning and Assessment Act, 1979

Please note:

Certain amendments to the Environmental Planning and Assessment Act 1979 No 203 (Act) commenced on 1 March 2018.

The Environmental Planning and Assessment (Amendment) Act 2017 No 60 makes structural changes to the Act and, as a consequence, the Act has been renumbered in a decimal format. For example, Section 149 Planning Certificates have become Section 10.7 Certificates. Some of the information in this certificate may refer to the previous version of the Act.

Council is committed to updating all relevant documents in a timely manner. This will include planning instruments, applications, approvals, orders, certificates, forms and other associated documents in both printed and electronic versions. Council is required to implement these changes and regrets any inconvenience caused to the local business, industry and the community.

EIS Attachment 3: Pre-lodgement Meeting Advice

PENRITH

Our Ref: PL20/0023
Contact: Wendy Connell
Telephone: (02) 4732 7908

20 April 2020

Carlo Ranieri
2051-2053 The Northern Road
GLENMORE PARK NSW 2745

Dear Carlo,

Pre-lodgement Advice
Proposed Development Resource Recovery Facility
Lot 5 DP 655046, 344 Park Road WALLACIA NSW 2745

Thank you for taking part in Council's pre-lodgement service. The information provided was useful for Council in gaining an understanding of your proposal.

Unfortunately, the proposal in its current form is not supported. The attached advice is provided for your information and review.

Information given by the pre-lodgement panel does not constitute a formal assessment of your proposal and at no time should comments of the officers be taken as a guarantee of approval of your proposal.

If we can help you any further regarding the attached advice, please feel free to contact me on (02) 4732 7908.

Yours sincerely

Wendy Connell
Senior Development Assessment Planner

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NSW 2751 Australia
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PENRITH
CITY COUNCIL

PRE-LODGEMENT ADVICE

Proposal Resource Recovery Facility

Address Lot 5 DP 655046

344 Park Road WALLACIA NSW 2745

Advice provided by the following Council Officers:

Wendy Connell – Senior Development Assessment Planner

Joshua Romeo – Senior Waste Planning Officer

Craig Squires – Building Certification and Fire Safety Coordinator

Stephen Masters – Senior Development Engineer

Graham Green – Senior Traffic Engineer

Carlie Fulton – Senior Environmental Health Officer

Zoning: RU1 Primary Production under Penrith Local Environmental Plan 2010

Development Type: Integrated and Designated – 30 day advertising period.

Site Constraints:

- Flood-related development controls
- Bushfire prone land
- Scenic and landscape values
- Native vegetation on site
- Mapped watercourse(s) traverse the site
- Main road location

The pre-lodgement panel will endeavour to provide information which will enable you to identify issues that must be addressed in any application. The onus remains on the applicant to ensure that all relevant controls and issues are considered prior to the submission of an application.

RELEVANT EPIs POLICIES AND GUIDELINES

- Sydney Regional Environmental Plan no 20 – Hawkesbury Nepean River (No 2 - 1997)
- State Environmental Planning Policy 33 – Hazardous and Offensive Development
- State Environmental Planning Policy. No 55 – Remediation of Land
- State Environmental Planning Policy (Infrastructure) 2007
- Penrith Local Environmental Plan 2010
- Penrith Development Control Plan 2014

KEY ISSUES AND OUTCOMES

Should the proposal be pursued any future development application will need to satisfactorily address the following issues:

PLANNING:

While it is acknowledged that SEARs have been issued for the proposal by the Department of Planning, it is noted that the expiry date of the SEARs is imminent.

The information provided for review has not satisfactorily demonstrated that the site is consistent with the strategic context in which it sits, and that the site is suitable for the proposed development.

The subject land is zoned *RU1 Primary Production* under Penrith Local Environmental Plan (LEP) 2010. The proposal is defined as "resource recovery facility". A resource recovery facility is defined as:

> *"Resource recovery facility means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration".*

Resource recovery facilities are a prohibited form of development in the *RU1* zone.

It is noted that resource recovery facilities are a permissible form of development in the *RU1 Primary Production* zone under Clause 121 of State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP).

However, notwithstanding permissibility, it is considered that the site is not suitable for the proposed development based on the following considerations:

- The proposal is inconsistent with several objectives of the *RU1 Primary Production* zone under Penrith LEP 2010, as detailed below.
  - *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
  - *To protect and enhance the existing agricultural landscape character of the land.*
  - *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*
  - *To preserve and improve natural resources through appropriate land management practices.*

- The proposal is not compatible with the surrounding rural area and is likely to have direct amenity impacts on nearby residences, particularly given a proposed 24/7 operation.

- The site is identified as having scenic character and landscape values under Clause 6.5 of Penrith LEP 2010. The location and layout of the proposed

development would result in unacceptable visual impacts. No elevations were provided to assess the built form impacts however hardstand truck and staff parking areas would adversely affect the visual amenity and scenic quality of the area.

- The development would have the potential to adversely affect the environmental values of the site. In this regard, the site is mapped as containing:

  - Cumberland Plain Woodland - a Critically Endangered Ecological Community under both State and Federal legislation;
  - Shale Plains Woodland which is listed as a Critically Endangered Ecological Community under State legislation; and
  - *Dillwynia Tenuifolia*, a vulnerable plant species under the Threatened Species Conservation Act 1995.

  Although not outlined on the site plan, no on-site sewage management system and/or disposal areas have been nominated. This, as well as the site being mapped as bush fire prone land and affected by flood related development controls, would increase the likelihood for vegetation removal to facilitate the proposed use.

