ENVIRONMENTAL IMPACT STATEMENT
PROPOSED CONSTRUCTION MATERIALS PROCESSING & RECYCLING FACILITY
100 Fairey Road, South Windsor NSW

Prepared for: Andy's Earthworks
MacroPlan Dimasi
Department of Planning and Environment
Hawkesbury City Council

Prepared by: Victoria Hale, Environmental Scientist
Kate Barker, Environmental Scientist
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Linda Zanotto, Senior Environmental Engineer
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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 4.12

EIS prepared by

name	Richard T Benbow
qualifications	Bachelor of Science (Engineering) With Merit
address	Benbow Environmental
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in respect of

development application

applicant name	Andy's Earthworks Pty Ltd
applicant address	1 Putland Place, Vineyard NSW 2765
land to be developed: address	100 Fairey Road, South Windsor, NSW 2756
lot no, DP/MPS, vol/fol etc	Lot 4 DP264159
proposed development	Establishment of a construction materials processing and recycling Facility within the IN1 zoned area of the site.

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 

name	Richard T Benbow
date	10-10-2019

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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

DOCUMENT CONTROL

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STUDY TEAM

R.T. Benbow	Benbow Environmental	Project Manager Consultation, Technical Review
Emma Hansma	Benbow Environmental	Project Manager Justification, Alternatives, Description of Proposal, Air Quality Assessment, Environmental Risk Assessment, Environmental Impact Statement Compilation
Linda Zanotto	Benbow Environmental	Executive Summary, Introduction, Planning Assessment, Description of Proposal, Water and Soil, Waste, Summary of Impacts & Mitigation Measures, Environmental Impact Statement Compilation
Victoria Hale	Benbow Environmental	Introduction, Description of the existing environment, Health, Socio-economic Impacts, Phase I Environmental Site Assessment, Environmental Impact Statement Compilation
Peter Gangemi	Benbow Environmental	Noise Impact Assessment
Kate Barker	Benbow Environmental	Air Quality Assessment, Phase I Environmental Site Assessment
Michael Bridgman	Transport and Urban Planning	Traffic Assessment
Morgan Walter	Sparks & Partners Consulting Engineers	Stormwater & Flood Management Report, Concept Cover Sheet, Locality Plan And Drawing Schedule, Sediment And Erosion Control Plan & Details, Bulk Earthwork Contour Plan, Bulk Earthwork Depth Cut To Fill Plan, Bulk Earthwork Sections, Siteworks And Grading Plan, Existing And Proposed Flooding Plan, Sediment Basin Plan & Details Sheet
Jason Anderson	Anderson Environmental	Bushfire Assessment Salinity and Acid Sulfate Soil Assessment Flora and Fauna Assessment

ABBREVIATIONS

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
DoP	Department of Planning
DoP&E	Department of Planning and Environment
DWE	Department of Water and Energy
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
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
INP	Industrial Noise Policy (guidelines developed by the EPA)
LEP	Local Environment Plan
LPG	Liquefied petroleum gas
NPI	National Pollutant Inventory
NRC	Natural Resources Commission
NSW	New South Wales
NSW EPA	New South Wales Environment Protection Authority
NSW RNP	New South Wales Road Noise Policy
PM_{10}	Particulate matter of size 10 μm
RBL	Rating background level
RNP	NSW EPA Road Noise Policy
RMS	Roads and Maritime Services
SEPP	State Environmental Planning Policy
TSP	Total suspended particulates

UNITS OF MEASUREMENT

°C	degree centigrade	(unit of temperature)
dB(A)	A-weighted decibels	(unit of noise)
ha	hectares	(unit of area)
g	gram	(unit of mass)
kg	kilogram	(unit of mass)
km	kilometre	(unit of length)
m	metre	(unit of length)
m^2	squared metre	(unit of area)
m^3	cubic meter	(unit of volume)
T	Tonne (1000 kg)	(unit of mass)
µg	microgram	(10^{-6} gm – unit of mass)
µg/m^3	microgram/cubic meter	(concentration)

EXECUTIVE SUMMARY

Andy's Earthworks propose to establish a construction materials processing and recycling facility that would receive up to 98,000 tonnes per year of construction and demolition (C&D) waste materials including virgin excavated natural material (VENM) and excavated natural material (ENM). This material would be processed within a purpose built building on the site with storage of incoming materials and finished goods in external covered storage bays.

The subject site is located at 100 Fairey Road, South Windsor NSW 2756 and is a large mixed rural/industrial allotment of which the majority is currently unused and contains a small research facility used by Evoqua. The proposed development would occupy the IN1 (general industrial) zoned portion of the site, within the south western area of the site. Some excavations will take place in the RU1 zone to provide cut and fill material for the proposed site.

The proposed area of the site will be levelled to approximately 18.0 – 17.3 AHD (Australian Height Datum) from the existing range of 18.13-13.8 AHD. Soil required to raise the level would come from elsewhere on the subject site. The site would be capped with road base material hardstand which would come from a supplier offsite.

The operation of the facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of C&D waste including VENM, ENM, recycled crushed concrete, brick and excavated rock products within the building; and
- Material storage in external covered storage bays.

Materials would be transported to and from the site within a combination of semi-trailers and trucks with dog trailers, each with an approximate capacity of 30 tonnes. All vehicles would access the site from Fairey Road along the existing site access road.

A weighbridge will be located on the access road in close proximity of the site entrance to weigh all incoming and outgoing loads. A closed-loop wheel wash will be installed immediately beyond the weighbridge for washing the wheels of trucks entering and exiting the property. Water used in the wheel wash will be recirculated within the system.

There would be one Concrete Jaw Crusher Komatsu BR380JG-1 or similar for the crushing operations and a triple deck screen for the separation and sizing of crushed materials located within the building. A 25 tonne excavator and front end loader would be used for transfer and handling of materials.

Processed materials would be stored in external covered storage bays on the site. Water sprays would be used for dust suppression purposes and would consist of water sprays/water cannon that provide a mist to adequately dampen materials and working areas. Water for this purpose would be sourced from a 30kL rainwater tank.

Vegetation would be planted along the northern and western border of the site to minimise dust and provide a visual screen of the operations from residential areas. A sediment control system containing two sediment basins, drainage channels and gravel filters to manage sediment laden stormwater runoff from the project area would be implemented.

The proposed development would also require the construction of a small site office building and a separate amenities building. These will be demountable buildings. A car parking area would also be established adjacent to the buildings.

Final processed product would be sold to recycling facilities for further processing or to facilities for reuse as aggregates for road base projects or as a binder in composite material.

Benbow Environmental was commissioned by MacroPlan Dismasi on behalf of Andy's Earthworks Pty Ltd to prepare this Environmental Impact Statement (EIS) to support the development application.

This EIS provides an assessment of the potential environmental impacts associated with the proposed modifications on the existing environment and provides for appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts.

A summary of the key issues addressed in the EIS is included below:

STRATEGIC CONTEXT

The site lies within land zoning IN1 – General Industrial and RU1 – Primary Production under the provisions of the *Hawkesbury Local Environmental Plan* (HLEP) *2012*, which applies to the subject site. The proposed development would be undertaken wholly within the IN1 zone and is a permitted use with consent within this Zone, under the Hawkesbury LEP 2012.

The proposal constitutes designated development under Clause 32 of Schedule 3 of the *Environmental Planning and Assessment Regulation 2000,* as a "Waste Management Works" as the activities involve processing of waste and materials for reuse, and the site is located adjacent to South Creek, a natural waterbody and is on Class 5 land containing acid sulfate soils. In addition, the site is located within 250 m of residential dwellings on James Meehan Street and is also located within 500 m of a residential zone of South Windsor.

The proposal constitutes integrated development. The proposed development involves works to be carried out within 40 metres of a wetland located on the site, being waterfront land under Clause 91(2) of the *Water Management Act, 2000* and therefore would require approval under Clause 4.46 of the Act. The proposed development also requires an Environment Protection Licence for 34 – Resource recovery, 41 – Waste processing (non-thermal treatment) and 42 – Waste storage under Part 1 of the *Protection of the Environment Operations Act, 1997*

WASTE MANAGEMENT

The proposed development would generate construction waste the majority of which would be recyclable. Waste bins and management practices would be in place for the duration of the construction phase. A Waste Assessment was undertaken by Benbow Environmental and is provided as Appendix 1.

Waste types to be received, processed and stored in include construction and demolition waste consisting mainly of concrete, brick, excavated rock, VENM and ENM with small quantities of metal, glass, timber and other general solid wastes. This waste is classified as general solid (non-putrescible) waste. No hazardous waste or odorous waste would be accepted.

A waste assessment was conducted in accordance with the *Waste Classification Guidelines – Part 1: Classification of waste* (NSW EPA, 2014), *Protection of the Environment Operations Act 1997*, *Protection of the Environment Operations (Waste) Regulation 2014* and *Waste Avoidance and Resource Recovery Act 2001*.

Waste would be stored within external covered storage bays and waste bins on site.

The proposed development would implement mitigation measures to ensure that waste receipt, handling and storage activities are undertaken with minimal impact to the surrounding environment. These include dust suppression for storage bays, recirculating truck wheel wash system, an on-site stormwater detention system, an unexpected finds protocol and incoming waste inspection procedure.

There would be waste generated on site that would require disposal. This would be undertaken by licensed waste contractors.

The proposed development is considered to be consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21.*

HAZARDS AND RISK

An Environmental Risk Assessment has been undertaken for the proposed development and is provided in Appendix 2. The assessment included a preliminary risk screening and assessment of environmental, land use conflict and biosecurity risks.

The mobile vehicles and machinery used on site will be refuelled by a tanker. All mobile vehicles and machinery will be serviced by contractors who will bring their own chemicals including lubricant and hydraulic oils. Only water will be used for ancillary activities. No chemicals will be stored on site.

A preliminary risk screening was undertaken and dangerous goods quantities would not exceed the SEPP 33 screening thresholds and therefore, SEPP 33 does not apply and a preliminary hazard analysis is not required.

A risk analysis was undertaken and the main environmental site hazards include:

- Generation and release of dust emissions;
- Leaks and spills of fuel and oils;
- Excessive noise from on-site operations and activities;
- Sedimentation of waterways;
- Exposure to silica dust; and
- External Fire.

The above hazards were analysed considering all existing safeguards relating to those hazards and the risk register. All risks were found to be Class III (except for fire) indicating an overall low level of risk. No high level risks of Class I were found for the proposed development.

The land use conflict risk assessment (LUCRA) determined all risk rankings to be 9 or below. Therefore, the potential for land use conflict is low.

The biosecurity risk assessment focused on pests, weeds and disease. With recommended safeguards in place, the risk to biosecurity from the proposed activities is low.

The site as designed and with safeguards in place is suited for the proposed use. The site represents a low risk to adjoining properties, the environment or premises within the vicinity.

A bushfire assessment was undertaken by Anderson Environmental, Appendix 3. The findings of the assessment indicate that the proposal can comply with the required bushfire protection requirements. Lands surrounding the site do not contain any vegetation considered to represent a significant fire threat within the 140 m assessment transect. The vegetation surrounding the site and on the site itself is managed and grazed pasture improved grassland with the land to the south and west being light industrial development.

AIR QUALITY

An Air Quality Impact Assessment (AQIA) has been undertaken by Benbow Environmental (Appendix 4) in accordance with the NSW EPA guidelines *"Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (2016) (AMMAAP).

A brief summary of the findings is presented below.

TSP and PM_{10} emissions at all sensitive receptors were predicted to comply with the *Approved Methods* criterion for an annual averaging period.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria due to elevated background concentrations. However, contemporaneous addition of the predicted daily increments with daily background levels showed that no additional days of exceedance would result from the proposed site activities at the most impacted sensitive residential receptor. Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

This assessment considers the realistic impacts of the proposed site activities. Appropriate mitigation techniques are proposed at all feasible and reasonable parts of the proposed site activities. Additional Vegetative Environmental Buffers are recommended to reduce impacts at industrial receptors.

NOISE

This noise impact assessment has been prepared by Benbow Environmental (Appendix 5) in accordance with the *NSW Noise Policy for Industry*, *NSW Road Noise Policy* and *NSW Interim Construction Noise Guideline*.

Background noise levels of the area have been obtained in accordance with the methodologies outlined in the NSW EPA Noise Policy for Industry and relevant Australian Standards. The potential noise impacts of operational, construction and road traffic activities on the nearby receivers have been predicted utilising noise modelling software, SoundPlan.

Following the implementation of all recommended noise control measures, namely the crusher and screen operating inside a building, noise emissions generated by the proposed facility are predicted to comply with the relevant acoustic criteria at all considered residential and industrial receiver locations.

Road traffic noise levels associated with the development have been considered against the Road Noise Policy, with compliance predicted at all considered receptors.

Compliance with the guidelines set out in the Interim Construction Noise Guideline was predicted at all surrounding receivers.

SOIL AND WATER

A Soil and Water Assessment was undertaken by Benbow Environmental (Appendix 6) for the proposed development. A Phase I Preliminary Site Investigation was also undertaken with the report provided as Appendix 7.

Potential impacts from the proposed development include the release of sediments and contaminants into the stormwater causing contamination of the nearby creek and wetlands. Groundwater and groundwater dependent ecosystems may impacted by contaminants seeping into the groundwater.

The proposed mitigation measures are summarized as follows:

- Installation of a stormwater drainage system consisting of drainage swales, primary and secondary sediment detention basins designed to treat sediment laden runoff and prevent seepage;
- Construction erosion and sediment controls implemented and maintained;
- Water quality testing of sediment detention basins and groundwater;
- Maintenance of all stormwater infrastructure including drainage swales and sediment detention basins;
- Preparation of a flood emergency response plan;
- Staff trained in spill response and emergency procedures, including flood emergency response 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).

The land is identified as being Class 5 land containing acid sulfate soils. Excavations proposed for the RU1 zoned areas of the land would excavate to a depth of up to 5 metres AHD. Therefore an acid sulfate soil management plan is recommended prior to works commencing.

FLOODING

A flood assessment was undertaken by Sparks and Partners, provided as an attachment to the Soil and Water Report, Appendix 6.

The proposed development will minimise the danger to life and damage to property from flood risks. This is largely achieved by raising process area above the 100 year flood level. It is recommended a flood emergency response plan be prepared for construction and operations.

The proposed development will not exacerbate flooding on other properties and the soil used to raise the site out of the flood area will come from elsewhere in the site, within the flood risk precinct, increasing the flood capacity of the surrounding site by the volume displaced from the proposed earthworks. A report prepared by Sparks and Partners, demonstrates that the development will not increase flood impacts elsewhere.

The design and siting controls will not unreasonably impact the amenity of the area, streetscape and the environment and ecology.

TRAFFIC & TRANSPORT

A traffic assessment has been completed by Transport and Urban Planning Pty Ltd, Appendix 8. The main findings of this assessment is summarised below:

- The proposal will receive, process and recycle approximately 98,000 tonnes of concrete materials at full operation (post Year 2020). All materials will arrive at the site via medium to large articulated trucks. Large semi trailer and truck trailer combinations will remove all recycled materials.

- Under full operating conditions the site is expected to generate 52 vehicle trips (including 4 trucks) in the AM and PM Monday to Friday peak hour. Four additional truck per hour on Argyle Street should not adversely impact upon the existing level of residential amenity between Mileham Street to Macquarie Street.

- The existing signalised intersection of Argyle Street with Macquarie Street may require an RMS operational review based on current accident levels and delay times.

- Existing and post development mid block traffic service levels on Fairey Road and Argyle Street will remain at favourable level of service LoS A performance standards.

- Peak hour articulated truck movements will be less than 4 movements per hour in peak times.

- The existing access intersections with Macquarie Street/Argyle Street and Argyle Street/Fairey Road has been (SIDRA) modelled for projected Year 2020 peak hour traffic flows with the additional traffic generation by the proposal. The post development results indicate there will be no significant change in existing traffic service levels at these intersections, due to this proposal.

- 100% of all end product materials will depart the site via Fairey Road to Argyle Street then to Macquarie Street and thence the regional main road network.

- Fairey Road and Argyle Street to Macquarie Street are existing, moderate volume truck routes into the existing light industrial precinct during business hours 6am to 6pm.

- The projected additional 2 trucks in and 2 trucks out per hour during peak times should have no adverse impacts upon the amenity or safety of Argyle Street during business hours.

- Incoming materials will arrive via the Macquarie Street and Argyle Street to Fairey Road. Recycled concrete would still be generated without this facility but would go elsewhere.

- During construction the majority of vehicles are expected to arrive and depart the site outside the peak hours on the surrounding road network. Even with the addition of construction based traffic, the volumes on the main routes leading to the site will be well below those experienced during peak hours.

- All proposed internal vehicle movements parking and circulation can be adequately accommodated within the site and are free of conflict and should be designed to comply with Councils DCP 2002 and Australian/NZ Standard 2890.2 at the Development Application stage.

BIODIVERSITY

A Threatened Species Test of Significance was undertaken by Anderson Environmental (Appendix 9). The assessment concludes that:

1. The proposal is unlikely to significantly affect any threatened species or ecological communities or their habitats according to the 5-part test – (Environmental Planning and Assessment Act (1979) (EP&A) provided for under Section 7.2 of the Biodiversity Conservation Act (2016).

2. The proposed development does not exceed the Biodiversity Offsets Scheme (BOS) threshold

3. The proposed development is not being carried out in a declared area of Outstanding Biodiversity Value (OBV).

VISUAL

The existing site is cleared pastoral land. The proposed development would significantly change the visual aspects of the site, with the main visual impact of proposed site operations being the building and external covered storage bays.

The site operations would be adequately screened from private receptors and the surrounding areas by a vegetated buffer along the northern and western boundaries of the project area. This is expected to improve the views of the site.

HERITAGE

No items of European or Aboriginal cultural heritage are located at the site. The proposed use of the site is restricted to the IN1 zoned area in the south western area of the site. The site activities would be separated by considerable distance from the nearest items of heritage and adequate safeguards are to be implemented to ensure that the risk for impacts to items of heritage is extremely low.

CONCLUSION

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

To ensure the impacts of the proposed development are kept low, Andy's Earthworks will update the following plans prior to commencing: Emergency Plan, Environmental Management Plan (EMP) and Construction Environmental Management Plan (CEMP).

A Statement of Commitments is provided as Section 14. The Statement of Commitments summarises the commitment made by Andy's Earthworks 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.

Approval is requested.