  Biodiversity requirements are included in SEAR 1227, including:

  - “accurate predictions of any vegetation clearing on site or for any road upgrades",
  - "an assessment of the proposal in accordance with the Biodiversity Assessment Method (BAM) including an assessment of any potential impacts on aquatic and riparian vegetation and groundwater dependent ecosystems".

  Therefore, a Biodiversity Development Assessment Report would need to be prepared, according to the BAM. The requirement for this report is also appropriate given some of the land on the property is located on the Biodiversity Values Map.

  The BDAR needs to give due consideration, in accordance with the BAM, to biodiversity impacts during construction and operation phases. Notably, comprehensive consideration of land falling within the Biodiversity Values Map is warranted.

  The site may be subject to historic compliance matters. A response to the previous clearing within the subject site should be addressed in any future development proposal, if not resolved prior.

- Any impacts on the site from the proposed Outer Sydney Orbital need to be established in consultation with TfNSW (formerly RMS).

ENVIRONMENTAL MANAGEMENT:

Integrated Development - NSW EPA Licence

Resource recovery activities are considered a scheduled activity under the *Protection of the Environment Operations Act*. In turn, any application will need to be referred to the EPA for comment and General Terms of Approval. Council encourages early discussions with the EPA to determine whether they require any further information or whether they have concerns about the proposed

development. Further, the EPA may have more specific requirements to those outlined below.

Noise Impacts

An acoustic assessment is required to be submitted as part of any development application to demonstrate that the proposed development will not have any noise impact on nearby sensitive receivers, including nearby residences. This Report is to be prepared by a suitably qualified acoustic consultant and is to consider:

- The *NSW Noise Policy for Industry* in terms of assessing the noise impacts associated with the development, all noise generating activities on the site (including, but not limited to, use of plant and equipment, sorting activities, deliveries, traffic and car parking);
- The acoustic report should also take into consideration the potential impact from road traffic noise resulting from vehicles entering and exiting site, demonstrating compliance with *NSW Road Noise Policy;* and
- Given the proposed hours of operation, the acoustic report should also consider the requirements of the NSW EPA's Sleep Disturbance Criteria.

Should mitigation measures be necessary, recommendations should be included to this effect and should be shown on all architectural plans.

Air Quality

An Air Quality Assessment prepared by a suitably qualified environmental consultant is to take into account all activities on the site that may cause air quality/odour impacts. This assessment is to consider the relevant NSW EPA guidelines and criteria, including the 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales' and the *Protection of the Environment Operations (Clean Air) Regulation 2010*, and the location of sensitive receivers.

Water Quality

It needs to be demonstrated that the use will not cause water pollution or enable contaminated water to enter local watercourses. In turn, a water management plan that addresses all stormwater and water used in the environmental management of the site, as well as information regarding proposed pollution control devices and bunding, is to be provided, including specifications.

State Environmental Planning Policy 33 – Hazardous and Offensive Development

Consider the Department of Planning's 'Applying SEPP 33' Guidelines and address the risk screening to determine whether a Preliminary Hazard Analysis is required. If required, a Preliminary Hazard Analysis should be prepared in accordance with the guidelines and submitted with any future development application. Consider inputs and outputs, what stored on site, and other activities occurring on the site and nearby.

Contamination (SEPP 55)

The application is to address all relevant requirements under State Environmental Planning Policy 55 Remediation of Land (SEPP 55). Council cannot consent to any

development unless these requirements have been satisfied.

Given the unauthorised activities that have occurred on the property, including the importation of fill materials and waste, a Stage 2 Detailed Site Investigation is to be submitted with any future development application. This report is to be prepared by a suitably qualified environmental consultant and is to consider the relevant NSW Environment Protection Authority Guidelines and the National Environment Protection (Assessment of Site Contamination) Measure. Should remediation works be found to be required, these works should form a part of this application. All remediation works in the Penrith Local Government Area are considered Category 1 works and require development consent.

It is also noted that in the NSW Environment Protection Authority's correspondence they have identified that asbestos and other wastes have been stored on the site. They have requested that proof of the lawful disposal of these materials is also submitted with any application.

Waste Management

A Waste Management Plan is to be provided with any future development application addressing waste produced during the demolition, construction and operational phases of the development. It should address waste quantities, storage locations and removal. Vehicular access for collection also needs to be addressed.

As the proposal is for a resource recovery facility, details of the proposed types of waste to be processed, as well as quantities and processing procedures is to be provided. The NSW Environment Protection Authority has provided specific comment regarding this aspect.

On-Site Sewage Management

As the property is not serviced by Sydney Water's sewerage system, all wastewater will need to be managed through an on-site sewage management system. In turn, the proposal will need to be supported by a Wastewater Assessment Report that demonstrates that the site has the capacity to manage wastewater generated by all activities carried out on the property.

The Wastewater Report will need to be prepared by a suitably qualified consultant and address the requirements of Council's On-Site Sewage Management and Greywater Reuse Policy and AS/NZ 1547:2012, including all relevant buffer distances. The Report will need to establish the expected water load from the development, identify a system type and an effluent disposal area. It is noted that the property is affected by overland flow, and, in turn, Section 2.1.7 of Council's Policy will also need to be addressed.

General Environmental Health Impacts

The environmental impacts associated with the demolition and construction phases of the development will also need to be addressed, such as water quality, noise, dust, air quality and sediment and erosion control.