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EIS Appendix 6: Soil and Water Assessment, Benbow Environmental
EIS Appendix 7: Phase I – Preliminary Site Investigation, Benbow Environmental
EIS Appendix 8: Traffic Impact Assessment, Transport and Urban Planning
EIS Appendix 9: Flora and Fauna Assessment, Anderson Environmental

Attachments

EIS Attachment 1: Secretary's Environmental Assessment Requirements (SEARs)
EIS Attachment 2: Pre-lodgement Meeting Advice
EIS Attachment 3: Community Leaflet
EIS Attachment 4: Site Plans

1. INTRODUCTION

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd ('the proponent') for the preparation of an Environmental Impact Statement (EIS) for a proposed construction materials processing and recycling facility at 100 Fairey Road, South Windsor NSW 2756.

The proposed development includes establishment of a facility to receive, handle and process construction and demolition (C&D) waste materials for storage and resale.

This section of the EIS provides a general overview of the proposed development including objectives, industry background and the need for development, and provides a general overview of the function and structure of this report.

1.1 PROPOSAL OVERVIEW

Andy's Earthworks propose to receive up to up to 98,000 tonnes of materials per year of construction and demolition (C&D) waste including recycled crushed concrete, brick, tiles, excavated rock products, VENM and ENM. This material will be transported via tipper trucks from quarries, excavations and demolitions sites in Western Sydney.

The subject site is a large mixed rural/industrial allotment of which the majority is currently unused and contains a small research facility used by Evoqua. The proposed development would occupy the IN1 (general industrial) zoned portion of the site, within the south western area of the site.

The proposed development would require the construction of a purpose built building for site operations to take place, installation of a small demountable site office building, an amenities building and a weighbridge. Some excavations will take place in the RU1 zone to provide cut and fill material for purpose of raising the level of the proposed site. Compacted crushed rock and stabilised fill would be used to create a working platform for hardstand areas and internal access roads. Establishment of a vegetated buffer as a visual screen and a sediment control system to manage sediment laden stormwater runoff from the project area would be implemented. Material would be stored within external covered storage bays.

1.1.1 Objectives of the Proposal

The objectives of the proposal are:

- Operate a construction material processing and recycling facility;
  - Receive up to 98,000 tonnes of material per year including bricks, concrete, tiles and excavated rock, as well as small quantities of glass, timber, general waste and soil;
  - Process this material via sorting, crushing and screening operations;
  - Store and resell materials for construction purposes;
- Operate the facility with minimal waste going to landfill;
- Design, plan, construct and operate the development with high environmental standards, meeting the relevant legislative requirements and adhering to cleaner production principles;
- Provide a modern processing and recycling facility, with the processing activities undertaken within a purpose built building, to benefit the long term environmental management of this industry;

- Similarly, another major objective is having in place a surface water management system that effectively manages offsite discharges;
- To accept waste materials and process these so that the majority of the waste is converted into reusable products that may be reused off site; and
- Provide local employment opportunities.

1.1.2 Staging of the Proposal

The proposed development will occur in one stage. There is potential for increasing material throughput of the facility in the future. Any increase would be addressed in a separate development application.

1.2 THE PROPONENT

Andy's Earthworks is one of Australia's leading Earthmoving, demolition and quarry companies and first joined the industry in 1997. They provide excavation & demolition services across Sydney, Penrith, Richmond and Windsor as well as supplying sandstone, riprap and retaining wall blocks under the name of Sydney Sandstone, which operates a quarry in East Kurrajong. Andy's Earthworks recycle brick and concrete, sandstone and sand. The recycled aggregates are used for road base, pipe bedding sand, drainage gravel, access gravel and for building sites. They also provide material for dams and validated fill for house pads, land, sheds and horse arenas.

1.2.1 Industry Background

The waste from construction and demolition contributes 40 per cent of Australia's total waste. However, much of this is clean, excavated material such as concrete, bricks and timber, which can be recovered through recycling.

Governments worldwide have responded to the need to reduce waste with regulation and legislation that have framed a market for building materials and products derived from the construction and demolition (C&D) waste stream. There are now, more than ever, clear opportunities for business and industry to invest in activities that will create profit and improve environmental outcomes by extracting valuable resources from the C&D waste stream. The built environment of the future is being constructed at the beginning of a new ecological era where governments are framing markets with regulation and legislation that respond to the challenges of environmental sustainability, and where industry must respond to the challenges of low-carbon economies and resource depletion. Businesses that are profiting and growing are adapting to these new challenges and responding with innovations that turn waste into valuable resources to supply the construction industry, which has traditionally been adverse to behavioural change.

1.2.2 Relationship with other Industries or Facilities

The proponent has a strong professional relationship with industry members, construction companies and related subcontractors across Sydney. 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

Industry growth and rising landfill fees has increased demands for recycling construction and demolition waste. Creating this facility will aid in reducing waste, as well as meeting current and future demands.

1.4 DEVELOPMENT ALTERNATIVES

1.4.1 Alternative Design and Methods

Site Layout, Access Modes and Routes

The site is accessed by trucks for material delivery and pickup from the western side via Fairey Road which provides direct access to the weighbridge, process area and material storage. The site is also accessed by staff cars and visitor cars from the western side of the site, providing direct access to the car park, office and amenities. Structures to be built on site include purpose built building, demountable office and amenities buildings and external covered storage bays which have been designed with a vegetated earth berm at the site boundaries to minimise the visual impact at surrounding viewpoints.

Materials Handling and Production Processes

The material handling and production process of receiving, sorting, crushing is standard for a C&D resource recovery facility and considering alternatives for this process is not warranted. The processing operations will be undertaken within a building which significantly reduces dust and noise impacts.

Waste and Water Management

The proposal is designed to minimise waste and recover the maximum amount of waste practicable from the C&D materials received. No alternatives to the waste management process are considered warranted. The site will be designed to have a slight fall towards the east with surface water runoff captured in primary and secondary sediment basins. The minimal fall will reduce the likelihood of erosion, and the basins are designed to effectively capture water from across the site without significantly impacting the usable areas of the site. A detailed assessment of alternative water management designs is not considered warranted.

Energy Source

The site is connected to the electricity network. No alternatives are considered warranted. However, it is proposed that a backup diesel powered electrical generator be purchased and stored on site just in case it is required in an emergency.

1.4.2 Site Selection

The site has been selected for the construction processing and recycling facility because it is a suitable size and is located in an area with easy access to Richmond Road to the south and Hawkesbury Valley Way and Windsor Road to the north.

The benefits of utilising the site for the proposed facility are as follows:

- The existing site has sufficient room available for the proposed development;
- The cost of establishing the business on this site is low;
- The development is a permitted use with consent;
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged;
- The development generates local employment;
- Transport routes are readily available; and
- The site has sufficient room for on-site parking and truck manoeuvring.

1.4.3 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.

1.4.4 "No project" Option

If this proposed development does not go ahead, then C&D waste in the area 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 all necessary assessments of the potential environmental and, to a minor extent,

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.

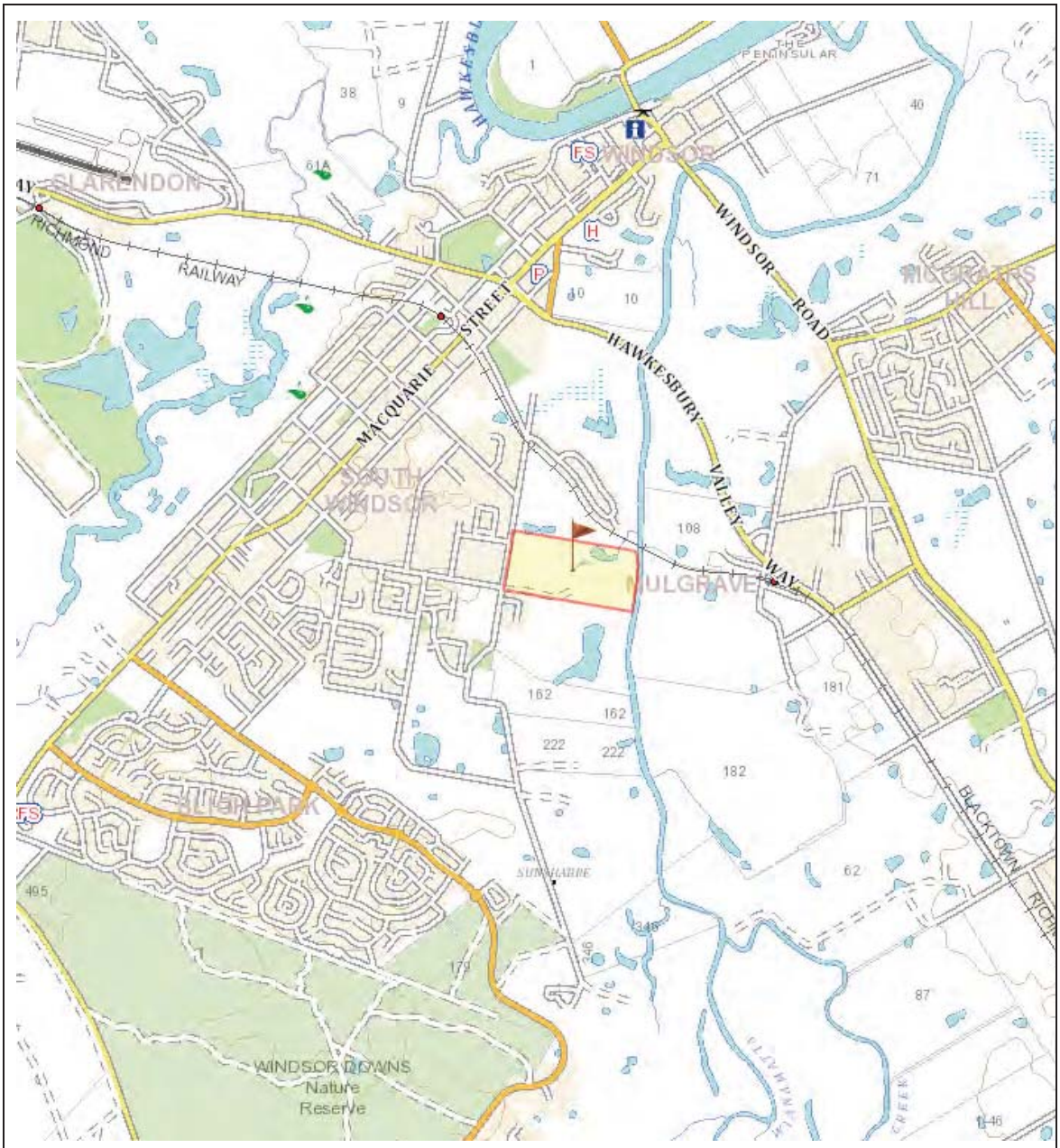
- **Appendices and Attachments**
  The Appendices contain the technical support documents, the Attachments include the Secretary's Environmental Assessment Requirements (SEARs), pre-lodgement meeting notes, site plans and community consultation leaflet.

2. LOCATION AND SETTINGS

2.1 SITE LOCATION AND BOUNDARIES

The proposed construction and demolition recycling facility will be located at 100 Fairey Road, South Windsor NSW 2756 ("the subject site"), legally described as Lot 4 DP264159. The location of the subject site is shown in Figure 2-1; the aerial view in Figure 2-2 shows the site in its local context and Figure 2-3 shows the site in its regional context.

Figure 2-1: Location of Subject Site



Source: SIX Maps

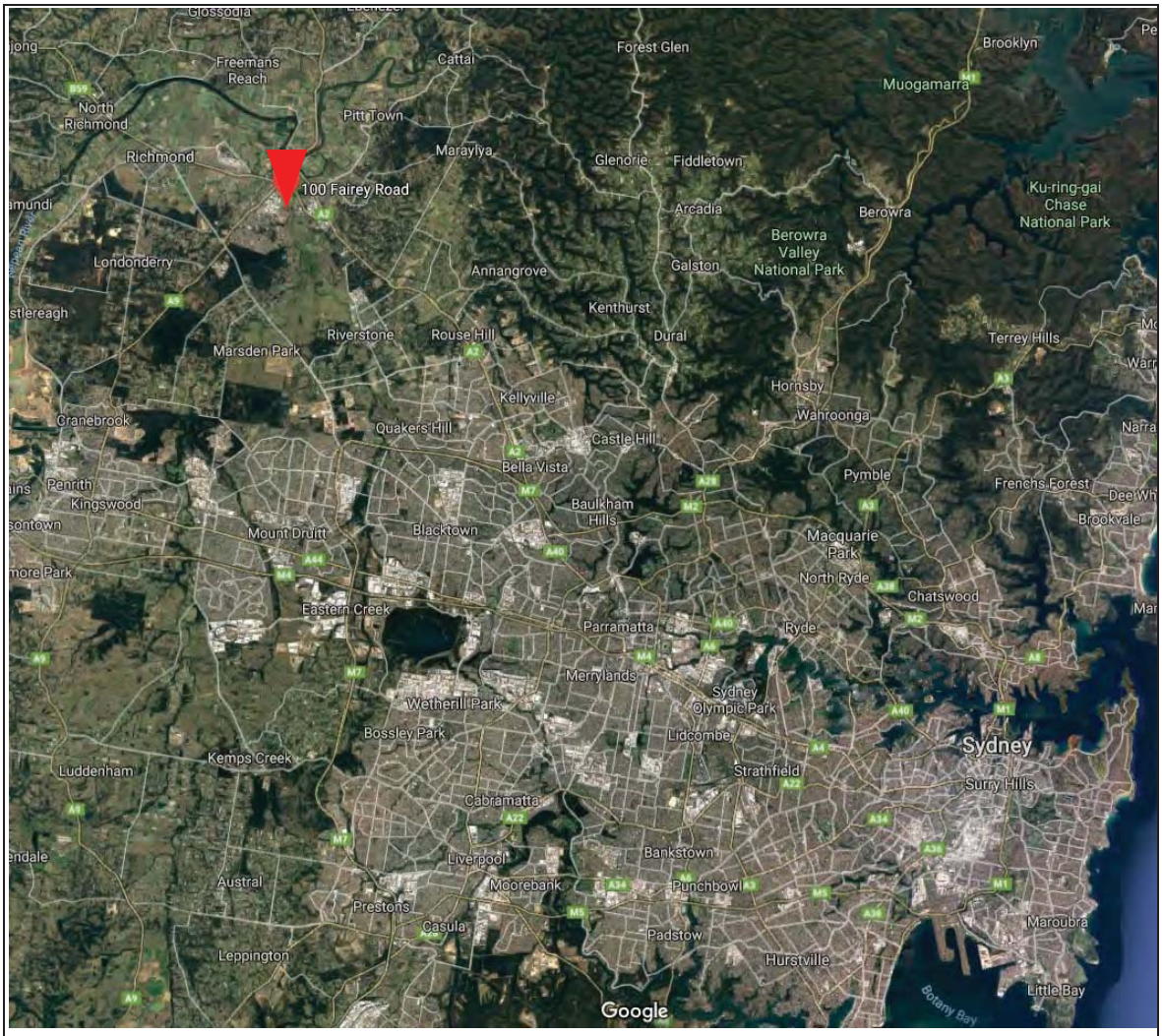
↑N	**Source:** SIX Maps 2018 **Legend:** Site boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Aerial View of the Site

Source: Land and Property Information – SixMaps

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

Figure 2-3: Site in its regional context



Source: Google Maps 2018

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

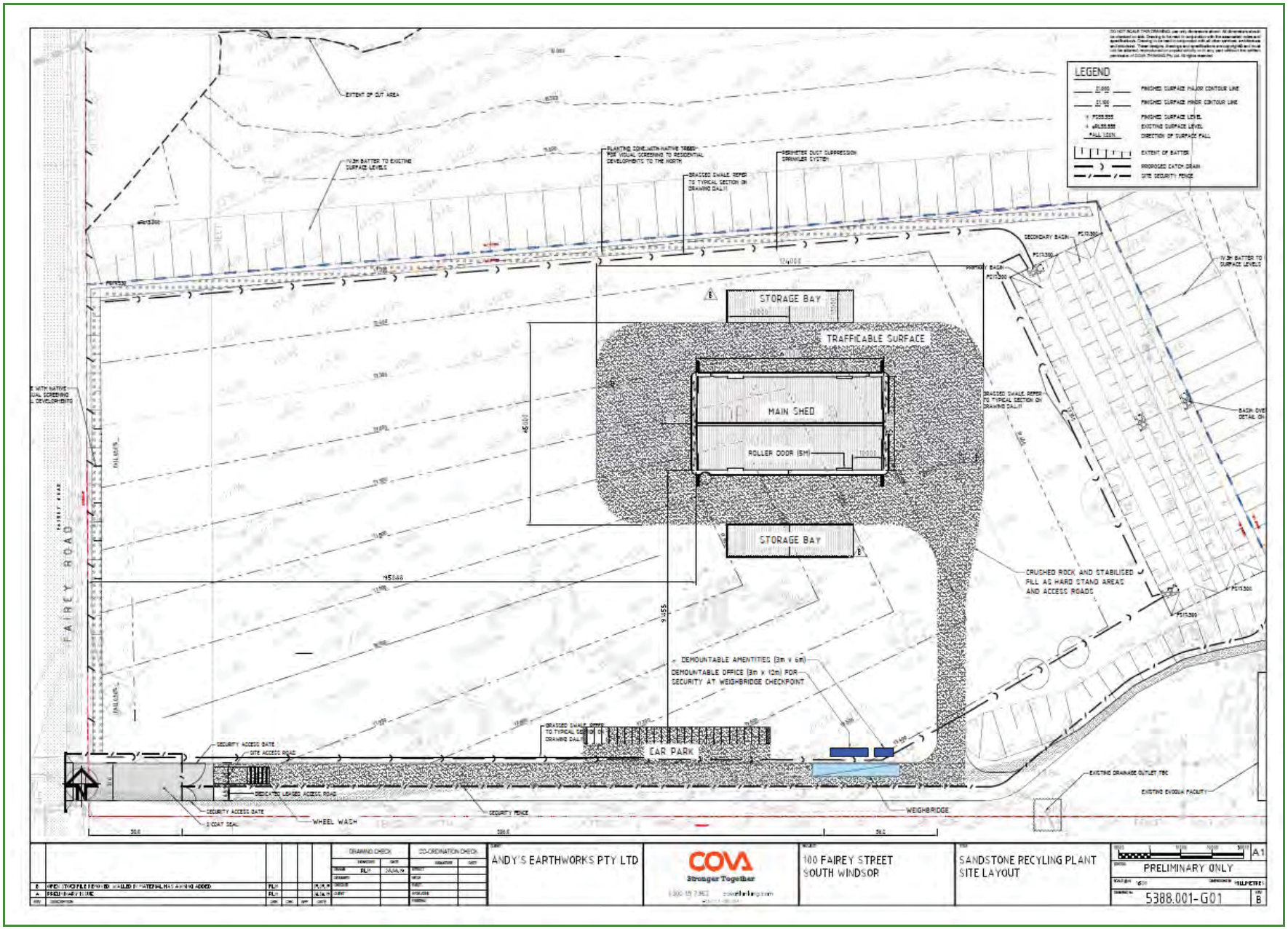
2.2 SITE LAYOUT AND PLANS

The existing site comprises of a large field for cattle with a cluster of small buildings along the centre of the southern boundary which include two caravans where a groundskeeper lives and two buildings for a micro-filtration research facility.

The proposed facility will be located on the first two thirds of the site from the eastern side.

Site plans showing the layout of the proposed facility are shown in Figure 2-4.

Figure 2-4: Site Layout showing the proposed development area



2.3 EXISTING FACILITIES

A drive way comprising of compacted road base material runs along the southern boundary to half way along the site.

Evoqua Water Technologies research facility is currently located on the site where they use the water from the stream to test their micro-filtration systems. This facility comprises of two main warehouse buildings, one has the dimensions: 9 m W x 15 m L x 5 m H and the other: 9 m W x 15 m L x 3 m H, both made of colorbond steel. There is a smaller ancillary shed which is used to store chemicals. The proposed development will not affect this facility.

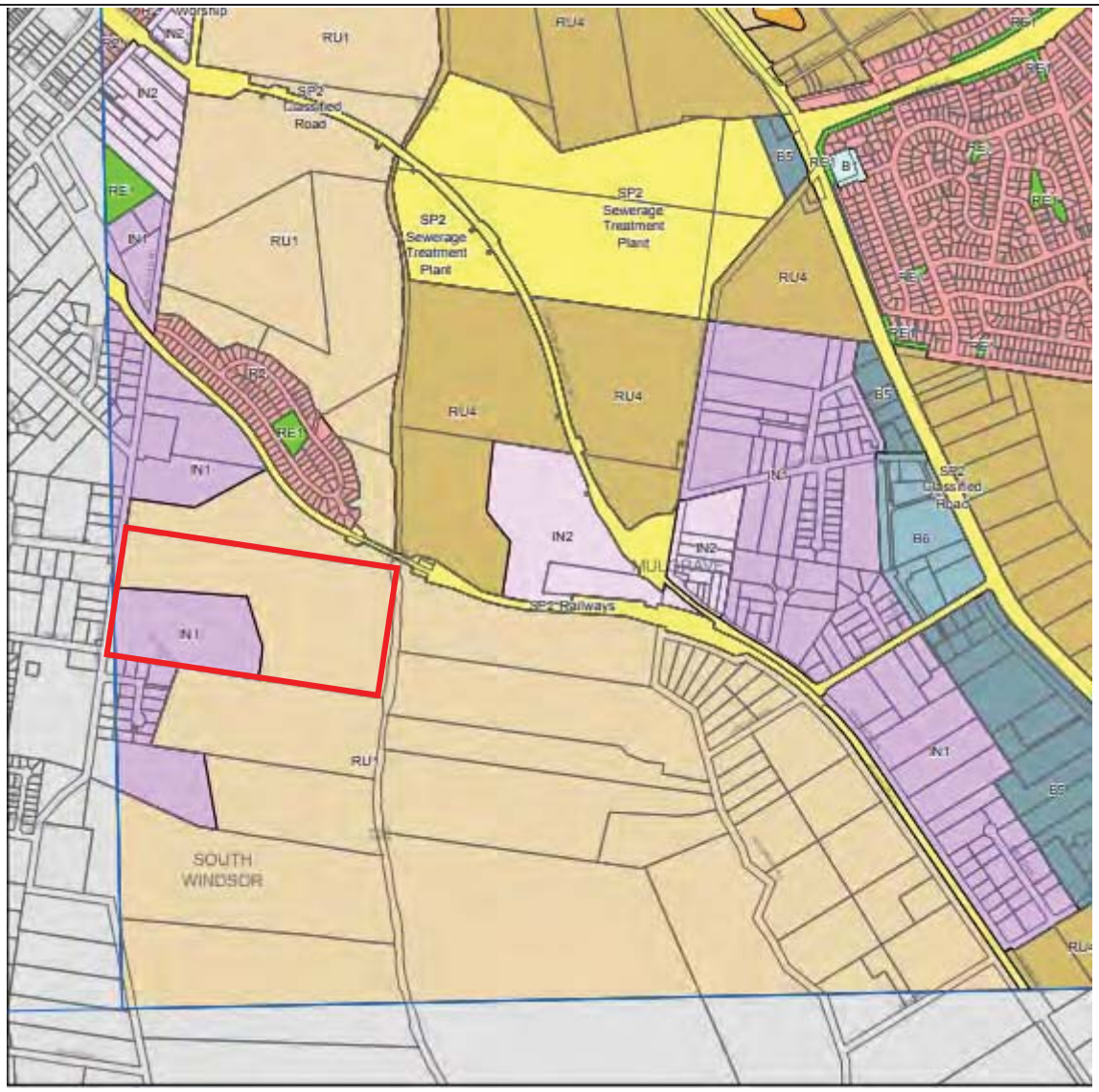
There are two caravans opposite Evoqua where a groundskeeper resides. Adjacent to this are a few shipping containers and empty water tanks and chemical storage containers.

There is evidence that the rest of the land is used as paddocks for cattle, but they are currently not occupied.

2.4 LAND USE

The land is zoned RU1 Primary production and IN1 General Industrial under the Hawkesbury Local Environmental Plan 2012. The development will be located within the IN1 General Industrial zoning to the south-west on the site. Other General Industrial IN1 zoned sites are located south-west, west and north-west of the site and include Boral Concrete, Snowflake Blast and Powdercoat and V J Glass, to name a few. Land zoned Primary production RU1 is to the north, east and south of the site. Further north of the site there is a railway line zoned SP2 Infrastructure and a R2 Low Density Residential area with a small RE1 Public Recreation area in the centre.

Figure 2-5: Hawkesbury LEP 2012 – Land Zoning Map (extract)



Source: Hawkesbury LEP 2012

N

Not to scale

LEGEND

Site Boundaries

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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2.5 LOCAL COMMUNITY

2.5.1 Surrounding Area

The suburb of South Windsor is located 59.5 km north-west of the Sydney Central Business district. Surrounding suburbs include Claredon, Windsor, Mcgraths Hill, Londonderry, Windsor Downs and Bligh Park. The site incorporates an IN1 General Industrial zone, which is generally found to the west and a RU1 Primary Production zone found to the east. There is a railway zoned SP2 Infrastructure to the north and an area of R2 Low Density Residential with a small area of RE1 Public Recreation in the centre. Areas zoned RU4 Primary Production Small Lots and IN2 Light Industrial are found to the north-east of the site.

2.5.2 Population Demographics

The Australian Bureau of Statistics conducts a national census every 4 years. Statistics have been taken from the latest census with available data, carried out in 2016.

At the time of the census, the population within the state suburb of South Windsor consisted of 5,892 people, of which 48% were males and 52% female. Of the total persons residing in Hornsby, 11,934 people were reportedly employed in 2016, of which approximately 63% worked full-time and 26% part-time. The occupations with the largest representation are technicians and trade workers – 18.3%, clerical and administrative workers – 15.1%, labourers – 13.0%, community and personal service workers – 11.5%, professionals – 11.2%, machinery operators and driver – 11.0%, sales workers – 9.0%, and managers – 8.9% .

2.6 SENSITIVE RECEIVERS

The nearest residence is located 370 m west of the site. The nearest residential zones are located to the south-west and north of the site and are approximately 400 m and 480 m away from the site respectively.

The nearest three industrial receivers are adjacent to the site and there is another 300 m north-west. Industrial properties are generally located to the west and north-west but there are a few directly south.

The nearest natural waterway is South Creek which runs along the eastern border of the site. The creek rises in Sydney's south western suburbs and flows generally north for 70 km before reaching its confluence with the Hawkesbury River near Windsor.

The nearest areas of biodiversity significance are onsite. There is an area of significant vegetation to the east of the site alongside South Creek and areas of connectivity between significant vegetation west of that near the wetland areas. However, there are no recorded sightings of threatened species within this area.

2.7 SITE HISTORY

Historical aerial photographs show that the site was largely vacant, used for agriculture and cleared of vegetation, apart from at the eastern border along South Creek from 1947 to present. In 2002 a dirt track appears along the southern boundary leading to a group of small buildings,

and caravans including a micro-filtration testing station. In 2007 shipping containers appear and in 2013 another building for Evoqua Water Technology's research facility has been erected. Additionally, in 2013 there is an area along the southern boundary that looks like it has been spread with a layer of top soil that is potentially excavated material from the adjacent site. Most recently in 2017, a few more structures have appeared that surround the sheds near the centre of the site.

2.7.1 DA History

The following table provides a summary of the development application (DA) records for the site.

Table 2-1: Summary of Council's Development and Building Application/ Consent Records

Year	Number	Description	Status
1985	BA0295/85	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Blocks and garage	Approved
1986	BA0084/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Dwelling	Approved
1986	DA0239/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1986	SA0053/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1987	DA0392/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; 2 lot subdivision	Withdrawn
1987	DA0393/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; 22 lot industrial subdivision	Approved
1987	SA0071/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1987	SA0072/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivison	Approved
1987	DA0394/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Golf driving range and amenities	Withdrawn
1996	DA0130/96	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Memfarm installation pump facilities/filtration. The activity undertaken on the site involves a continuous micro-filtration (CMF) testing station. The site was been chosen given its proximity to surface water to enable operation of several CMF units. The CMF testing facility is proposing to expand to enable testing of additional units to expand development of the units.	Approved
2010	DA0183/10	Lot 4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Construction of a building for the purpose of a research facility.	Approved

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 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

Under the National Greenhouse and Energy Reporting Act 2007 (NGER Act), reporting of greenhouse gas emissions and energy production and consumption is required if a facility meets certain thresholds. The current thresholds under the Act that are of relevance to the site are the facility thresholds which include:

- 25 kt or more of greenhouse gases (CO2-e) (scope 1 and scope 2 emissions);
- Production of 100 TJ or more of energy; or
- Consumption of 100 TJ or more of energy.

The proposed facility would be well under the thresholds and therefore would not be required to report under the NGER Act.

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 Reg) 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 designated development.

3.2.1.1 State Significant Development

Clause 4.36 of the EP&A Act defines state significant development. The proposed development is not State Significant Development under this Clause and as shown in Section 3.2.4.6.

3.2.1.2 Designated Development

Activities that constitute Designated Development are defined under Schedule 3 of the Environmental Planning and Assessment Regulation 2000. The following definitions are of relevance:

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.

Comment:
The proposed development is defined by Clause 32(b)(iii) as it would process more than 30,000 tonnes per year of waste materials and 32(d)(i), (ii), (v) and (vi) as the activities would involve the processing of waste material on a site that is located adjacent to South Creek, a natural waterbody and is on Class 5 land containing acid sulfate soils. In addition, the site is on a floodplain and is located within 250 m of residential dwellings on James Meehan Street and is also located within 500 m of a residential zone of South Windsor.

Therefore, the proposed development constitutes designated development under Clause 32 – Waste Management Facilities or Works.

3.2.1.3 Integrated development

Clause 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
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	Yes

The proposed development constitutes integrated development as it requires a controlled activity approval under the Water Management Act 2000 as detailed in Section 3.2.1.3.2 and requires an Environment Protection Licence as detailed in Section 3.2.1.3.1.

3.2.1.3.1 Protection of the Environment Operations Act 1997

Clauses 16 – Crushing, grinding or separating, 34 – Resource recovery, 41 – Waste processing (non-thermal treatment) and 42 – Waste storage of Part 1 in Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) are of relevance. If the proposed development meets the definition of these scheduled activities, an Environment Protection Licence (EPL) is required. The clauses are discussed as follows:

> ***16 Crushing, grinding or separating***
> *(1) This clause applies to* ***crushing, grinding or separating****, meaning the processing of materials (including sand, gravel, rock or minerals, but not including waste of any description) by crushing, grinding or separating them into different sizes.*
> *(2) The activity to which this clause applies is declared to be a scheduled activity if it has a capacity to process more than 150 tonnes of materials per day or 30,000 tonnes of materials per year.*

Comment:
The proposed development involves crushing and separating works, however, the material to be processed is 'waste' and therefore, this clause does not apply.

> ***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).*
> *(2A) This clause also does not apply to the receiving of waste at premises from off site and its processing if:*
> *(a) the waste is to be sold or supplied from those premises as landscaping material (that is, as lawful soil amendments or for landscape gardening) and nothing else occurs in respect of the waste at the premises other than blending, mixing, packaging or storage of the waste for the purpose of that sale or supply, and*
> *(b) the waste is virgin excavated natural material or meets all of the conditions of a resource recovery order (made under clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 at the time it is received, and*
> *(c) the waste does not include any liquid waste or biosolids that are not general solid waste (non-putrescible), and*
> *(d) no other activity is carried out at the premises that would result in the premises being a scheduled waste facility within the meaning of the Protection of the Environment Operations (Waste) Regulation 2014.*

(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

Column 1	***Column 2***
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 oil	*involves processing more than 20 tonnes of waste oil per year or having on site at any time more than 2,000 litres of waste oil*
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*

Comment:

The proposed development involves recovery of general waste and the processing of more than 6,000 tonnes of these waste materials per year. Therefore, the proposed development is defined under Clause 34 – Resource recovery.

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).

(2AA) This clause also does not apply to the receiving of waste at premises from off site and its processing if:

(a) the waste is to be sold or supplied from those premises as landscaping material (that is, as lawful soil amendments or for landscape gardening) and nothing else occurs in respect of the waste at the premises other than blending, mixing, packaging or storage of the waste for the purpose of that sale or supply, and

(b) the waste is virgin excavated natural material or meets all of the conditions of a resource recovery order (made under clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014) at the time it is received, and

(c) the waste does not include any liquid waste or biosolids that are not general solid waste (non-putrescible), and

(d) no other activity is carried out at the premises that would result in the premises being a scheduled waste facility within the meaning of the Protection of the Environment Operations (Waste) Regulation 2014.

(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.

Table

Column 1	***Column 2***
Activity	***Criteria***
non-thermal treatment 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*
non-thermal treatment of hazardous and other waste	*involves having on site at any time more than 200 kilograms of waste (other than clinical and related waste), or* *involves having on site at any time any quantity of clinical and related waste*
non-thermal treatment of liquid waste	*involves having on site at any time more than 200 kilograms of liquid waste (other than clinical and related waste), or* *involves having on site at any time any quantity of liquid waste that is clinical and related waste*
non-thermal treatment of waste oil	*involves having on site at any time more than 2,000 litres of waste oil, or* *involves processing more than 20 tonnes of waste oil per year*
non-thermal treatment 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*

Comment:
The proposed development involves the processing of more than 6,000 tonnes of general waste per year by non-thermal treatment. Therefore, Clause 41 applies.

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.

(2A) This clause also does not apply to the receiving of waste from off site and its storage if:

(a) the waste is to be sold or supplied from those premises as landscaping material (that is, as lawful soil amendments or for landscape gardening) and nothing else occurs in respect of the waste at the premises other than storage of the waste for the purpose of that sale or supply, and

(b) the waste is virgin excavated natural material or meets all of the conditions of a resource recovery order (made under clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014) at the time it is received, and

(c) the waste does not include any liquid waste or biosolids that are not general solid waste (non-putrescible), and

(d) no other activity is carried out at the premises that would result in the premises being a scheduled waste facility within the meaning of the Protection of the Environment Operations (Waste) Regulation 2014.

(2B) This clause also does not apply to the receiving of virgin excavated natural material from off site and its storage if the only waste received is virgin excavated natural material.

(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.

Comment:
The proposed development has the capacity to store more than 1,000 tonnes of waste at any time, therefore Clause 42 applies.

The proposed development is defined under Clauses 34 – Resource Recovery, 41 – Waste Processing (non-thermal treatment) and 42 – Waste Storage within Schedule 1 of the POEO Act, therefore an EPL is required.

3.2.1.3.2 Water Management Act 2000

Clause 91(2) of the Water Management Act, 2000 (WMA Act) require an activity approval to carry out a controlled activity in, on or under waterfront land. The following definitions apply:

"controlled activity" *means:*

a) the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
d) the carrying out of any other activity that affects the quantity or flow of water in a water source.

***"waterfront land"** means:*

a) the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or
(a1) the bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and the prescribed distance inland of, the shore of the lake, or
(a2) the bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the estuary, or
b) if the regulations so provide, the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters,

where the prescribed distance is 40 metres or (if the regulations prescribe a lesser distance, either generally or in relation to a particular location or class of locations) that lesser distance. Land that falls into 2 or more of the categories referred to in paragraphs (a), (a1) and (a2) may be waterfront land by virtue of any of the paragraphs relevant to that land.

Waterbodies and a wetland are identified to exist at the site itself and the works involved with the proposed development would be within 40 metres of these waterbodies. Therefore, the proposed modifications require a controlled activity approval.

The proposed development constitutes integrated development as the works require a controlled activity approval under the Water Management Act 2000.

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

The *Hawkesbury Local Environmental Plan* (HLEP) *2012* applies to the subject land. The subject land is within land zoned RU1 Primary production and IN1 General Industrial. The south west corner of the site is covered by the IN1 General Industrial zoning and the remainder of the property on the north and east of the lot is covered by the RU1 Primary Production zoning. All works associated with the proposed development are to be contained within the project area

inside the area zoned IN1. Under the provisions of the IN1 land zoning, the proposed use is permissible with the consent of Council.

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

The following may be of relevance:

- *Draft State Environmental Planning Policy - Integrating Land Use and Transport*
- *Draft State Environmental Planning Policy (Application of Development Standards) 2004*
- *Draft State Environmental Planning Policy (Competition) 2010*
- *Draft State Environmental Planning Policy (Infrastructure) Amendment (Review) 2016*
- Amendment to *State Environmental Planning Policy No. 44 Koala Habitat Protection*
- *Draft State Environmental Planning Policy (Primary Productions and Rural Development) 2017*
- *Draft State Environmental Planning Policy (Environment) 2017*
- Amendment to *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2014 — Site Compatibility Certificates*
- Amendment to *State Environmental Planning Policy No. 55— Remediation of Land Amendment to Standard Instrument Local Environment Plan — Retail land use definitions*
- Amendment to *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 — Housekeeping Amendments*

With the exception of *Draft State Environmental Planning Policy (Environment) 2017,* none of the above draft environmental planning instruments apply to the proposed development. This SEPP will consolidate 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.

Of the above SEPPs, Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No. 2-1997) is of relevance. This plan is addressed in Section 3.2.4.7.

(iii) Any Development Control Plans

The proposed use will be assessed in accordance with the Hawkesbury DCP 2002.

(iv) Any matters prescribed by the regulations.

None at this stage.

(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*

The proposed use will complement the development and strengthen the overall economic development of the area.