ENGINEERING:

General

- Council's engineering requirements for subdivisions and developments, including policies and specifications listed herein, can be located on Council's website at the following link: https://www.penrithcity.nsw.gov.au/Building-and-Development/Development-Applications/Engineering-requirements-for-developments/

- All engineering works must be designed and constructed in accordance with Council's *Design Guidelines for Engineering Works for Subdivisions and Developments* and Council's *Engineering Construction Specification for Civil Works.*

Stormwater

- Stormwater drainage for the site must be in accordance with the following:
  - Council's Development Control Plan,
  - *Stormwater Drainage Specification for Building Developments* policy, and
  - *Water Sensitive Urban Design Policy* and *Technical Guidelines.*
- A stormwater concept plan, accompanied by a supporting report and calculations, shall be submitted with the application
- Stormwater discharge from the site is to be contained to pre-developed flows. Accordingly, an On-site Stormwater Detention (OSD) system is to be provided for the site.
- The on-site detention system must be within common property and accessible from the street without going through dwellings or private courtyards.
- A water sensitive urban design strategy prepared by a suitably qualified person is to be provided for the site. The strategy shall address water conservation, water quality, water quantity, and operation and maintenance.
- The material resource recovery operations area and the proposed small truck parking area are to be bunded to contain all stormwater runoff from the site.
- All stormwater runoff from the site shall be treated in accordance with Council's adopted Water sensitive Urban Design Policy and Technical Guidelines. MUSIC modelling is to be submitted (.sqz file) demonstrating compliance.

Local Overland Flows

- The site is affected by local overland flow flooding and is subject to flood related development controls.
- It is understood that the applicant has previously obtained flood information from Council showing flood levels for various sections of the property.
- All plans for the site shall have levels and details to AHD.
- The application must demonstrate that the development proposal is consistent with Council's Development Control Plan for Flood Liable Land.
- Details of the culvert under the main access driveway are to be provided including a capacity assessment for the 1% AEP local overland flow.

Traffic & Internal Roads

- Park Road is a TfNSW (formerly RMS) classified road and requires referral to TfNSW under SEPP Infrastructure as well as under the SEARs and EIS requirements.

  Any development applicant is requested to include a Traffic and Access Report prepared by a suitably qualified person addressing, but not limited, to pre-lodgement TfNSW advice, advice regarding the impact of the proposed M9 traffic corridor on the site, traffic generation, impact on the road network (including the intersection of Park Road and The Northern Road, Park Road and the development access at Park Road), size, type and volume of vehicle access to site, driveway access, heavy vehicle access, management of staff/visitor vehicle conflict with heavy vehicle access (particularly removal of conflicts at the internal intersection of these conflicting access aisles), loading areas, manoeuvring areas and car parking in accord with TfNSW Guidelines, Austroads guidelines, Australian Standard (AS) 2890 Parts 1, 2 and Council Development Control Plans) clearly demonstrating satisfactory manoeuvring on-site and forward entry and exit into and from Park Road.

  The Traffic and Access Report is requested to include plans and assessment of the proposed traffic arrangements at the Park Road / Access Driveway intersection to provide intersection arrangements, driver sight distances and turning movements that are acceptable to both TfNSW and Council.

  An operational Traffic Management Plan to manage and control heavy vehicle access routes that are requested to be predominantly via The Northern Road / Park Road route.

- The access driveway from Park Road to the weighbridge is to be sealed with a heavy duty pavement. The proposed car park is also to be sealed.

- The operations area and small truck parking area is to be constructed of a suitably stabilised pavement to minimise erosion.

- Details of ongoing dust suppression maintenance from the operations area is to be provided.

Earthworks

- No retaining walls or filling is permitted for this development which will impede, divert or concentrate stormwater runoff passing through the site.

- Earthworks and retaining walls must comply with Council's Development Control Plan.

- Proposed fill material must comply with Council's Development Control Plan.

- The application is to be supported by a geotechnical report prepared by a suitably qualified person and shall assess all areas of existing fill with regards to ground water movement, salinity and contamination.

BUILDING:

- The Resource Recovery Facility building is to be constructed in accordance with the requirements of the Building Code of Australia (BCA).
- In accordance with Clause 93 of the Environmental Planning and Assessment Regulation 2000, the existing dwelling will need to comply with the Category 1 fire safety provisions for its change of use from a Class 1a classification to a Class 5 classification.
- Access for persons with disabilities is to be provided to the dwelling proposed to be used as an office. Should any internal alterations be carried out to the new office space wc facilities for persons with disabilities may be required.
- Parking for persons with disabilities is to be provided in accordance with Part D of the BCA.

WASTE MANAGEMENT:

Integrated On-site Waste Collection

Waste collection vehicles proposed to service commercial and industrial developments are to be designed in accordance with the vehicle specifications outlined in section 3.5 of the *'Industrial, commercial and mixed-use waste management guideline'* document.

On-site Collection (section 2.2.1)

The vehicle must be able to safely and efficiently access the site and the nominated collection point to perform on-site waste collection. There must be sufficient manoeuvring area on-site to allow the collection vehicle to enter and exit the site in a forward direction and service the development efficiently with little or no need to reverse.

Swept Path Models (section 2.2.3)

Swept path models to be provided illustrating how a standard waste collection vehicle (section 3.5) will enter, service and exit the site. A 0.5m unobstructed clearance is required from all obstructions for the vehicle's ingress and egress manoeuvres. The model to provide on-street parking on both sides of the road adjacent to the development to demonstrate unobstructed access during a 'business as usual' configuration.

Service Clearances (section 2.2.4)

For rear loaded vehicles an additional 2m unobstructed loading zone is required behind the vehicle for the loading of 660L and 1,100L bins. Additionally, a 0.5m side clearance is require on either side of the vehicle for driver movements and accessibility.