- *Potential Impact on Adjoining Properties*

There will be negligible negative impact on the adjoining or surrounding industrial developments.

- *Access, Transport and Traffic*

A traffic assessment has been undertaken by Transport and Urban Planning and found that the proposed development will not change the existing traffic service levels at the affected intersections and the internal vehicle movements, parking and circulation can be adequately accommodated within the site.

- *Public Domain*

The proposed use will have a positive contribution to the public domain.

- *Utilities*

The existing utilities are provided to service the proposed development.

- *Heritage*

There are no heritage issues.

- *Other Land Resources*

The proposed development will utilise valuable resources removed from construction and demolition sites.

- *Critical Habitat*

The land does not include or comprise critical habitat. The site does contain areas of "significant vegetation" and "connectivity between significant vegetation" as shown on the Hawkesbury LEP terrestrial biodiversity map, however, these areas are not within the area of the proposed development and would not be disturbed.

- *Air and Microclimate*

There are no microclimate issues. An air quality impact assessment and is summarised in Section8.1.

- *Waste*

The facility would accept waste materials for processing for dispatch to recycling facilities. This would prevent the disposal of this waste to landfill. There would be minor quantities of waste

generated by the process and by office activities. The management of wastes are addressed in Section 8.6.

- *Energy*

The proposed operation would not involve energy intensive activities therefore there are no energy issues.

- *Noise*

A detailed noise impact assessment has been conducted in accordance with the NSW Noise Policy for Industry, the NSW Interim Construction Noise Guideline and the NSW Road Noise Policy. The noise assessments is summarised in Section 8.2.

- *Natural Hazards*

There are no acknowledged natural hazards.

- *Social Impact in the Locality*

There are no negative social impacts.

- *Economic Impact in the Locality*

The proposed use will contribute to the economic development of the area.

- *Site Design and Building Form*

The proposed development would occupy the IN1 zoned area of the land within the south western portion of the site. An industrial building and small demountable site office building and amenities building will be erected, and a weighbridge installed along the existing access road. Materials would be stored within external covered storage bays and a vegetated buffer would be established along the northern and western site boundaries for use as a visual screen.

- *Construction*

The construction works would involve establishment of a purpose built processing building, site office, amenities weighbridge and a sediment control system to manage sediment laden stormwater runoff from the project area.

- *Cumulative Impacts*

There are no cumulative impact issues.

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

The proposed development is appropriate for this site. The objectives of the zone IN1 have been satisfied.

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

No submissions at this stage.

(e) The public interest

There are no aspects of the proposed use that would be contrary to the public interest.

3.2.2 NSW Heritage Act 1977

The subject land does not contain an item of environmental heritage and there are no items of heritage in the immediate vicinity of the subject land that would be impacted by its proposed use. Therefore, there are no issues in relation to the *NSW Heritage Act 1977*.

3.2.3 Biodiversity Conservation Act 2016

The subject land is a not biodiversity certified land as shown in the Planning Certificate no. PC0069/19 issued under Section 10.7 of the *Environmental Planning And Assessment Act 1979* and does not contain threatened species or ecological communities. Therefore, there are no biodiversity issues in relation to the *Biodiversity Conservation Act, 2016*.

3.2.4 State and Regional Environmental Planning Policies

A number of State Environmental Planning Policies (SEPPs) as well as Draft SEPPs, apply to the subject land and are listed in Table 3-2. The most relevant SEPPs are then discussed in greater detail.

Table 3-2: State and Regional Environmental Planning Policies

Policy	Comments
SEPP No 19 – Bushland In Urban Areas	No application
SEPP No 21 – Caravan Parks	No application
SEPP No 30 – Intensive Agriculture	No application
SEPP No 33 – Hazardous and Offensive Development	**No application: Discussed below**
SEPP No 44 – Koala Habitat Protection	No application
SEPP No 50 – Canal Estate Development	No application
SEPP No 55 – Remediation of Land	**No application: Discussed below**
SEPP No 62 – Sustainable Aquaculture	No application
SEPP No 64 – Advertising and Signage	No application
SEPP No 65 – Design Quality of Residential Apartment Buildings	No application
SEPP No. 70 – Affordable Housing (Revised Schemes)	No application
SEPP (Building Sustainability Index: BASIX) 2004	No application
SEPP (Exempt and Complying Development Codes) 2008	No application
SEPP (Affordable Rental Housing) 2009	No application
SEPP (Infrastructure) 2007	**No application: Discussed below**
SEPP (Integration and Repeals) 2016	No application
SEPP (Vegetation in Non-Urban Areas)	No application
SEPP (Housing for Seniors or People with a Disability) 2004	No application

Table 3-2: State and Regional Environmental Planning Policies

Policy	Comments
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	**No application: Discussed below**
SEPP (Miscellaneous Consent Provisions) 2007	No application
SEPP (State Significant Precincts) 2005	**No application: Discussed below**
SEPP (Repeal of Concurrence and Referral Provisions) 2008	No application
SEPP (State and Regional Development) 2011	**No application: Discussed below**
Sydney Regional Environmental Plan No. 9 – Extractive Industry (No. 2 – 1995)	No application
Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River (No. 2 – 1997)	**No application: Discussed below**
SEPP (Educational Establishments and Child Care Facilities) 2017	No application
SEPP (Coastal Management) 2018	No application

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

A preliminary risk assessment demonstrated that the proposed development does not trigger SEPP 33 and a preliminary hazard analysis is not required. SEPP 33 does not apply.

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

The proposed development would not involve major construction or excavation works below 5 metres Australian Height Datum. A phase I environmental site assessment has found no evidence of potentially contaminating activities to have occurred at the site. Therefore the proposed development is not assessable under SEPP 55 – Remediation of Land.

3.2.4.3 State Environmental Planning Policy (Infrastructure) 2007

The development is not an infrastructure proposal and the provisions of the SEPP (Infrastructure) 2007 do not apply.

3.2.4.4 SEPP (Mining, Petroleum Production and Extractive Industries) 2007

The proposed site is not identified under Schedules 2 or 3 of this SEPP. Furthermore, "extractive industries" is defined as:

> ***"extractive industry"*** *means the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, 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:*
>
> *(a) turf farming, or*
>
> *(b) tunnelling for the purpose of an approved infrastructure development, or*
>
> ***(c) cut and fill operations, or the digging of foundations, ancillary to approved development,*** *or*

(d) the creation of a farm dam if the material extracted in the creation of the dam is used on site and not removed from the site.

The proposed excavation is for the purposes of cut and fill to raise the level of the site to reduce flood risk to adjoining properties and is ancillary to the development. Therefore the proposed use does not fall under the definition of "extractive industries". This SEPP does not apply.

3.2.4.5 State Environmental Planning Policy (State Significant Precincts) 2005

The development is not within a State Significant Precinct and the provisions of the SEPP (State Significant Precincts) 2005 do not apply.

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

The proposed development is not defined under Schedule 1 of the SEPP (state and regional development) 2011 and is not State Significant Development. The following definition is of relevance:

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 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.

Comment: Although the proposed development is for is for a resource recovery facility, the facility would not handle more than 100,000 tonnes per year of waste and therefore does not constitute State Significant Development.

The proposed development is defined under Schedule 7, Clause 7(c) of the SEPP – waste management facilities or works, which meet the requirements of designated development under

clause 32 of Schedule 3 to the *Environmental Planning and Assessment Regulation 2000*, and is therefore Regionally Significant Development.

3.2.4.7 Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River

The site is bounded by South Creek to the east which is a tributary of the Hawkesbury-Nepean River system. The industrial zoned land of the site would be used as a waste management facility. Due to the proximity of South Creek to the site, the requirements of Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River (SREP) are addressed in detail below.

The aim of the SREP 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*. As demonstrated throughout this EIS, the proposed development does not involve the removal of water from the river system or release of wastewater and/or wastes to waters. It is essentially a closed system that would use mains water, recycled water and would treat or dispose of any wastewater and solid waste using licensed waste contractors. Stormwater runoff would be managed using an on-site detention system. The site would employ safeguards that prevent the release of potential contaminants. Therefore, the proposed development is consistent with the aim of the SEPP.

General planning considerations are provided in Clause 5 of the SREP. These are as follows:

(a) the aim of this plan, and
(b) the strategies listed in the Action Plan of the Hawkesbury-Nepean Environmental Planning Strategy, and
(c) whether there are any feasible alternatives to the development or other proposal concerned, and
(d) the relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored.

The aim of the plan is addressed above.

The Hawkesbury-Nepean Catchment Action Plan 2013-2023 provides strategies on pages 9 and 10. The proposed development is in line with these strategies as it would maintain safeguards that would protect aquatic ecosystems whilst operations are undertaken.

Feasible alternatives to the proposed development have been considered in Section 1.4 of this EIS.

Potential impacts of the development and how these will be minimised and monitored are addressed in Section 8, 9 and 12.

Therefore, the proposed development is consistent with the aim and general provisions of the Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River.

Clause 6 of the SREP details the specific planning policies and recommended strategies. Relevant policies and strategies are discussed in the following table.

Table 3-3: Specific Planning Policies and Recommended Strategies – SREP No. 20

Policy / Strategies	Comment
(1) Total catchment management	
Policy: Total catchment management is to be integrated with environmental planning for the catchment.	Complies
Strategies:	
(a) Refer to the application or other proposal for comment to the councils of each adjacent or downstream local government area which is likely to suffer a significant adverse environmental effect from the proposal.	Not required.
(b) Consider the impact of the development concerned on the catchment	Addressed in Appendix 6
(c) Consider the cumulative environmental impact of development proposals on the catchment.	Addressed in Section 10

Table 3-3: Specific Planning Policies and Recommended Strategies – SREP No. 20

Policy / Strategies	Comment
(2) Environmentally sensitive areas Policy: The environmental quality of environmentally sensitive areas must be protected and enhanced through careful control of future land use changes and through management (where necessary) remediation of existing uses.	The site contains a wetland and is identified as containing Class 5 acid sulfate soils. The wetland is shown to be within the rural land zoning and not part of the area where the proposed development will be located.
Strategies:	Response to strategies:
a) Rehabilitate parts of the riverine corridor from which sand, gravel or soil are extracted so that attached aquatic plant beds are replaced and water quality and faunal habitats improved.	N/A
b) Minimise adverse impacts on water quality, aquatic habitats, riverine vegetation and bank stability.	Sediment management system is proposed.
c) Minimise direct and indirect adverse impacts on land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916* and conservation area sub-catchments in order to protect water quality and biodiversity.	N/A
d) Protect wetlands (including upland wetlands) from future development and from the impacts of land use within their catchments.	Applies. This is addressed in Appendix 6
e) Consider the need to include buffer zones (such as adequate fire radiation zones) for proposals on land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916.*	N/A
f) Consider the views of the Director-General of National Park and Wildlife about proposals for land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974.*	N/A
g) Consideration should be given to the impact of the development concerned on the water table and the formation of acid sulphate soils.	Applies. This is addressed in Appendix 6
h) New development in conservation area sub-catchments should be located in areas that area already cleared.	N/A

Table 3-3: Specific Planning Policies and Recommended Strategies – SREP No. 20

Policy / Strategies	Comment
(3) Water quality	
Policy: Future development must not prejudice the achievement of the goals of use of the river for primary contact recreation (being recreational activities involving direct contact, such as swimming) and aquatic ecosystem protection in the river system. If the quality of receiving waters does not currently allow these uses, the current water quality must be maintained, or improved, so as not to jeopardise the achievement of the goals in the future. When water quality goals are set by the Government these are to be the goals to be achieved under this policy.	Complies
Strategies:	
(a) Quantify, and assess the likely impact of, any predicted increase in pollutant loads on receiving waters	Addressed in Appendix 6
(b) Consider the need to ensure that water quality goals for primary contact recreation and aquatic ecosystem protection are achieved and monitored	Addressed in Appendix 6
(c) Approve development involving primary contact recreation or the withdrawal of water from the river for human contact (not involving water treatment), such as showers, only in locations where water quality is suitable (regardless of water temperature)	Not relevant.
(d) Do not carry out development involving on-site disposal of sewage effluent if it will adversely affect the water quality of the river or groundwater. Have regard to the nature and size of the site.	Not relevant.
(e) Develop in accordance with the land capability of the site and do not cause land degradation.	Land will be stabilised and vegetated.
(f) Consider the need for an Erosion and Sediment Control Plan (to be in place at the commencement of the development) where the development concerned involves disturbance of soil.	An ESCP will be prepared.
(g) Minimise or eliminate point source and diffuse source pollution by the use of best management practices.	No water releases from site are proposed.
(h) Site and orientate development appropriately to ensure bank stability. Plant appropriate native vegetation along banks of the river and tributaries of the river, but not so as to prevent or inhibit the growth of aquatic plants in the river and consider the need for a buffer or native vegetation.	Removal of modified and grazed paddock vegetation is required. Vegetated areas are proposed and shown on site plans.
(i) Consider the impact of the removal of water from the river or from groundwater sources associated with the development concerned.	No water will be removed.
(j) Protect the habitat or native aquatic plants.	Adequate safeguards would be provided.

Table 3-3: Specific Planning Policies and Recommended Strategies – SREP No. 20

Policy / Strategies	Comment
(4) Water quantity	The proposal would not involve removal of water nor release of wastewater into the river.
(5) Cultural heritage	There are no items of cultural heritage at the site.
(6) Flora and fauna	Flora and fauna is assessed in Appendix 9.
(7) Riverine scenic quality Policy: The scenic quality of the riverine corridor must be protected.	Addressed in Section 9.2.
(8) Agriculture/aquaculture and fishing	Not relevant.
(9) Rural residential development	Not relevant.
(10) Urban development	Not relevant.
(11) Recreation and tourism	Not relevant.
(12) Metropolitan strategy Policy: Development should complement the vision, goal, key principles and action plan of the Metropolitan Strategy. Strategies: (a) Consider the impacts of transport infrastructure proposals on water quality and air quality (b) Consider the impacts of metropolitan waste disposal on water quality (c) Consider the impacts of development on air quality (d) Consider the need for waste avoidance, waste reduction, reuse and recycling measures (e) Consider the implications of predicted climate change on the location of development and its effect on conservation of natural resources	 Complies Not relevant Not relevant Addressed in Appendix 4 Addressed in Appendix 1 Addressed in Appendix 6

Clause 11 of the SREP sets out particulars for the development controls. The proposed use is identified under item 18 as follows.

> ***(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.

Comments:
Matters considered in this EIS in relation to the above development controls include:

- There is a low potential for groundwater contamination due to the nature of the majority materials to be stored and processed on site being inert and the safeguards to be implemented to minimise the risk of spills and incidents. This is demonstrated in the Soil and Water Assessment provided as Appendix 6.
- The proposed activities are essentially a closed system that would use mains water, recycled water and would treat or dispose of any wastewater and solid waste using licensed waste contractors. Stormwater runoff would be managed using an on-site detention system, the adequacy of this is discussed in the Soil and Water Assessment. The site would employ safeguards that prevent the release of potential contaminants.
- During the operation of the site, an Environmental Management Plan (EMP) would be implemented. This plan would be prepared in accordance with the ISO14001 international standard. The proposed development is a relatively small site and not a large mining facility, therefore the long term stability of the final landform can be addressed within the EMP under site rehabilitation which would include stabilising the site to ensure erosion is minimised and to promote future uses.
- No extraction of material is proposed.

As demonstrated above, the proposed use of the site would satisfy the "waste management facilities or works" development controls listed under Clause 11(18) of the SREP. The proposed use of the site is in line the aims and objectives of the SREP and complies with the general planning considerations and relevant specific planning policies and recommended strategies under the SREP.

3.3 LOCAL CONTROLS

3.3.1 Local Environmental Plan

The Local Environmental Plan that applies to the subject site is the Hawkesbury Local Environmental Plan (LEP) 2012.

The proposed development is considered to be consistent with the particular aims of the Plan under Part 1, Clause 1.2 (2), specifically (d) as follows:

a) to provide the mechanism for the management, orderly and economic development and conservation of land in Hawkesbury,
b) to provide appropriate land in area, location and quality for living, working and recreation activities and agricultural production,
c) to provide attractive landscapes and preserve places of natural beauty, including wetlands and waterways,
d) to protect and enhance the natural environment in Hawkesbury and to encourage ecologically sustainable development,

e) to conserve and enhance buildings, structures and sites of recognised significance that are part of the heritage of Hawkesbury for future generations,
f) to provide opportunities for the provision of secure, appropriate and affordable housing in a variety of types and tenures for all income groups in Hawkesbury,
g) to encourage tourism-related development that will not have significant adverse environmental effects or conflict with other land uses in the locality.

3.3.1.1 Permissibility

The land zoning for the subject land is described as IN1 – General Industrial and RU1 – Primary Production under the provisions of the *Hawkesbury Local Environmental Plan* (HLEP) *2012*, which applies to the subject site.

3.3.1.1.1 IN1 – General Industrial Zone

The proposed construction materials processing and recycling facility would be located wholly within the IN1 zone and is a permitted use with consent within this Zone, under the Hawkesbury LEP 2012 as underlined below.

> ***2 Permitted without consent***
>
> *Environmental protection works; Home occupations*
>
> ***3 Permitted with consent***
>
> *Depots; Freight transport facilities; Funeral homes; Garden centres; General industries; Hardware and building supplies; Health consulting rooms; Hospitals; Industrial training facilities; Light industries; Neighbourhood shops; Places of public worship; Roads; Warehouse or distributions centres; Any other development not specified in item 2 or 4*
>
> ***4 Prohibited***
>
> *Airports; Airstrips; Amusement centres; Boat sheds; Business premises; Camping grounds; Car parks; Caravan parks; Cellar door premises; Cemeteries; Charter and tourism boating facilities; Educational establishments; Exhibition homes; Exhibition villages; Farm buildings; Forestry; Hazardous storage establishments; Health services facilities; Highway service centres; Home-based child care; Home businesses; Home occupations (sex services); Intensive livestock agriculture; Intensive plant agriculture; Jetties; Kiosks; Marinas; Markets; Moorings; Offensive storage establishments; Office premises; Recreation facilities (major); Research stations; Residential accommodation; Restricted premises; Roadside stalls; Sex services premises; Shops; Specialised retail premises; Tourist and visitor accommodation; Water recreation structures; Wholesale supplies*

The following definitions apply:

> ***general industry*** *means a building or place (other than a heavy industry or light industry) that is used to carry out an industrial activity.*
>
> ***industrial activity*** *means the manufacturing, production, assembling, altering, formulating, repairing, renovating, ornamenting, finishing, cleaning, washing, dismantling,*

transforming, processing, recycling, adapting or servicing of, or the research and development of, any goods, substances, food, products or articles for commercial purposes, and includes any storage or transportation associated with any such activity.