Route of Travel for the Waste Collection Vehicle (2.2.5)

The route of travel of the collection vehicle to the designated loading bay is to satisfy the dimensions of standard waste collection vehicle. To support unobstructed access adequate driveways and ramps of sufficient strength are required to support waste collection vehicle movements.

A structural engineer's report is required to be submitted accompanying the Waste Management Plan. The report to confirm all infrastructure used for vehicle ingress and egress movements can support the vehicle's 'gross weight' outlined within section 3.5.

Plan of Operations (2.2.6)

All development applications to be submitted with accompanying 'Plan of Operations', outlining proposed; Bin Infrastructure Sizes, Collection Frequency, Waste Collection Vehicle Dimensions, Hours of Collection and Access to Waste Collection Room.

Waste Collection Infrastructure

Waste collection infrastructure to be provided in accordance with section 3.1 of the *'Industrial, commercial and mixed-use waste management guideline'* document.

Waste Generation Rates

Proposed generates rates for respective developments are required to be provided to permit waste collection in accordance with section 3.3 of the *'Industrial, commercial and mixed-use waste management guideline'* document.

Alternate Use (section 3.3.5)

For commercial and industrial waste streams that are not outlined in section 3.3, supporting documentation is required to validate the proposed volumes for the respective waste streams.

Waste Collection Rooms

All developments are required to provide a waste collection room integrated wholly within the developments built form to permit a safe and efficient waste collection service. The room will to incorporate infrastructure in accordance with section 3.4 of the *'Industrial, commercial and mixed-use waste management guideline'* document.

Documentation to be submitted with Development Application

- Survey Drawing
- Floor Plan(s)
- EIS
- Elevation and Section Plans
- Traffic and Parking Assessment Report
- Schedule of External Materials and Finishes
- Signage Details (if proposed)
- Site Plan
- Stormwater Concept Plan
- Waste Management Plan
- WSUD Strategy
- Contamination Assessment
- Access Statement
- Operational Plan of Management

- Acoustic Report / Statement
- Waste Water Report
- Landscape Plan

A Development Application can be lodged through the NSW Planning Portal following the link below:

Alternatively, 1 x hard copy and 1 x PDF digital copy to be lodged to Council (additional copies required if integrated development). Please refer to Council's submission requirement located on the website:
https://www.penrithcity.nsw.gov.au/building-development/development/application-process

Please refer to Council's Development Application checklist, as attached, for further details of submission requirements and ensure that plans submitted illustrate consistent detail.

Please ensure you contact Council's duty officer on 4732 7991 to make an appointment for lodgement of this application.

Sydney Water Services
For all development proposals within Mulgoa, Wallacia and Londonderry, it is recommended that Sydney Water is contacted to ascertain servicing availability. Please contact Sydney Water's Growth Planning and Development Team on 8849 4649 or email urbangrowth@sydneywater.com.au for this information.

Key Land Based Considerations
Bushfire Prone Land will likely require lodgement of a Bushfire Assessment Report.

Flood Affected Land will require floor levels to Australian Height Datum (AHD).

Impacts to native vegetation (including grassland) will require an assessment under the NSW Biodiversity Offset Scheme and may require a Biodiversity Assessment Report or a Test of Significance.

Fees
Please call the Development Services Department Administrative Support on (02) 4732 7991 to enquire about fees and charges.

Our Ref: PL17/0115
Contact: Allison Cattell
Telephone: (02) 4732 7909

23 November 2017

C/- Adam Coburn
Mecone Pty Ltd
Suite 1204B Level 12
179 Elizabeth Street
SYDNEY NSW 2000

Dear Mr Coburn,

Pre-lodgement Advice
Proposed Extractive Industry
Lot 5 DP 655046, 344 Park Road WALLACIA NSW 2745

We welcome your initiative to undertake a project in the Penrith Area.

Thank you for taking part in Council's pre-lodgement meeting on 14 November 2017**.** The meeting was useful for Council in gaining an understanding of your proposal.

Unfortunately, the proposal in its current form is not considered suitable as outlined in the attached information.

As I am sure you are aware, Council's full assessment and determination can only be made after you lodge an application.

If we can help you any further regarding the attached advice, please feel free to contact me on (02) 4732 7909.

Yours sincerely

Allison Cattell
Senior Environmental Planner

PROPERTY AND PLANNING INFORMATION	
Attendees	**Proponent** Adam Coburn – Mecone Pty Ltd Georgia Sedgemen – Mecone Pty Ltd **Penrith City Council** Allison Cattell – Senior Environmental Planner Fred Shockair – Senior Development Engineer Paul Reynolds – Team Leader for Environmental Health and Compliance Graham Green – Senior Traffic Engineer
Proposal	Extractive Industry
Address	Lot 5 DP 655046, 344 Park Road WALLACIA NSW 2745
Zoning and permissibility	The site is zoned RU1 – Primary Production under Penrith Local Environmental Plan 2010. A Section 149 Planning Certificate will confirm the zone of the site, and you are encouraged to obtain this document to confirm the zone of the site. 'Extractive industries' is a permissible land use in the zone, with Council consent, and subject to compliance with relevant planning legislation including, but not limited to, State Environmental Planning Policy (SEPP) No.33 – Hazardous and Offensive Development. 'Extractive industry' means "*the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunnelling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing, crushing, sawing or separating, but does not include turf farming".* Please note that potentially hazardous or offensive industries are prohibited if the development is proposed on a floodway in accordance with SREP No.20 – Hawkesbury Nepean River. A '*waste or resource management facility'* is permissible in the RU1 zone under Part 3, Division 23 of State Environmental Planning Policy (SEPP) (Infrastructure) 2007. A '*waste or resource management facility'* includes '*resource recovery facility*' and '*waste or resource transfer station'*.
Site constraints	• Flood-related development controls • Bushfire prone land • Scenic and landscape values • Native vegetation on site • Located on a main road • Mapped watercourse(s) traverse the site • Assessment is required to confirm the contamination status of the land • Site is located on the boundary of two local government areas, being Penrith and Liverpool
Development	Designated and integrated development (refer to **Appendix A**)

KEY ISSUES AND OUTCOMES

The proposal is to address the following issues:

RELEVANT EPI's POLICIES AND GUIDELINES

Planning provisions applying to the site, the provisions of all plans and policies are contained in **Appendix B**.

PLANNING REQUIREMENTS

The following advice is provided for your information regarding the key matters discussed at the meeting in relation to the proposal.

Permissibility and site suitability
The subject land is zoned *RU1 Primary Production* under Penrith Local Environmental Plan (LEP) 2010. The proposal is most closely categorised as a "resource recovery facility" (refer to land use definition below). Resource recovery facilities are a prohibited form of development in the *RU1* zone.

"Resource recovery facility means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration".

It is noted that resource recovery facilities are a permissible form of development in the *RU1 Primary Production* zone under Clause 121 of State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP).

Alternatively, if the use were considered 'extractive industry', this is a permissible land use on the RU1 zone.

However, notwithstanding permissibility, it is considered that the site is not suitable for the proposed development based on the following considerations:

- The proposed development is located in a significant overland flow path which will have adverse impacts on the surrounding properties.

- Inconsistency with several objectives of the *RU1 Primary Production* zone under Penrith LEP 2010, as detailed below.
  - *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
  - *To protect and enhance the existing agricultural landscape character of the land.*
  - *To ensure development is compatible with the environmental capabilities of the land and does not unreasonably increase the demand for public services or public facilities.*
  - *To preserve and improve natural resources through appropriate land management practices.*

- Earth mounds and hardstand areas would adversely affect the visual amenity and scenic quality of the area. In this regard, the site is identified as having scenic character and landscape values under Clause 6.5 of Penrith LEP 2010. The location and layout of the proposed development would result in unacceptable visual impacts.

- The development would have the potential to adversely affect the environmental values of the site. In this regard, the site is mapped as containing:

  - Cumberland Plain Woodland - a Critically Endangered Ecological Community under both State and Federal legislation;
  - Shale Plains Woodland which is listed as a critically endangered ecological community under State legislation; and
  - *Dillwynia Tenuifolia* , a vulnerable plant species under the Threatened Species Conservation Act 1995.

  In addition, the site is mapped as bush fire prone land, and being subject to flood-related development controls, increasing the likelihood for required vegetation removal to facilitate the proposed use.

- The development would significantly impact on the surrounding rural and residential environment, particularly by way of noise, dust, flood and traffic generation. Mitigation measures to these issues may then result in visual impacts that are not acceptable in rural settings.

- The site is relatively proximate to more appropriately zoned, serviced and unconstrained land within the industrial areas of the City.

- The site is identified as being subject to flood-related development controls. The use of the site and any necessary supporting development is likely to create unacceptable flooding impacts on adjoining properties.

- The site is traversed by a natural watercourse. No filling or altering of watercourses is permitted.

- It is noted that the site has recently been used for the storage of used wooden packaging pallets. Concern is raised as to whether this use of the land has resulted in land contamination. This matter will need to be investigated via a Phase 2 land contamination assessment including soil sampling and analysis to confirm the site is suitable for use.

- Concern is raised over the compatibility of the proposed development with dwelling house development adjoining, surrounding and on site.

In summary, the proposal is unlikely to be supported in its current form. Should it be intended to pursue the proposal in a modified form, a follow-up meeting with Council officers is recommended. It is preferable that Roads and Maritime Service (RMS) pre-lodgement comments are obtained should a second meeting be arranged.

Documents to be submitted with development application	The application is not supported in its current form, and the site is unlikely to be suitable for the proposed use for reasons raised earlier in this advice. Should you choose to pursue consent on this site for the proposed use despite this advice, the following documents would be required to make a complete application: ▪ **Survey Drawing (to AHD)** ▪ **Site Plan** ▪ **Floor Plan(s)** ▪ **Elevation and Section Plans** ▪ **Environmental Impact Statement** This is to accord with any Secretary's Environmental Assessment Requirements (SEARs) obtained from the Department of Planning ▪ **Roads and Maritime Service pre-lodgement advice** ▪ **Overland Flow Flood Report prepared by a suitably qualified person** ▪ **Stormwater Concept Plan (with report and calculations)** ▪ **Waste Management Plan** ▪ **Overland Flow Flood Report** ▪ **Water Sensitive Urban Design (WSUD) Strategy** ▪ **Landscape Plan** ▪ **Traffic and Access Report** Prepared by a suitably qualified person addressing but not limited to traffic generation, impact on the road network (including the intersection of Park Road and The Northern Road, Park Road and the development access at Park Road), size, type and volume of vehicle access to site, driveway access, heavy vehicle access, management of staff/visitor vehicle conflict with heavy vehicle access, loading areas, manoeuvring areas and car parking in accord with RMS Guidelines, Austroads guidelines, Australian Standard (AS) 2890 Parts 1, 2 and Council Development Control Plans) clearly demonstrating satisfactory manoeuvring on-site and forward entry and exit to and from the public road ▪ **Flora and fauna assessment report** The impacts of noise, dust and vibration on animals in the immediate vicinity is to be considered ▪ **A Wastewater Report** ▪ **An air quality impact assessment** This is to be prepared in accordance with relevant NSW EPA guidelines ▪ **A Water Quality Management Plan** ▪ **Contamination Assessment (SEPP 55) – Phase 2** A Remediation Action Plan is required where remediation is required ▪ **A noise impact assessment** This is to be prepared in accordance with the NSW EPA's Noise Policy for Industry (October 2017) and other relevant guidelines. The report must assess noise associated with all processing and transport activities including the operation of plant and equipment, and the movement of vehicles at the site. ▪ **Operational Plan of Management**