The following definitions also apply:

waste or resource management facility *means any of the following:*
(a) a resource recovery facility,
(b) a waste disposal facility,
(c) a waste or resource transfer station,
(d) a building or place that is a combination of any of the things referred to in paragraphs (a)–(c).

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.*

The proposed use can be defined as "resource recovery facility". The site would not be used for the purposes of a heavy industrial storage establishment nor any other use listed under "4 Prohibited" and therefore is permissible with consent.

3.3.1.1.2 RU1 – Primary Production Zone

The proposed development would include cut and fill earthworks within the RU2 zone for the purposes of reducing flood risk to adjoining properties and using the excavated material for raising the level of the IN1 zoned area of the land. This is a permitted use with consent within this Zone, under the Hawkesbury LEP 2012 as underlined below.

2 Permitted without consent

Bed and breakfast accommodation; Environmental protection works; Extensive agriculture; Home occupations

3 Permitted with consent

Animal boarding or training establishments; Boarding houses; Boat sheds; Building identification signs; Business identification signs; Camping grounds; Caravan parks; Cemeteries; Centre-based child care facilities; Charter and tourism boating facilities; Community facilities; Correctional centres; Crematoria; Dual occupancies (attached); Dwelling houses; Educational establishments; Entertainment facilities; Environmental facilities; Extractive industries; Farm buildings; Flood mitigation works*; Food and drink premises; Forestry; Funeral homes; Health consulting rooms; Helipads; Heliports; Home-based child care; Home industries; Hospitals; Intensive livestock agriculture; Intensive plant agriculture; Jetties; Landscaping material supplies; Moorings; Open cut mining; Places of public worship; Plant nurseries; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Respite day care centres; Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers'*

dwellings; Tourist and visitor accommodation; Truck depots; Veterinary hospitals; Water recreation structures; Water storage facilities

4 Prohibited

Any development not specified in item 2 or 3

The following definitions apply:

***flood mitigation work** means work designed and constructed for the express purpose of mitigating flood impacts. It involves changing the characteristics of flood behaviour to alter the level, location, volume, speed or timing of flood waters to mitigate flood impacts. Types of works may include excavation, construction or enlargement of any fill, wall, or levee that will alter riverine flood behaviour, local overland flooding, or tidal action so as to mitigate flood impacts.*

The proposed use of the RU1 zoned area of the land may fall under the definition of "flood mitigation work" as it is for the purposes of reducing the flood risk to adjoining properties. Flood mitigation works are permissible with consent within the RU1 zone.

3.3.1.2 Provisions

The provisions of the Hawkesbury LEP 2012 are assessed in Table 3-4 to Table 3-6. Of relevance to the proposed development are Part 4 Principal Development Standards, Part 5 Miscellaneous Provisions and Part 6 Additional Local Provisions.

Table 3-4: Hawkesbury Local Environmental Plan 2012 Part 4 Principal Development Standards

Clause	Comments	Compliance
4.1 Minimum subdivision lot size	The proposed modification does not involve the subdivision of land	No application
4.1AA Minimum subdivision lot size for community title schemes	The proposed modification does not involve the subdivision of land	No application
4.1A Minimum subdivision lot size for strata plan schemes in certain zones	The proposed modification does not involve the subdivision of land	No application
4.1B Minimum lot size for certain split zone lots	Not applicable	No application
4.1C Exceptions to minimum subdivision lot size for rural and large lot residential zones	The proposed modification does not involve the subdivision of land	No application
4.1D Exceptions to minimum subdivision lot size for certain land	The proposed modification does not involve the subdivision of land	No application
4.1E Exceptions to minimum subdivision for Grose Wold	The proposed modification does not involve the subdivision of land nor is it in Grose Wold	No application

Table 3-4: Hawkesbury Local Environmental Plan 2012 Part 4 Principal Development Standards

Clause	Comments	Compliance
4.1 F Exceptions to minimum subdivision lot size for certain land in North Richmond	The proposed modification does not involve the subdivision of land nor is it in North Richmond	No application
4.1 G Restriction on the number of lots created by subdivision of certain land	The proposed modification does not involve the subdivision of land	No application
4.2 Rural subdivision	The site is not located on rural zoned land	No application
4.2A Residential development and subdivision prohibited on certain land	The proposed modification does not involve residential development or the subdivision of land	No application
4.2B Additional requirements for subdivisions in certain flood planning areas	The proposed modification does not involve the subdivision of land	No application
4.3 Height of buildings	The maximum height of a building built in the RU1 Primary Production zone of the site is – 10 m as indicated by the Height of Buildings Map. No restriction to height of buildings applies to the IN1 zone of the site.	The height of the proposed building is 10m. Complies
4.4 Floor space ratio	Not adopted	No application
4.5 Calculation of floor space ratio and site area	Not adopted	No application
4.6 Exceptions to development standards	No variation of development standards is required.	No application

Table 3-5: Hawkesbury Local Environmental Plan 2012 Part 5 Miscellaneous Provisions

Clause	Comments	Compliance
5.1 Relevant acquisition authority	No part of the land is required to be acquired for a public purpose	No application
5.1A Development on land intended to be acquired for public purposes	Subject site is located on IN1 General Industrial zoned land and RU1 Primary Production	No application
5.2 Classification and reclassification of public land	No part of the land is classified as public land	No application
5.3 Development near zone boundaries	Land use on the subject site is not changing	No application
5.4 Controls relating to miscellaneous permissible uses	The existing business is not of the type described in this clause	No application
5.5	Repealed	Repealed
5.6 Architectural roof features	There will be no roof features/ decorative elements of visual interest	No application
5.7 Development below mean high water mark	Not applicable	No application

Table 3-5: Hawkesbury Local Environmental Plan 2012 Part 5 Miscellaneous Provisions

Clause	Comments	Compliance
5.8 Conversion of fire alarms	The proposed modification does not involve the conversion of a fire alarm system	No application
5.9, 5.9AA	Repealed	Repealed
5.10 Heritage conservation	There are no heritage items, Aboriginal objects or a building, work, relic or tree within a heritage conservation area located within the subject land	No application
5.11 Bush fire hazard reduction	Relates to the Rural Fires Act 1997	No application
5.12 Infrastructure development and use of existing buildings of the Crown	The proposed modification does not affect a building of the Crown	No application
5.13 Eco-tourist facilities	Not applicable	No application
5.14 Sliding Spring Observatory – maintaining dark sky	Not adopted	Not adopted
5.15 Defence communications facility	Not adopted	Not adopted

Table 3-6: Hawkesbury Local Environmental Plan 2012 Part 6 Additional Local Provisions

Clause	Comments	Compliance
6.1 Acid sulfate soils	Land is identified as containing Class 5 acid sulfate soils and due to the nature of proposed excavations, an acid sulfate soil management plan is recommended.	Applies
6.2 Earthworks	Earthworks are part of the proposed modification. Earthworks are addressed in Section 5.2.1.	Earthworks are ancillary to the development application. Complies.
6.3 Flood planning	The Hawkesbury Floodplain Risk Management Study and Plan identifies the subject land as being located in a "extreme flood risk" and "high flood risk" precinct.	A Flood Study is required. Appendix 6.
6.4 Terrestrial biodiversity	The subject land contains an area of Significant Vegetation and Connectivity Between Significant Vegetation.	The flora and fauna study addresses this clause.
6.5 Wetlands	The subject land contains an area of Wetlands.	The flora and fauna study addresses this clause.

Table 3-6: Hawkesbury Local Environmental Plan 2012 Part 6 Additional Local Provisions

Clause	Comments	Compliance
6.6 Development in areas subject to aircraft noise	The development is not within an ANEF contour of 20 or greater to the RAAF Base Richmond.	No application
6.7 Essential services	Water and electricity will be supplied from the mains, sewage will be disposed of appropriately, adequate stormwater drainage will be on site, and there will be suitable road access.	Complies
6.8 Arrangements for designated State public infrastructure	The land is not identified as 'Density Control' on the Pitt Town Subdivsion and Designated State Public Infrastructure Map	No application
6.9 Additional requirements for subdividing in Pitt Town Heritage Area	Not applicable	No application
6.10 Certain development on Lot 1, DP 827148, Richmond Road, Clarendon	Not applicable	No application
6.11 Residential accommodation at Johnston and New Streets, Windsor	Not applicable	No application
6.12 Certain development at Richmond Lowlands	Not applicable	No application

The proposed development is considered to be consistent with all relevant provisions of the Hawkesbury LEP 2012.

3.3.2 Development Control Plans

The Hawkesbury Development Control Plan (DCP) 2002 applies to all land within the Hawkesbury Local Government Area (LGA) to which LEP 2012 applies.

The objectives of this DCP are:

a) *To provide a comprehensive document that contains detailed development controls for development which meets community expectations and addresses the key environmental planning issues of the Hawkesbury LGA;*
b) *To promote economically, socially and environmentally sustainable development within the City of Hawkesbury;*
c) *To enable an aesthetically pleasing and functional development that sympathetically relates to adjoining and nearby development;*
d) *To maintain and enhance the environmental and cultural heritage of the Hawkesbury LGA;*
e) *To involve the local community in the planning process by ensuring openness, accountability and transparency in the decision-making process;*

f) To set out clear processes, procedures and requirements to facilitate an integrated and consistent framework for dealing with development assessment;
g) To ensure that development will respond to its context and not detrimentally affect the surrounding development; and
h) To promote the Ecologically Sustainable Development (ESD) principles including water sensitive urban design, climate responsive building design, energy efficiency, and selection/use of recycled materials.

The requirements of relevance to the proposed development are contained within Part C General Guidelines and Part D-2 Specific Development – Industrial Development and area assessed in Table 3-7and Table 3-8. The assessments provided within this EIS adequately address these requirements.

Table 3-7: General Guidelines within Part C of the Hawkesbury Development Control Plan 2002

DCP Guidelines	Comments
1. Landscaping	Vegetation will be provided along the northern and western boundary of the site
2. Car Parking and Access	There will be adequate parking for staff and visitors.
3. Signs	Appropriate signage will be used.
4. Soil Erosion and Sediment Control	There will be an erosion and sediment control plan (ESCP) implemented.
5. Bushfire Prone Land	The site is on vegetation category 3 bushfire prone land and any construction will comply with Council's Bushfire Mitigation Policy, Building Code of Australia, Australian Standard AS 2959 – Construction of Buildings in Bushfire Prone Areas, Planning for Bushfire Protection produced by the Rural Fire Service and Planning NSW and The Hawkesbury Bushfire Risk Management Plan. A bushfire hazard assessment is provided as Appendix 3.
6. Energy Efficiency	The site will endeavour to be energy efficient where possible.
7. Effluent Disposal	The site's amenities will be provided as a demountable building with an effluent waste tank that would require regular pump out.
8. Management of Construction and Demolition Waste	The site will correctly dispose of and recycle construction and demolition waste. A waste management plan is provided.
9. Preservation of Trees and Vegetation	Only modified and grazed paddock vegetation would require removal.
10. Heritage Conservation	There are no items of heritage on the site.

Table 3-8: Industrial Development within Part D of the Hawkesbury Development Control Plan 2002

DCP Guidelines	Comments
2.1 General Principles	The subject site will encourage economic development, good design and appearance.
2.2 Building Setbacks	Any buildings will be sited to make adequate provision for landscaping, allowing solar access to staff recreation areas and to provide visual amenity for employees.
2.3 Relationship to Adjacent Development	The industrial land use will be compatible with adjacent, commercial, residential and rural areas.
2.4 Building Design and Construction	The development is designed to make a positive contribution to the streetscape.
2.5 Fencing	Fencing is required for the prevention of entry of livestock and unauthorised persons. Fencing will be of a standard/ style that does not detract from the landscaping or building facades.
2.6 Open Storage Areas	Open storage areas are to be screened from the road and adjoining land by vegetated barriers.
2.7 Environmental Issues	The relevant risk, air and noise impact assessments have been conducted.

The proposed development is considered to be consistent with all relevant requirements of the Hawkesbury Development Control Plan 2012.

4. CONSULTATION

Consultation with government departments and the local community 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 summarized 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 all 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. Summarised below are all the regulatory stakeholders that have been consulted as part of this development application, together with the details of such consultation.

- Department of Planning and Environment (DP&E)
  A request for the Secretary's Environmental Assessment Requirements (SEARs) and related Scoping Report was sent to the Planning Services Division. The SEARs (document reference 1188) were provided on 15/12/2017 with requirements attached (Attachment 1). The DP&E has also included input from NSW Environment Protection Authority (EPA), NSW Rural Fire Service, NSW Department of Primary Industries (DPI) Agriculture Roads and Maritime Services (RMS), NSW DPI Fisheries and Office of Environment and Heritage.

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

- NSW Department of Primary Industries (DPI) Agriculture
  Key issues and assessment requirements from the NSW DPI Agriculture were included in the SEARs.

- Roads and Maritime Services (RMS)
  Key issues and assessment requirements from the RMS for a transport and traffic assessment were included in the SEARs.

- NSW Rural Fire Service (RFS)
  NSW RFS advised that a bushfire assessment report which identifies the extent to which the proposed development conforms with or deviates from relevant provisions of *Planning for Bush Fire Protection 2006* is required.

- NSW Department of Primary Industries (DPI) Fisheries
  NSW DPI Fisheries indicated they had no specific comments but note that the site is located adjacent to Key Fish Habitat (South Creek) and best management practice to ensure surface runoff from the works is contained and prevented from entering the adjacent waterways is supported.

- Office of Environment and Heritage (OEH)
  OEH indicated the matter does not contain biodiversity, natural hazards or Aboriginal cultural heritage issues that require a response at this stage. It is noted that the Heritage Division may wish to provide separate comments.

- Office of Environment and Heritage (OEH) – Heritage Division
  A separate email requesting advice from the heritage division was sent on 1 November 2018. At the time of writing, no response had been provided. Heritage issues are addressed within the EIS.

- Hawkesbury City Council
  A pre-lodgement meeting with Council was undertaken by representatives of MacroPlan Dimasi and Andy's Earthworks. Council provided advice in pre-lodgement advice in a letter dated 6 November 2017 following the meeting. This advice is provided in Attachment 2.

Assessment requirements from advice provided by each department are shown in Section 4.3 with a reference to where each item is addressed within the EIS.

4.2 COMMUNITY CONSULTATION

A community consultation leaflet was prepared and is provided as Attachment 3. The leaflet was distributed to the nearby residential areas on the 20/11/2018. One resident called the office regarding concerns over the quantities and number of vehicles proposed and the impact that would have on the surrounding road network. These concerns are addressed in the Traffic Report.

4.3 ASSESSMENT REQUIREMENTS

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

Table 4-1: DP&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.	1.3 and 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.	13	13-1
Traffic and transport		
Details of road transport routes and access to the site.	9.4	9-10
Road traffic predictions for the development during construction and operation.	Appendix 8	Appendix 8
An assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development.		
Air quality		
A description of all potential sources of air and odour emissions.	8.1	8-6
An air quality impact assessment in accordance with relevant Environment Protection Authority guidelines.	Appendix 4	Appendix 4
A description and appraisal of air quality impact mitigation and monitoring measures.		

Table 4-1: DP&E Assessment Requirements and EIS Reference

Environmental Assessment Requirements – Key Issues	EIS Reference	
	Section	Page No
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. A description and appraisal of noise and vibration mitigation and monitoring measures.	8.2 Appendix 5	8-6 Appendix 5
Soil and water		
A description of local soils, topography, drainage and landscapes. The details of stormwater, leachate and wastewater management. The details of sediment and erosion controls. A detailed site water balance. The details of water usage including water supply and licences. An assessment of impacts to surface and groundwater resources, flooding impacts and impacts to groundwater dependent ecosystems. Measures that would be implemented to ensure that the development is consistent with the Hawkesbury Floodplain Risk Management Study and Plan. An assessment in accordance with ASSMAC Guidelines for the presence and extent of acid sulfate soils (ASS) and potential acid sulfate soils (PASS) on the site. Details of the stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts. A description and appraisal of impact mitigation and monitoring measures.	6 Appendix 6, 7 & 8	6-1 Appendix 6, 7 & 8
Hazards and risk		
The Environmental Impact Statement must include 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). An assessment of the risk of bushfire, including addressing the requirements of *Planning for Bush Fire Protection 2006* (RFS).	8.7.1 Appendix 2 Appendix 3	8-10 Appendix 2 Appendix 3
Waste management		
A description of waste streams that would be accepted at the site including the type, classification, maximum daily, weekly and annual throughputs and the maximum size and heights for stockpiles. Details of the source of the waste streams to justify the need for the proposed processing capacity. A description of waste processing operations, including a description of the technology to be installed, resource outputs, and the quality control measures that would be implemented. Details of how waste would be stored and handled on site, and transported to and from the site including details of how the receipt of non-conforming waste would be dealt with. 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.*	8.6 Appendix 1	8-8 Appendix 1
Biodiversity		
Accurate predictions of any vegetation clearing on site or for any road upgrades. A detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements. Details of weed management during construction and operation in accordance with existing State, regional and local weed management plans or strategies. A detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.	Appendix 9	Appendix 9
Visual		
Including an impact assessment at private receptors and public vantage points.	9.2	9-2
Heritage		
Including Aboriginal and non-Aboriginal cultural heritage.	9.3	9-8

Table 4-2: EPA Assessment Requirements 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
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. e) Include a site diagram showing the site layout and location of environmental controls.	5	5-1
2. 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). 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.	Appendix 4	Appendix 4
2. 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.	Appendix 5	Appendix 5

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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.		
2. 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.	Appendix 6	Appendix 6
2. 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) 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.	8.6 Appendix 1	8-8 Appendix 1
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.	8.7.1 Appendix 2	8-10 Appendix 2
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)		

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
2. 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
3. Rehabilitation		
Outline considerations of site maintenance, and proposed plans for the final condition of the site (ensuring its suitability for future uses).	5.7	5-9
4. 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 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.	1.4	1-3
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 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.	Appendix 4	Appendix 4

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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.	Appendix 5	Appendix 5
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.	Appendix 6	Appendix 6
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.	Appendix 6 & 7	Appendix 6 & 7
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. Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environmental risk.	8	8-6
1. General - *Describe baseline conditions*		
Provide a description of existing environmental conditions for any potential impacts.	6	6-1
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.	8	8-6

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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.		
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. This description should include the following parameters: coarse particulates; PM10 and PM2.5; and any other potential pollutants identified in the assessment process.	Appendix 4	Appendix 4
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.	Appendix 4	Appendix 4

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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) and *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC, 2007).		
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.	Appendix 4	Appendix 4
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 *Noise Policy for Industry 2017.* 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 in accordance with the Noise Policy for Industry (2017) : 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)' 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 j) determination of LAeq noise levels from existing industry.	Appendix 5 Appendix 5	Appendix 5 Appendix 5
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 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*.	Appendix 5	Appendix 5

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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 the Noise Policy for Industry (2017) .		
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.		