	One (1) printed and 2 x CD copies of your development application Please refer to Council's Development Application checklist, as attached, for further details of submission requirements and ensure that plans submitted illustrate consistent detail. Please ensure you contact Council's duty officer on 4732 7991 to make an appointment for lodgement of this application. **ALL DOCUMENTS ON THE REQUIRED DISCS MUST BE IN PDF FORMAT**
Fees	Please call the Development Services Department Administrative Support on (02) 4732 7991 to enquire about fees and charges.

APPENDIX A

Category of development ('Designated' and 'Integrated' development)

The category of development will need to be addressed in any development application including:

- ***Designated development***
  There a few categories of 'designated development' that can be triggered for uses involving glass recycling, some of which involve consideration of the capacity of the operations and others that do not. Of most relevance to your proposal is 'concrete works' and/or 'crushing, grinding or separating works'. Processing capacity, the distance to residential dwellings, or distance to natural waterbodies/mapped watercourse triggers this requirement.

  It appears the application represents 'designated development' under Schedule 3 of the Environmental Planning and Assessment (EP&A) Regulation 2000. It is noted that you have advised the handling of substances under the Australian Dangerous Goods Code does not occur as part of the proposed use.

  You are encouraged to discuss this proposal with the Department of Planning prior to pursuit of a development application to confirm their requirements in preparing any required Environmental Impact Statement.

- ***Integrated development***
  The application is integrated development under the Protection of the Environmental Operations Act (POEO) 1997. The triggers for 'integrated' development include, though are not limited to, 'concrete works', 'crushing, grinding, or separating', 'resource recovery', and/or 'waste storage'.

  Based on the type of development described in the meeting and pre-lodgement documents, the proposal represents "Crushing, grinding or separating works". The threshold in Schedule 1 of POEO for crushing, grinding and separating works is a capacity to process more than 150 tonnes per day or 30,000 tonnes per year. Based on the information provided, including the specifications for the crusher and frequency of vehicles relative to their size, the proposal exceeds this capacity threshold and is likely to require an environment protection licence from the NSW EPA.

  You are encouraged to discuss the proposal with the Environmental Protection Authority for their licensing requirements.

APPENDIX B

- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Threatened Species Conservation Act 1995
- Sydney Regional Environmental Plan No.20 – Hawkesbury Nepean River (No.2 - 1997)
- State Environmental Planning Policy (SEPP). No 55 – Remediation of Land
- SEPP No.33 – Hazardous and Offensive Development
- State Environmental Planning Policy (Infrastructure) 2007
- Protection of the Environment Operations Act 1997
- Penrith Local Environmental Plan 2010
- Penrith Development Control Plan 2014

Important Note

The pre-lodgement panel will endeavour to provide information which will enable you to identify issues that must be addressed in any application. The onus remains on the applicant to ensure that all relevant controls and issues are considered prior to the submission of an application.

Information given by the pre-lodgement panel does not constitute a formal assessment of your proposal and at no time should comments of the officers be taken as a guarantee of approval of your proposal.

It is noted that there is no Development Application before the Council within the meaning of the Environmental Planning and Assessment Act 1979. This response is provided on the basis that it does not fetter the Council's planning discretion and assessment of any Development Application if lodged. It is recommended that you obtain your own independent expert advice.

The response is based upon the information provided at the time of the meeting.

EIS Attachment 4: Flood Level Enquiry

Our reference: ECM 9073801
Contact: Dr Elias Ishak
Telephone: (02) 4732 7579

26 March 2020

Ellie Abraham Barikham
203-223 Chain-O-Ponds Road
MULGOA NSW 2745

Dear Sir/Madam

Flood Level Enquiry
Lot 5 DP 655046 - No. 344 Park Road, Wallacia

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7579.

Yours sincerely

Dr Elias Ishak
Acting Engineering Stormwater Supervisor

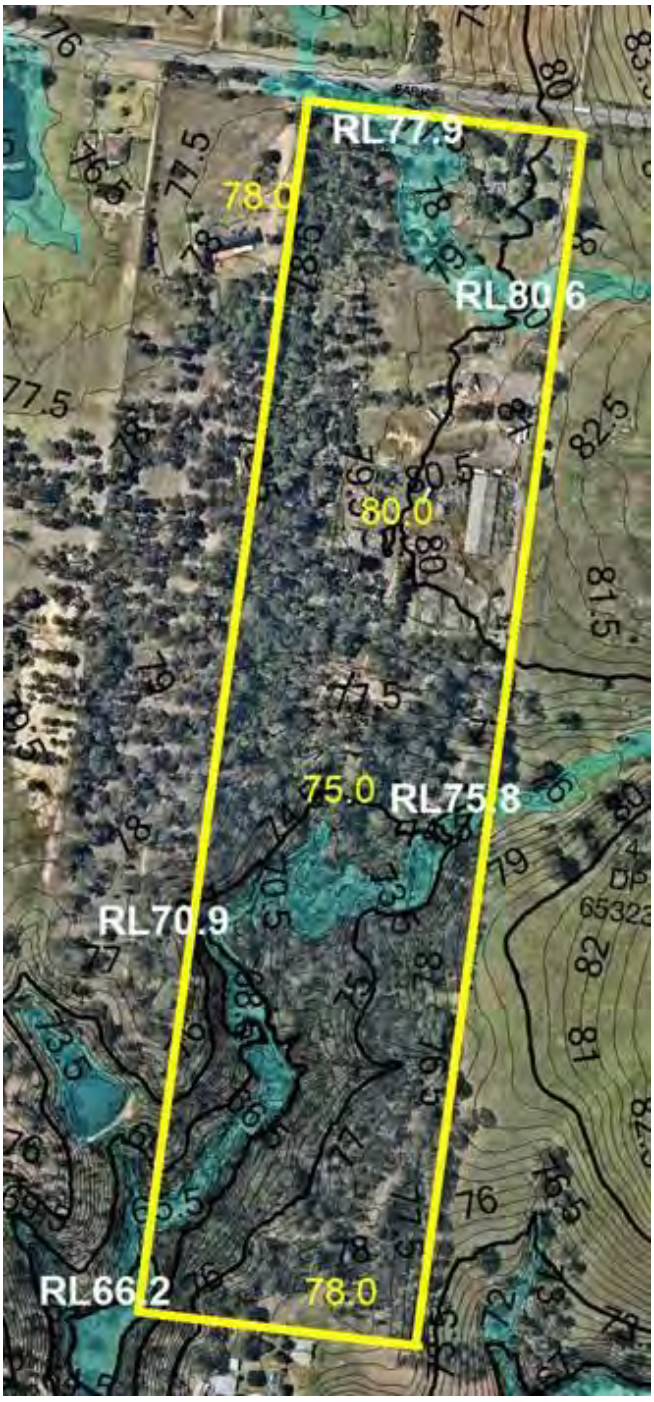
Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

Flood Information
Lot 5 DP 655046 - No. 344 Park Road, Wallacia

Date of issue: 26 March 2020

The 1% AEP local overland flow flood levels affecting the above property are as indicated on the map below in white colour.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website www.penrithcity.nsw.gov.au.



Definitions
AEP – *Annual Exceedance Probability* – the chance of a flood of this size occurring in any one year.
AHD – *Australian Height Datum* – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

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Legend

	Extent of 1% AEP local catchment overland flow path. Generally depths less than 150mm is not shown.

Notes:

1. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.

2. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.

3. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.

4. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1", "2". As such you should carry out and rely upon your own investigations.

Dr Elias Ishak
Acting Engineering Stormwater Supervisor

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EIS Attachment 5: Community Consultation Leaflet

Proposed Resource Recovery Facility
344 Park Road, Wallacia

COMMUNITY INFORMATION SHEET

Greenfields Resource Recovery Facility is proposing to establish a resource recovery facility at 344 Park Road, Wallacia for the recovery of up to 95,000 tonnes per year of Construction & Demolition (C&D) and Commercial & Industrial (C&I) waste. An Environmental Impact Statement (EIS) for the proposed development is currently being prepared for submission to the NSW Department of Planning, Industry and Environment. The EIS will be exhibited for a minimum of 28 days, at which time the community are invited to make submissions.

About Greenfields Resource Recovery Facility

Greenfields Resource Recovery Facility was established for the purpose of operating the proposed resource recovery facility. The company is an Australian owned and operated family enterprise. The company's director and associates have a long history of involvement in similar resource recovery and recycling projects for over twelve years including medium and large civil works projects in NSW.

The Subject Site

The subject site is located at 344 Park Road, Wallacia, also known as Lot 5 DP 655046 shown in Figure 1. The total land is over 200,000 square metres in area and the development is proposed to be established on the north eastern portion of the site within an approximate area of 30,000 m^2. The remaining site area will not be developed. The site is within a rural land zoning and has frontage to Park Road.

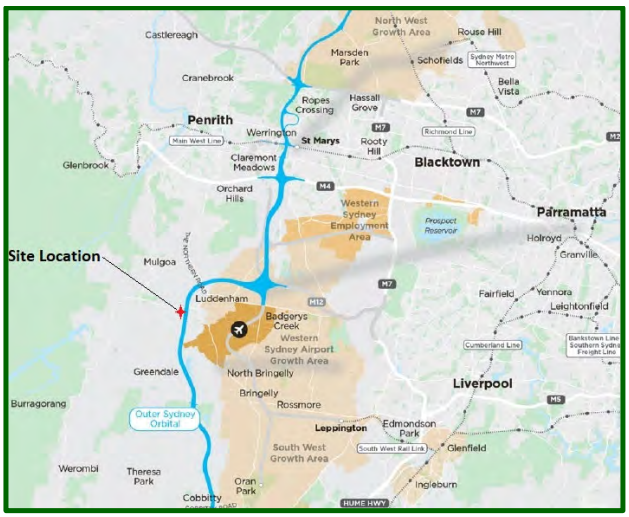

Figure 1: Site Location (Source: Transport for NSW)

The Proposed Development

The proposal involves the construction of a purpose-built 5000 m^2 building to house the resource recovery facility and development of internal access driveway, car park, hardstand areas on the north eastern portion of the site. The existing dwelling will be converted into a site office and a weighbridge would be provided on the access driveway from Park Road. Earth mounds around the perimeter of the facility would be landscaped to provide a visual screen and separate the facility from the undisturbed area of the site.

The facility would operate 24 hours 7 days a week and accept up to 95,000 tonnes per year of C&D and C&I waste mainly from the local and Sydney metropolitan area. This waste would be separated to generate a range of materials mainly for use in the construction industry and civil works. Due to the quantity of waste to be processed and stored, the facility will require an Environment Protection Licence.