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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.		
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.	Appendix 5	Appendix 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.	Appendix 5	Appendix 5
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.	Appendix 6	Appendix 6
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.	Appendix 6	Appendix 6

Table 4-2: EPA Assessment Requirements 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.	Appendix 6	Appendix 6
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). 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.	Appendix 6, 7 & 8	Appendix 6, 7 & 8

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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)		
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, 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.	Appendix 6, 7 & 8	Appendix 6, 7 & 8

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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		
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.	Appendix 6 & 7	Appendix 6 & 7
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.	Appendix 6	Appendix 6
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).	Appendix 6	Appendix 6
6. Waste and Chemicals		
6. Waste and Chemicals - *Describe baseline conditions*		
Describe any waste or chemical operations related to the proposal.	8.7.1	8-10
6. Waste and Chemicals – *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.	8.6	8-8
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;		

Table 4-2: EPA Assessment Requirements and EIS Reference

Environmental Assessment Requirements	EIS Reference	
	Section	Page No.
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.		
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.	12	12-1
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).	13	13-1
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). 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.	12	12-1

Table 4-3: NSW Department of Primary Industries (Agriculture) – Assessment Requirements and EIS Reference

Key Assessment Requirements	EIS Reference	
	Section	Page No.
Site Suitable for Development		
Detail that the proposal is consistent with strategic plans and zone requirements	Appendix 2	Appendix 2
Complete a Land use Conflict Risk Assessment (LUCRA) to identify potential land use conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide.		
Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors.		
Consideration for Impacts to Agricultural Resources and Land		
Describe the current and potential important Agriculture Land on the proposed development site and surrounding locality including the land capability and agricultural productivity.	Section 9.5	Section 9.5
Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated.		
Consider possible cumulative effects to agricultural enterprises and landholders.		
Detail the expected life span of the proposed development		
Bushfire Risk Identified and Managed		
Risk assessment level and mitigation plan developed to address bush fire risk.	Appendix 3	Appendix 3
Suitable and Secure Water Supply		
Outline and impacts to water use from agriculture and mitigation measures if required.	N/A	N/A
Surface & Groundwater Protected Biosecurity Standards Met		
Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession.	Appendix 2	Appendix 2
Include a biosecurity (pests, weeds and disease) risk assessment outlining the likely plant, animal and community risks.		
Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed, disease and pest management plans.		
Details of adequate fencing to keep livestock out.		
Suitable Traffic Movements		
Consideration of the route for movements needs to be taken into account so that impacts on sensitive receptors are minimised (e.g. noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves1 (TSR) and the movement of livestock or farm vehicles along/across the affected roads.	Appendix 8	Appendix 8
Adequate Consultation with Community		
Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure.	4	4-1
Consult with the owners/managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about, the proposal, the likely impacts and suitable mitigation measures or compensation.		
Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with Council in relation to complaint issues.		
Contingency and Environmental Management Plan Developed		
Contingency plans should be developed to enable the operation to deal with emergency situations.	12	12-1

Table 4-4: RMS Assessment Requirements and EIS Reference

Key Transport and Traffic Issues	EIS Reference	
	Section	Page No.
Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required).	Appendix 8	Appendix 8
The key intersection to be examined and modelled is: Macquarie Street / Argyle Street Hawksbury Valley Way / Mileham Street		

5. DESCRIPTION OF PROPOSED DEVELOPMENT

Andy's Earthworks propose to receive up to up to 98,000 tonnes of materials per year of construction and demolition (C&D) waste including recycled crushed concrete, brick, tiles, excavated rock products, VENM and ENM. This material will be transported via tipper trucks from quarries, excavations and demolitions sites in Western Sydney. Storage of waste would be in external covered storage bays.

5.1 SITE LAYOUT PLANS

Site plans are provided as Attachment 4. The proposed facility would be confined to the IN1 zoned area of the site. This area would be raised and levelled using fill material from the RU1 zone of the site.

A double access road would be provided, a 7.5 metre wide driveway for access to the proposed facility and a 4.5 metre wide access driveway to the existing Evoqua facility. These driveways would be constructed of 2 coat seal at the entrance and then compacted roadbase and separated by a security fence and would be gated. A weighbridge will be installed along the access road followed by a recirculating truck wheel wash.

Compacted crushed rock and stabilised fill would be used to create a hardstand working platform for the proposed building and trafficable areas.

The crushing and screening operations would take place within a purpose built building of approximately 1,800 m^2. These operations will take place inside for noise and dust control purposes. Two small demountable buildings will be installed for office and amenities purposes.

A vegetative buffer would be established on the western and northern boundaries of the proposed development area with plantings of native trees for the purposes of a visual screen. A perimeter dust suppression sprinkler system would be installed along with mobile water sprays on the storage bays that would be used for dust suppression purposes. A diversion drainage channel would run along the northern boundary to capture stormwater runoff from the development area. This drainage channel would flow into a primary basin at the eastern end of the development area. Overflow from this basin would flow through a gravel filter into a secondary basin for the purposes of sediment control.

Two water reuse tanks would be installed adjacent to the weighbridge. A rising main from the Evoqua facility would service these tanks and be used for the demountable office and amenities and wheel wash.

Material received on site and processed material would be stored in external covered storage bays.

5.2 CONSTRUCTION WORKS

Construction activities will include:

- Levelling of the land by cut and fill;
- Stabilising the area using road base material;

- Establishment of sediment basins, drainage channels and stormwater management controls;
- Planting of vegetation;
- Construction of outdoor storage bays and awning;
- Construction of a purpose built building for operations to take place;
- Installation of small demountable buildings for use as office and amenities; and
- Installation of mains water storage tanks, weighbridge, wheel wash facilities and a perimeter dust suppression sprinkler system that consists of mobile water sprayers on the external storage bays.

A preliminary construction timetable is provided in Section 5.2.2. This timetable is based on the expected works required and is subject to change.

5.2.1 Bulk Earthworks

The proposed area will be levelled to approximately 18.0–17.3 AHD (Australian Height Datum) from the existing range of 18.13-13.8 AHD. Soil required to raise the level would come from elsewhere on the subject site within the RU1 zoned area. 127,976 m^3 of soil will be cut from the site and used as fill. The proposed development area would be capped with road base material hardstand which would come from a supplier offsite.

Some areas of the site are within 500 m of class 4 acid sulfate soils and as earthworks within this area are to excavate below 5 metres Australian Height Datum / the watertable will lowered below 1 m Australian Height Datum an Acid Sulfate Management Plan is required.

5.2.2 Preliminary Construction Timetable

The expected construction timetable is provided in Table 5-1. This is a preliminary timetable that includes the expected construction works required and the expected duration of the work based on the site plans. This timetable would be revised and finalised within the construction environmental management plan.

The construction works are expected to take between 6 to 9 months.

Table 5-1: Construction activities – Preliminary Timetable

Component	Typical activities	Duration
Site Establishment	• Fencing of relevant construction areas of the site • Erection of construction signs • Installation of erosion and sediment controls • Placement of waste bins for construction waste	2-3 weeks
Bulk Earthworks	• Excavation machinery will commence cut and fill requirements for the raising and levelling of the proposed development area • Placement of fill to create grade and batters • Temporary stockpiling and removal of top soil	8-10 weeks
Driveways and hardstand	• Application and compacting of road base material • Application of 2 coat seal at driveway entrance	4-6weeks
Stormwater infrastructure	• Establishment of drainage channels, sediment basins and stormwater infrastructure	4-6 weeks

Table 5-1: Construction activities – Preliminary Timetable

Component	Typical activities	Duration
Landscaping	• Plantings of native species along boundaries • Restoration of excavated areas using a seed mix to provide a protective cover of native grass species	2-4 weeks
Installation of site infrastructure	• Erection of purpose built building for site operations to take place • Erection of demountable buildings • Installation of water storage tanks • Installation of weighbridge and truck wheel wash facility • Installation of mobile sprinkler system • Installation of security fencing and gate	3-4 months
Connections	• Connections to electricity, water, telecommunications as required	2 weeks
Finishing works	• Removal of temporary works • Site clean-up and disposal of surplus waste materials • Removal of waste skip bins	1 week

5.2.3 Construction Hours

The proposed hours of construction include:

Monday to Friday: 7:00am to 6:00pm
Saturday: 8:00am to 1:00pm
Sundays and Public Holidays: No construction works

5.2.4 Construction Employment

The construction phase of the project is expected to generate up to 30 temporary jobs.

5.3 Production Process

The operation of the proposed facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of recycled crushed concrete, brick and excavated rock products; and
- Material storage in external covered storage bays.

Materials would be transported to and from the site within a combination of semi-trailers and trucks with dog trailers, each with an approximate capacity of 30 tonnes. All vehicles would access the site from Fairey Road along the 7.5 metre wide ADE site access road.

A weighbridge will be located on the access road in close proximity of the site entrance to weigh all incoming and outgoing loads. Records of the date, material type received or despatched,

weight recorded and transport carrier would be maintained by the weighbridge operator. A closed-loop wheel wash will be installed immediately beyond the weighbridge for washing the wheels of trucks entering and exiting the property. Water used in the wheel wash will be recirculated within the system.

Up to 98,000 tonnes per year of mixed construction and demolition waste materials including recycled crushed concrete, brick, tiles, excavated rock products, VENM and ENM would be accepted at the site. Potentially minor quantities of other materials such as timber, glass, metal, soil and general waste will be received within the incoming waste loads. The quantity for each material may vary significantly depending on the source that generated the waste. Concrete bricks and similar waste would be crushed and screened on site. Timber will either be disposed of at a licenced waste facility or recycled off site. Glass and metal will be recycled off site; soil will be classified and reused and general waste will be disposed of appropriately.

An incoming load inspection procedure would be undertaken on each load entering the site. The outcomes of this inspection would be recorded at the weighbridge.

Upon receipt of material, a 25 tonne excavator and front end loader would be used for transfer and handling of materials. Materials would either be stockpiled within external covered storage bays for resale or processed by crushing and screening. This quantity would be managed using the weighbridge records to ensure this storage quantity is not exceeded.

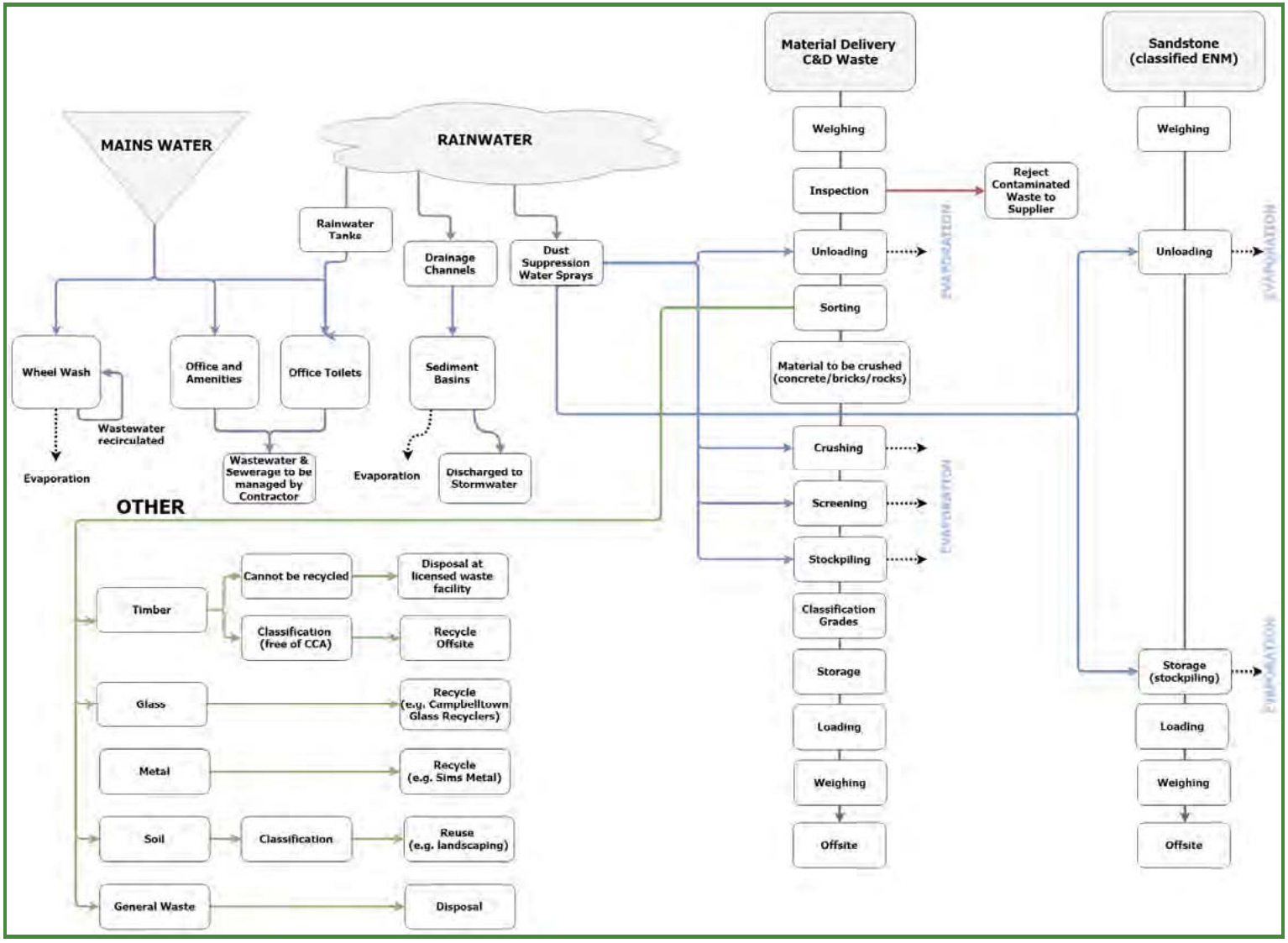
There would be one Concrete Jaw Crusher Komatsu BR380JG-1 or similar for the crushing operations and a triple deck screen for the separation and sizing of crushed materials. These would operate within a purpose built building.

Processed materials would be stored in external covered storage bays on the site. Mobile sprinkler systems would be used for dust suppression purposes and would consist of water sprays/water cannon that provide a mist to adequately dampen stockpiles and working areas. Water for this purpose would be sourced from the 30kL rainwater tank.

Bins would be provided on site for the small quantities of metals, timber and glass that would be expected to be generated. These bins would be serviced by a licensed contractor for recycling.

A process flow diagram is provided in the following figure:

Figure 5-1: Process Flow Diagram



5.4 RESOURCES AND FINISHED GOODS

The site would receive the following raw materials:

- Construction and demolition waste:
  - Bricks;
  - Rocks;
  - Tiles;
  - Concrete;
  - VENM & ENM;
  - Other (general waste which can include small quantities of excavated materials, waste asphalt, plasterboard and vegetation); and
  - Minor quantities of timber, glass, metal and general waste.

The finished goods would include:

- ENM;
- Aggregates; and
- Recovered fines.

5.5 EQUIPMENT

The following mobile vehicles, machinery and equipment will be required for the proposed development:

- Concrete Jaw Crusher Komatsu BR380JG-1;
- Triple Deck Screen;
- 25T Excavator;
- Front End Loader (<111 kW at 2000 rpm);
- Trucks;
- Wheel wash;
- Weighbridge; and
- Dust suppression system.

5.6 OPERATIONAL DETAILS

This section outlines the operational details of the site with regards to the utility connections, hours of operation, employment, traffic and parking.

5.6.1 Utility Connections

This section details the utilities which will be used for the proposed development.

5.6.1.1 Water

The site will be connected to mains water via Evoqua's existing connection. A 30kL rainwater tank would capture roof water from the proposed building.

5.6.1.2 Sewage and Wastewater

Demountable office and amenities will be provided at the site. The amenities buildings would contain a waste storage tank that would require regular pump out. The sewerage and wastewater would be managed by a contractor.

5.6.1.3 Electricity

Electricity is delivered by a local service provider.

5.6.1.4 Telecommunications

Service provided by local network.

5.6.1.5 Gas, Petrol and Diesel

Machinery will be fuelled by a mobile tanker. There will be no onsite storage of chemicals, including LPG, natural gas, petrol or diesel.

5.6.2 Site Security

The proposed development area (IN1 zone) of the site would be completely surrounded by a site security fence. This fence would prevent the entry of livestock as well as any unauthorised persons to the proposed facility.

Entry to the site would be via two driveways from Fairey Road. The two driveways would be separated by a security fence. The 7.5 metre wide driveway, labelled the "ADE Facility Access Road" on the site plans would provide access to the proposed facility. The 4.5 metre wide driveway labelled "Dedicated leased access road" would provide access to the existing Evoqua facility. Both driveways would have separate security access gates.

Heavy vehicles would be required to pass over a weighbridge prior to entering the processing area.

5.6.3 Hours of Operations

The proposed hours of operation for the facility are 7.00am to 6.00pm during Monday to Friday and 7.00am to 1.00pm on Saturdays.

5.6.4 Employment

The proposed development will employ 20-25 personnel, including:

- 6 to 8 machinery operations;
- 2 weighbridge/inspection person at site entry;
- 5 materials and safety inspectors; and
- 10 drivers of materials truck owned by Andy's Earthworks.

5.6.5 Traffic

A traffic assessment has been completed by Transport and Urban Planning Pty Ltd, Appendix 8. The main findings of this assessment is summarised below:

- The proposal will receive, process and recycle approximately 98,000 tonnes of concrete materials at full operation (post Year 2020). All materials will arrive at the site via medium to large articulated trucks. Large semi trailer and truck trailer combinations will remove all recycled materials.
- Under full operating conditions the site is expected to generate 52 vehicle trips (including 4 trucks) in the AM and PM Monday to Friday peak hour. Four additional truck per hour on Argyle Street should not adversely impact upon the existing level of residential amenity between Mileham Street to Macquarie Street.
- The existing signalised intersection of Argyle Street with Macquarie Street may require an RMS operational review based on current accident levels and delay times.
- Existing and post development mid block traffic service levels on Fairey Road and Argyle Street will remain at favourable level of service LoS A performance standards.
- Peak hour articulated truck movements will be less than 4 movements per hour in peak times.
- The existing access intersections with Macquarie Street/Argyle Street and Argyle Street/Fairey Road has been (SIDRA) modelled for projected Year 2020 peak hour traffic flows with the additional traffic generation by the proposal. The post development results indicate there will be no significant change in existing traffic service levels at these intersections, due to this proposal.
- 100% of all end product materials will depart the site viz Fairey Road to Argyle Street then to Macquarie Street and thence the regional main road network.
- Fairey Road and Argyle Street to Macquarie Street are existing, moderate volume truck routes into the existing light industrial precinct during business hours 6am to 6pm.
- The projected additional 2 trucks in and 2 trucks out per hour during peak times should have no adverse impacts upon the amenity or safety of Argyle Street during business hours.
- Incoming materials will arrive via the Macquarie Street and Argyle Street to Fairey Road. Recycled concrete would still be generated without this facility but would go elsewhere.
- During construction the majority of vehicles are expected to arrive and depart the site outside the peak hours on the surrounding road network. Even with the addition of construction based traffic, the volumes on the main routes leading to the site will be well below those experienced during peak hours.
- All proposed internal vehicle movements parking and circulation can be adequately accommodated within the site and are free of conflict and should be designed to comply with Councils DCP 2002 and Australian/NZ Standard 2890.2 at the Development Application stage.

5.6.6 Parking

Parking is addressed in accordance with Hawkesbury City Development Control Plan 2002 DCP Part C in the traffic assessment prepared by Transport and Urban Planning Pty Ltd, Appendix 8. However, Hawkesbury City DCP does not make recommendations for truck parking for this specific land use. Alternatively, the Australian Standards AS 2890.2-2002 specifies the dimensions for truck bays as 3.5 m x 19.0 m for articulated trucks. For truck and carparking the following conditions apply:

- At least one car space must be made available for disabled car parking and then one space in every one hundred should be for disabled car parking.

- The size of a 90 degree car parking space should be 2.6 m x 5.5 m with an aisle width of 6.2 m.

- Truck bays are to be at least 3.5 m x 19 m, no B-Doubles will access the site.

The car and truck parking details will comply with the above standards at the time of development application. Table 5-2 shows the parking provisions for the following vehicles:

Table 5-2: Parking Provisions

Use	Required Spaces	Complies
Employee Spaces	25	Yes
Disabled Spaces	1	
Visitor Spaces	5	
TOTAL	**31**	
Service Bays (Heavy Freight Vehicles)	20	

A 31 space car park is to be provided. This complies with the DCP.

5.7 REHABILITATION

Rehabilitation for the purposes of decommissioning of the site would be addressed in the Environmental Management Plan. The EMP would address the approach to any site remediation that may be required at the closure of the facility. The final site condition would ensure the site's suitability for future uses.

Rehabilitation activities for the proposed land use are expected to include but not be limited to:

- Decommissioning of unwanted surface infrastructure and removal from site;
- Clean up and removal of external areas including waste materials;
- Stabilise any disturbed surfaces; and
- Inspection of the ground surface to determine whether any additional investigations or work is required to remediate potential contamination and ensure the land is suitable for future industrial uses.

5.7.1 Construction Rehabilitation

Due to the scale of the earthworks, a staggered approach is recommended to minimise the area of loose fill exposed to the elements at one time. For example, smaller sections outside the development area will be excavated, used as fill, and then rehabilitated and this cycle repeated until the earthworks are finished. This will allow each area to be stabilised and revegetated with pastoral grasses immediately following the excavations works. A rigorous Construction Environmental Management Plan will need to be prepared and implemented.

6. EXISTING ENVIRONMENT

6.1 GEOLOGY AND SOILS

6.1.1 Geological and Soil Landscapes

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

Tl: Londonderry Clay – Clay, patches of ferruginized, consolidated sand.

Tr: Rickabys Creek Gravel – Conglomerate, matrix suspended.

The Soil and Land Resources of the Hawksbury-Nepean Catchment Map shows that the subject site is located in across two soil landscaping areas classified as Alluvial and Beach

The soil map 'Soil Landscape of Penrith 1:100,000 Sheet 9030' shows that the subject site is located in across two soil landscape areas classified as Fluvial landscapes. 'Berskshire Park' (bp) and 'Freemans Reach' (fr) landscapes are described as follows:

Fluvial landscape 'Berskshire Park' (bp)

> *Landscape: dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system*
>
> *Soils: weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large (up to 20cm) silcrete boulders occur in sand/clay matrix. Solods (Dy 3.41), Yellow Podzolic soils (Dy4.11, Dy2.11, Dy2.21, Dy2.22), Red Podzolic Soils (Dr4.11), Chocolate Soils (Dr4.11, Dr4.61), Structured plastic clays (Uf5.23, Gn4.11 and Gn3.11)*
>
> *Limitations: very high wind erosion hazard if cleared. Gully, sheet and rill erosion on dissected areas. Waterlogging, impermeable subsoils, low fertility.*

Fluvial landscape 'Freemans Reach' (fr)

> *Landscape: present active floodplain of the Nepean River. Level with minor (<10m) relief to meander scrolls, levees and back swamps.*
>
> *Soils: Deep brown sands and loams, apedal to moderately structured, usually friable. Alluvial Soils (Uc1.21, Uc1.24), Solods (Dy3.41), dark Podzolic soils (Db3.51)*
>
> *Limitations: High streambank erosion hazard, frequent flooding.*

6.1.2 Acid Sulfate Soils

Information on the SEED (Sharing and Enabling Environmental Data) Map Viewer of Acid Sulfate Soils Risk shows that there is a low probability of occurrence on approximately less than one third of the eastern side of the subject site.

A search from the Australian Soil Resource Information System (ASRIS) of the Atlas of Australian Acid Sulfate Soils database developed by the CSIRO, shows that there is an extremely low to low probability of occurrence of acid sulfate soils (ASS) on the subject site or within close proximity to the site. A map is shown in Figure 6-1 to illustrate these findings.

Furthermore, Hawkesbury City Council has further mapping available as part of the Hawkesbury Local Environmental Plan 2012. Under this plan, the subject site is located on land of Class 5 acid sulfate soils, shown in Figure 6-2.

The S10.7 certificate no. PC0069/19 for the property indicates that special provision under Clause 6.1 Acid sulfate soils from the Hawkesbury Local Environmental Plan may apply. In relation to Class 5 land, the following is relevant:

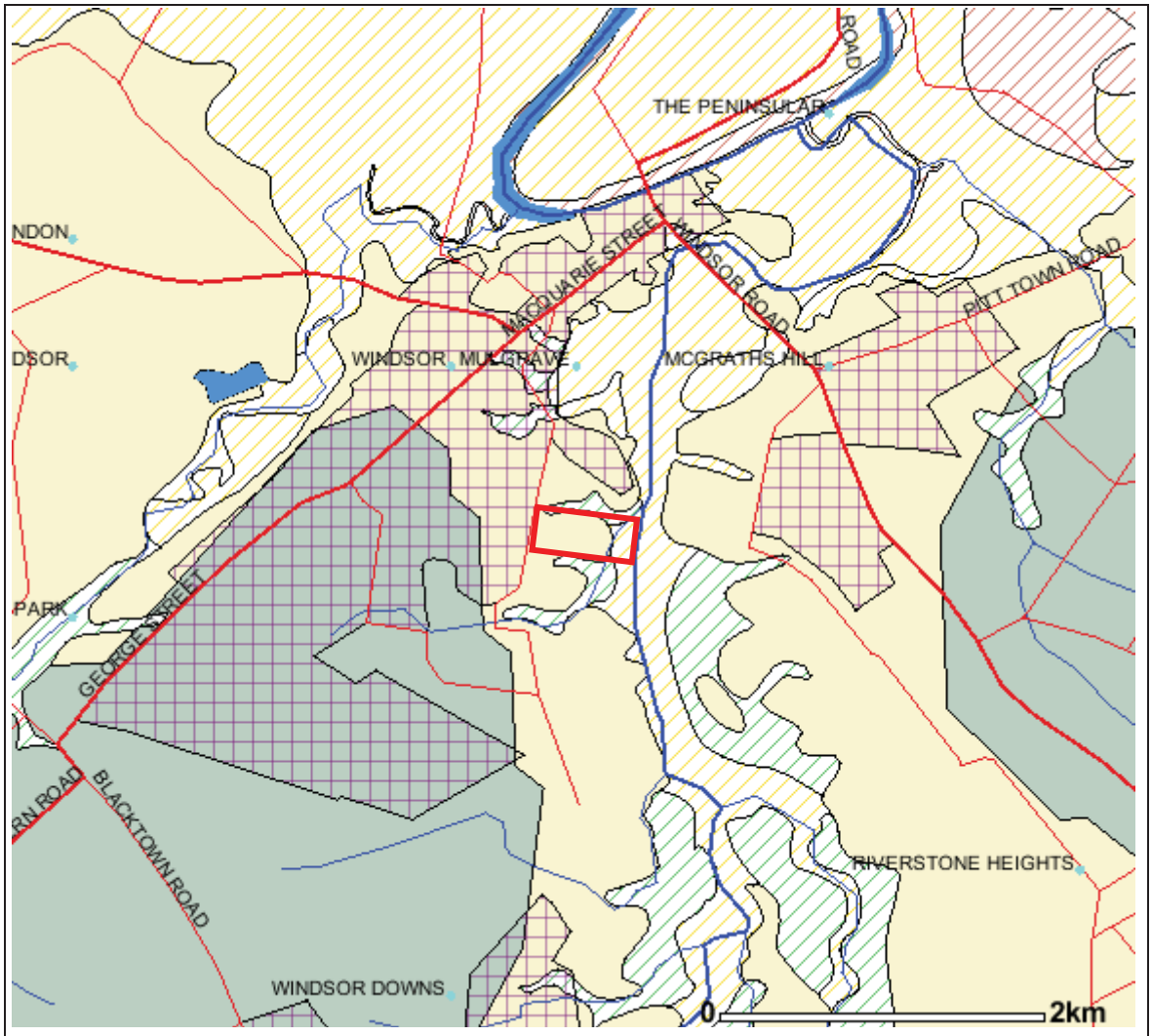
> *6.1 Acid sulfate soils*
>
> *(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works.*
>
> *Class of land Works*
>
> *5 Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*

Some areas of the site are within 500 m of adjacent class 4 land and due to the scale of the excavation an acid sulfate soil management plan is required.

The area located within 500 m of adjacent Class 4 land is shown in green on Figure 6-2.

A salinity and acid sulfate soil assessment is provided as an attachment to the soil and water report (Appendix 6).

Figure 6-1: Probability of Acid Sulfate Soil Occurrence at the site



Source: ASRIS 2018

↑N
Not to scale

LEGEND:

Approximate site location

- A1 High Probability/High Confidence
- A2 High Probability/Moderate Confidence
- A3 High Probability/Low Confidence
- A4 High Probability/Very Low Confidence
- A- High Probability/Confidence Unknown
- B1 Low Probability/High Confidence
- B2 Low Probability/Moderate Confidence
- B3 Low Probability/Low Confidence
- B4 Low Probability/Very Low Confidence
- B- Low Probability/Confidence Unknown
- C1 Extremely Low Probability/High Confidence
- C2 Extremely Low Probability/Moderate Confidence
- C3 Extremely Low Probability/Low Confidence
- C4 Extremely Low Probability/Very Low Confidence
- C- Extremely Low Probability/Confidence Unknown

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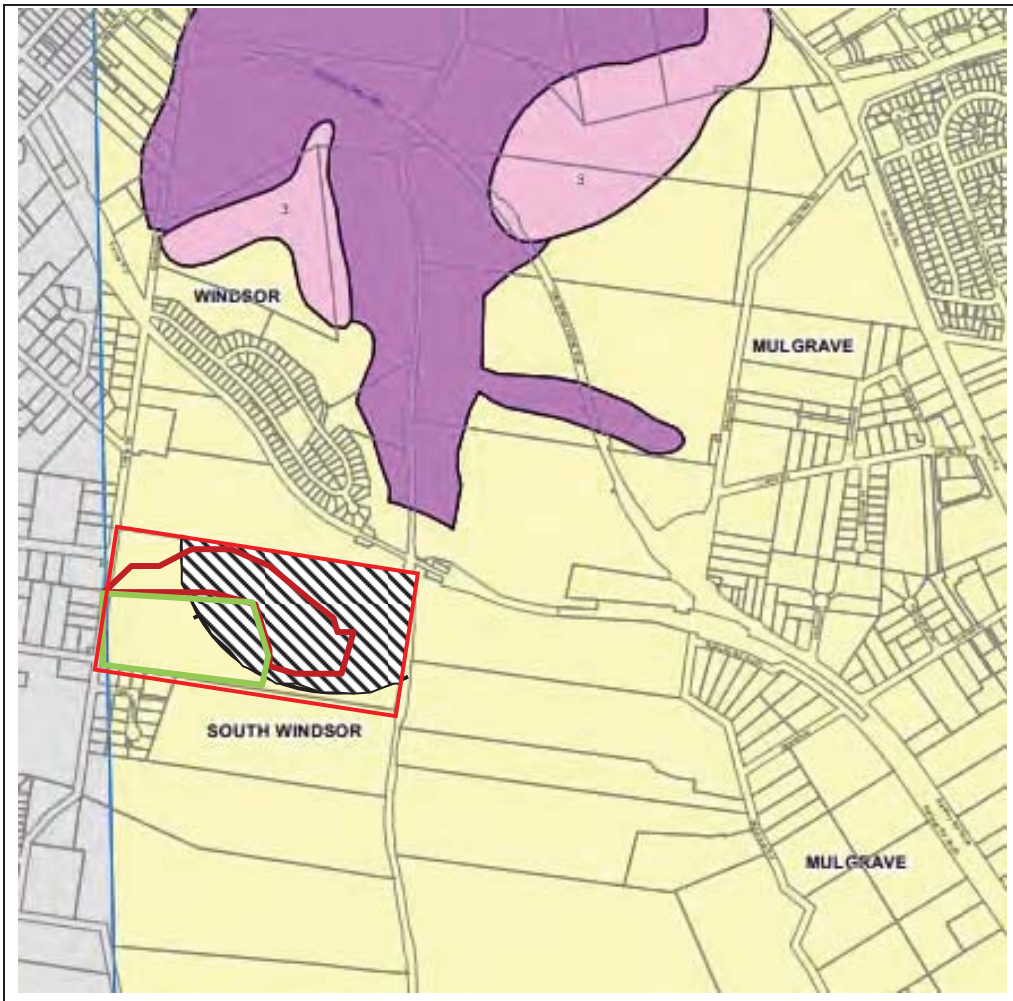
Figure 6-2: Acid Sulfate Soil Map from Hawkesbury LEP 2012



Source: Hawkesbury LEP 2012 Acid Sulfate soils Map – Sheet ASS_008DB

↑N
Not to scale

LEGEND:
Area of site within 500 m of Class 4 ASS
Proposed development
Excavated area
Approximate site location

Acid Sulfate Soils
1 Class 1
2 Class 2
3 Class 3
4 Class 4
5 Class 5

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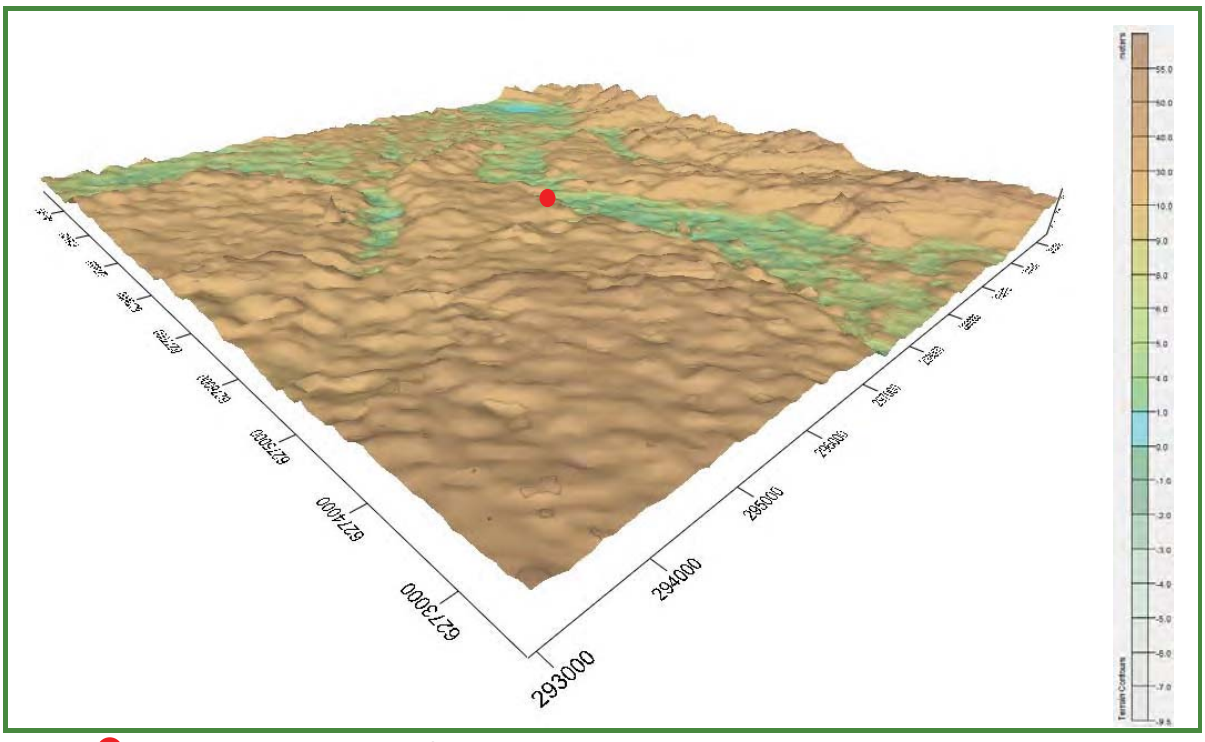
6.2 TOPOGRAPHY

The south-west corner is slightly raised with the site gently sloping downwards towards South Creek along the eastern boundary. Along the northern boundary the terrain also dips down where the stream runs across the site.

A three-dimensional view of the local topography surrounding the site has been provided in Figure 6-3, with the terrain/vertical axis exaggerated by a factor of 10. It should be noted that this figure approximates the actual terrain, based on information that has been digitised from local contour maps.

Figure 6-3: Local Topography with Vertical Exaggeration of 10



Note: ● = Approximate location of site

6.3 HYDROLOGY

The following section details the hydrological aspect of the site and surrounding region. Specifics on surface water, waterways and groundwater have been described, together with overall catchment issues such as salinity and flooding.