The proposed facility is ideally located, being 10 km from the Western Sydney Airport and in close proximity to the associated infrastructure projects required to establish growth centres in Western and Southern Sydney. The proposal would generate 30 new employment positions.

Waste Material

The waste accepted would consist of C&D and C&I waste, classified as "General Solid Waste (Non-putrescible) under the *NSW Waste Classification Guidelines*. The recyclable material would be made up of:

Construction & Demolition	Commercial & Industrial
▪ Wood	▪ Cardboard
▪ Gyprock – plaster board	▪ Paper
▪ Concrete	▪ Plastic
▪ Brick	▪ Steel
▪ Aggregates	▪ Aluminium
▪ Steel	▪ Wood

Resource Recovery Processes

Resource recovery involves the following activities:

- Unloading, loading and storage of waste;
- Initial inspection and separation;
- Feeding and conveying;
- Magnetic removal of steel;
- Screening to separate heavy and light fractions;
- Air separation; and
- Baling, transfer and storage.

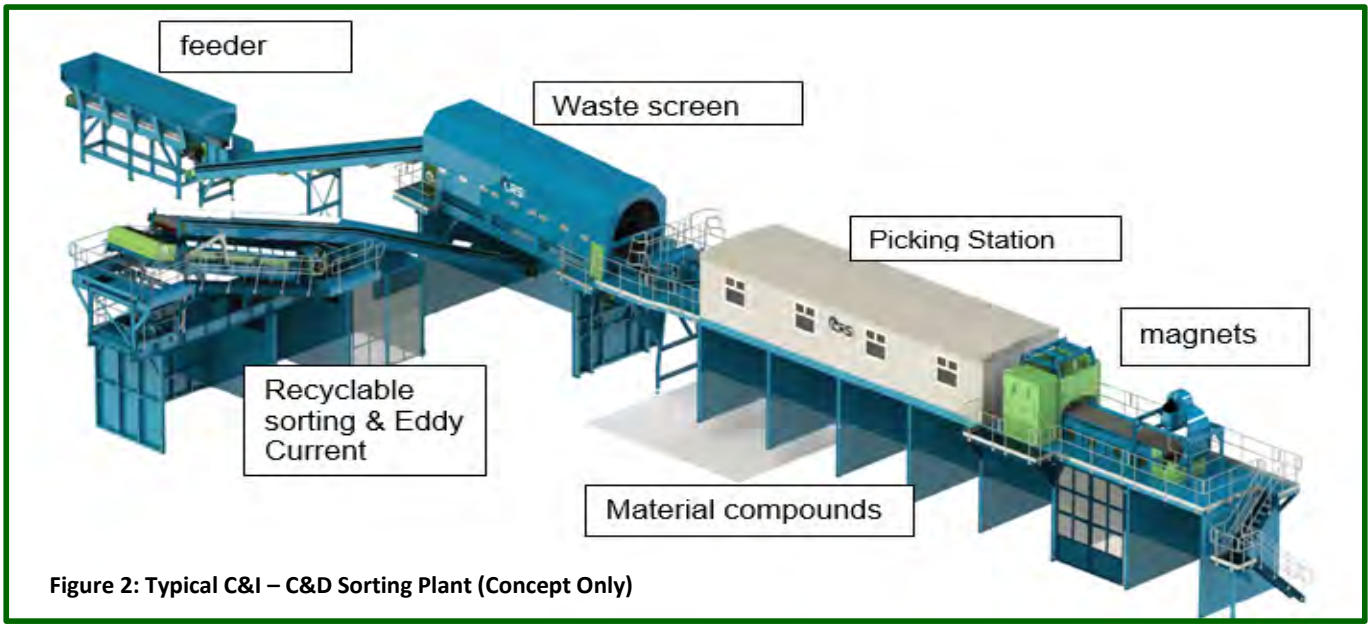

Figure 2: Typical C&I – C&D Sorting Plant (Concept Only)

The materials will be sorted through the plant in separate runs, the C&I and C&D will not be mixed to ensure maximum recovery of recyclables. Figure 2 shows a concept design of a similar plant.

Project Objectives

The main objectives of the project are to:

- Meet the aims for reducing waste to landfill & resource recovery targets under the NSW Waste Strategy;
- Increase the amount of recycling and resource recovery which is not currently being applied to the material collected by others;
- Continue to grow and improve the recovery and recycling efforts in the Penrith City Council areas;
- Provide a long-term sustainable recycling facility; and
- Develop a process to increase recycling and create a resource recovery facility that the community can be proud of.

Environmental Considerations

Key environmental issues that will be considered in the design of the facility and addressed in the EIS include:

- Waste Management including how waste will be received, managed, processed and stored on site. Types and quantities of waste in accordance with relevant guidelines.
- Air Quality will be assessed and safeguards designed into the facility to ensure air emissions are below relevant standards.
- Soil and Water including the design of the facility to ensure the potential for pollution of water and land is prevented during operation.
- Noise associated with the proposed site operations and safeguards to be implemented to ensure noise levels are within NSW guidelines at the nearest receptors.
- Traffic and Transport including assessing increased truck movements associated with the development, the need for road upgrades and consideration of the future M9 motorway within the Outer Sydney Orbital which is adjacent to the site.
- Hazards and Risk including the need for environmental protection equipment to be installed at the premises to minimise the potential risks.
- Biodiversity including design of the facility to ensure potential impacts on the environmental values of the site are minimised.

Environmental safeguards and controls would be designed into the facility to ensure impacts on the environment are minimised.

For More Information

For further information contact Benbow Environmental on (02) 9896 0399 or email admin@benbowenviro.com.au

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