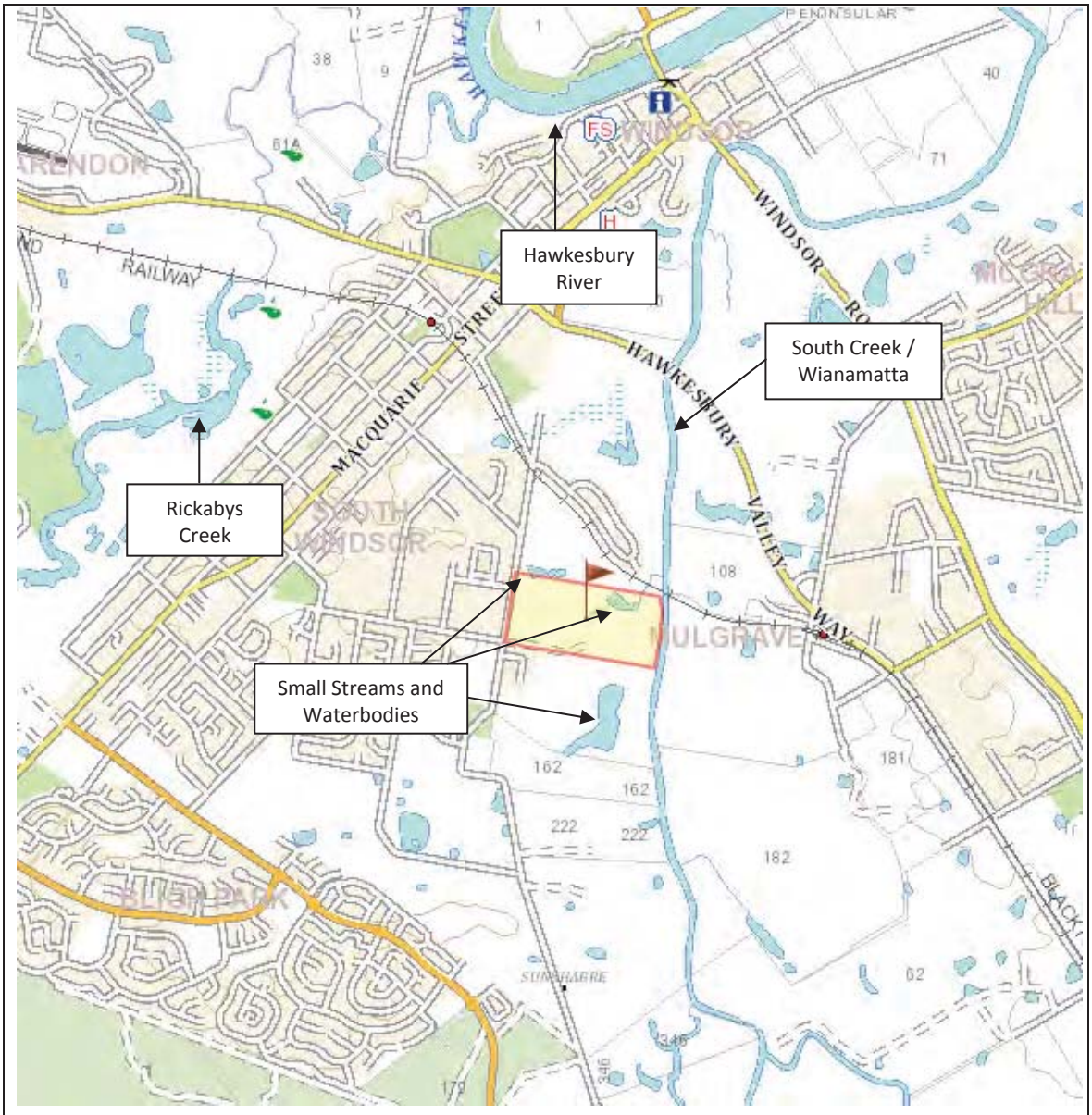
6.3.1 Waterways and Catchment

The nearest water bodies to the site include the wetlands to the north-east of the site itself, which links to South Creek, via a small stream that runs from south to north across the site, The eastern side of the site is divided by an area of wetlands as described by the Hawkesbury LEP 2012 Wetlands mapping, shown in Figure 6-5.

South Creek or Wianamatta runs along the eastern border of the site and is located on the Cumberland Plain and is approximately 70 km long. The Creek rises in Sydney's south western suburbs about 4 km north-east of Narellan and flows generally north, joined by seventeen tributaries including Badgerys Creek, Kemps Creek, Ropes Creek and Eastern Creek, until reaching its confluence with the Hawkesbury River near Windsor. South Creek has a catchment area of around 620 km^2 and is part of the Hawkesbury-Nepean catchment.

There are also three isolated water bodies just past the north-western boundary of the site and a larger water body, also described as an area of wetlands by the Hawkesbury LEP 2012, 320 m south-east of the site and another one 760 m north of the site, shown in Figure 6-5. The Hawkesbury River is located approximately 2.1 km north of the site.

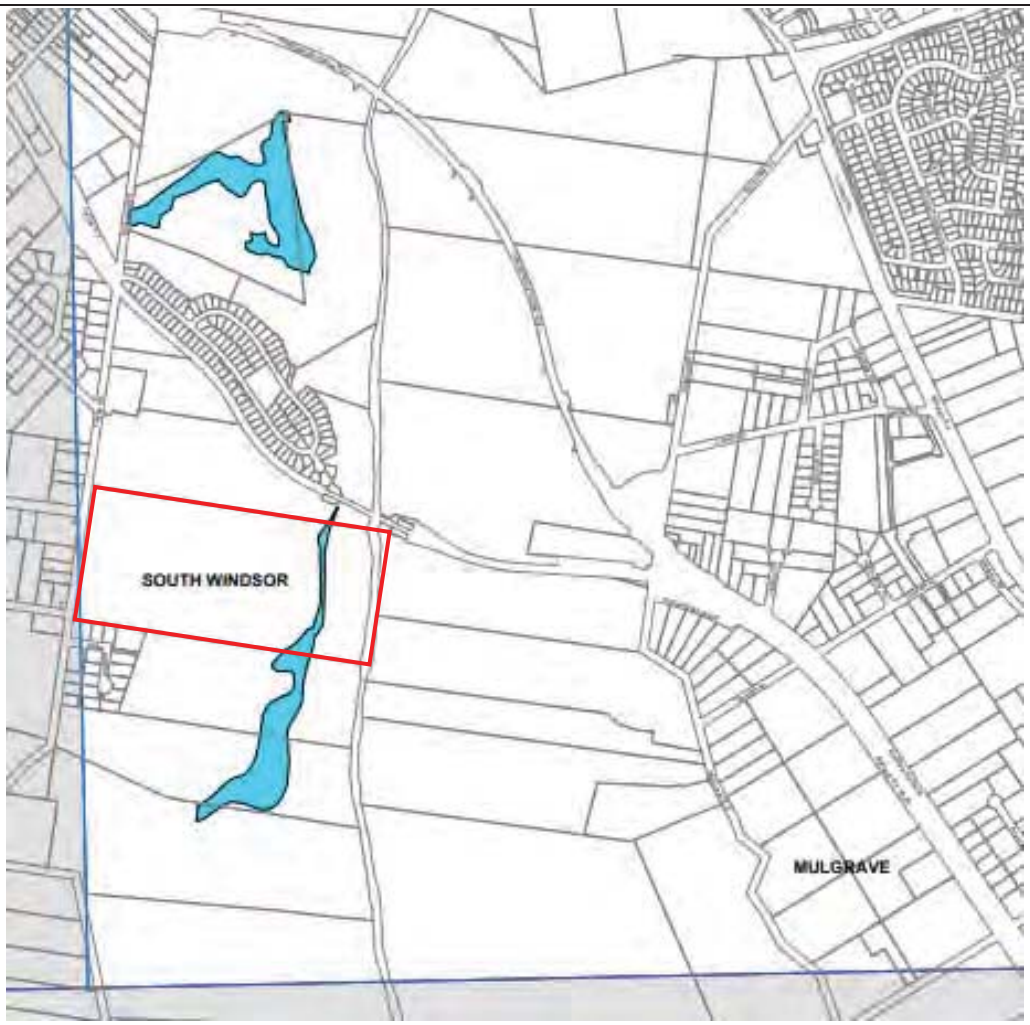
Figure 6-4: Nearest waterways and bodies of water



Source: Six Maps 2018

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

Figure 6-5: Wetlands Mapping



Source: Hawkesbury LEP 2012 Wetlands Map – Sheet WET_008DB

N Not to scale	LEGEND: - Site Boundary Wetlands	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.3.1.1 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 specific 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.

6.3.1.2 Catchment Management Plan

The Hawkesbury-Nepean Catchment Action Plan 2013-2023 (Hawkesbury-Nepean Catchment Management Authority, 2013) is a ten-year plan to guide the management of water, land and vegetation by the community and government.

The Hawkesbury-Nepean and Sydney Metropolitan CMA regions were amalgamated in late 2012 to create the current HNCMA region. The new region encompasses 24,470 square kilometres of varied landscapes including farmland, highly urbanised areas, rivers, estuaries, wetlands and coastline, pristine native vegetation, sandstone escarpments and gorges. The HNCMA's vision for the region has been created through consultation with partners and the community: *Working together to achieve productive, biodiverse, resilient landscapes and liveable urban areas.* The CAP supports this vision through five goals: productivity, biodiversity, community, urban liveability and landscape resilience. A summary of the CAP strategy priorities and CAP actions is in Table 6-1 below.

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.

Table 6-1: CAP Goals and Strategies

	Community	Productivity	Biodiversity	Urban Liveability	Resilient Landscapes
	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.
	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.

6.3.2 Groundwater

A search was undertaken in order to identify registered groundwater bores located within a 500 metre radius from the centre of the site, 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 groundwater monitoring bore (GW105482.1.1) within 500 m of the subject site. A summary of information available for this bore has been provided in Table 6-2.

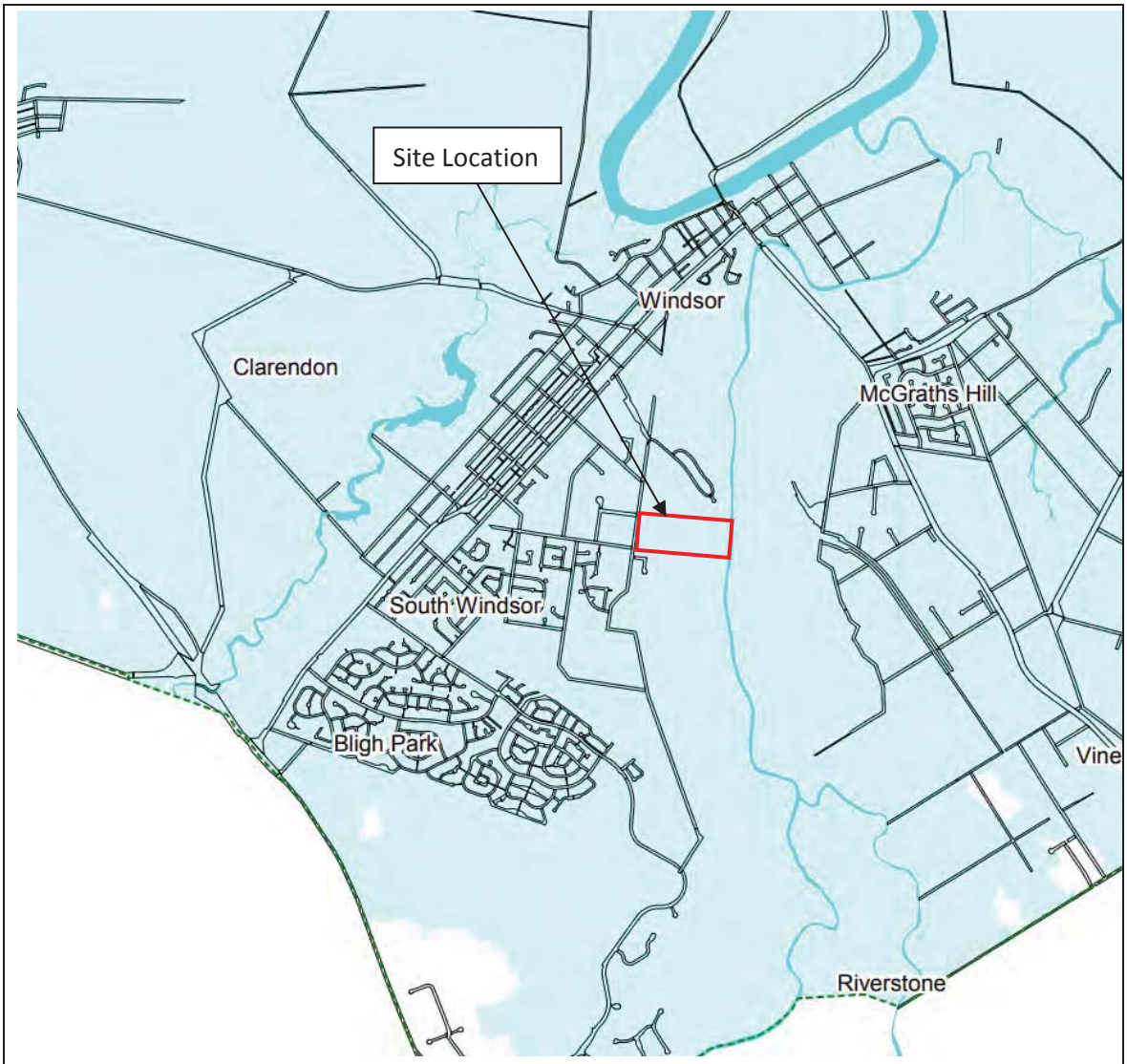
Table 6-2: Available Data for Groundwater Bores within 500 m of the subject site

Bore	Bore Depth (m)	Drilled date	Purpose	Standing Water Level (m)	Water Bearing Zone from-to (m)	Salinity	Location Co-ordinates
GW105482.1.1	244	17/07/2002	Commercial And Industrial	false	-	true	-33.624261, 150.826083

6.3.3 Flooding

Council holds a number of flood studies and investigations that provide documentation of the process by which the various floodplains in the region have been determined. Floodplain Risk Management Plans have also been adopted by Council in order to protect residents from major flood damages. In 2012 Hawkesbury Council adopted the Hawkesbury Floodplain Risk Management Study and Plan. Figure 6-6 shows the flood extent and flood level contours for a probable maximum flood (PMF). Figure 6-7 shows the site would be in an area of 1% AEP which is equivalent to 1 in 100 year flood.

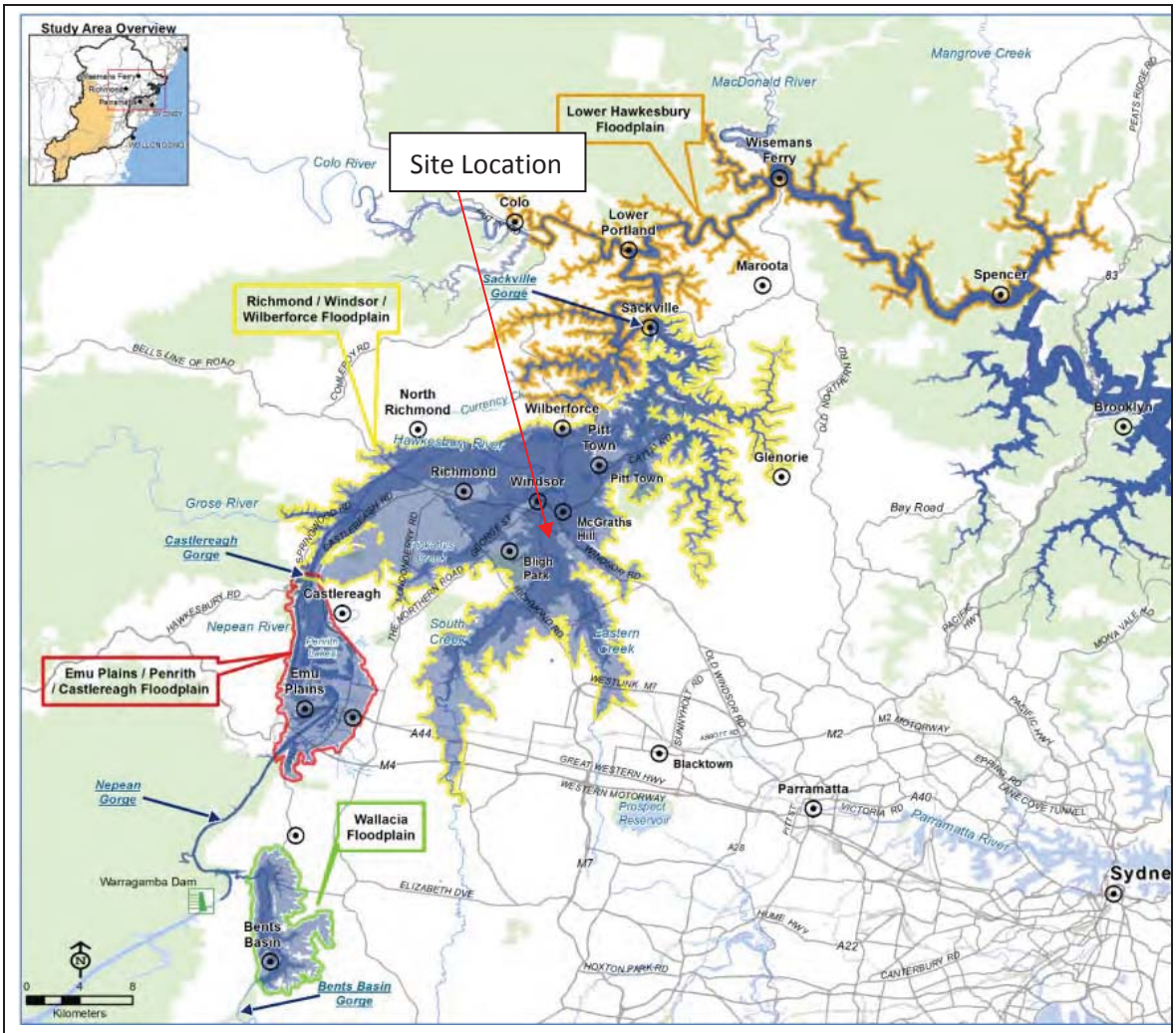
Figure 6-6: Probable Maximum Flood Hazard Extent



Source: Hawkesbury Floodplain Risk Management Study and Plan

↑N Not to scale	LEGEND: Site Boundary Estimated Extent of Flood Inundation 5.4 Probable Maximum Flood Level (m AHD) LGA Boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 6-7: Hawkesbury-Nepean Floodplains



Source: Hawkesbury Nepean Flood Plan

↑N Not to scale	LEGEND: Town Roads Railway Creeks & Rivers National Parks Water body Probable Maximum Flood (PMF) 1 % AEP **Floodplains** Lower Hawkesbury Richmond / Windsor / Wilberforce Emu Plains / Penrith / Castlereagh Wallacia	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

FLORA AND FAUNA

6.3.4 BioNet Atlas

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 proposed development is located in the middle of the selected area, a 10 km × 10 km extent with the following coordinates: North -33.57, West 150.77, East 150.87, South -33.76. The results from the search are listed in Table 6-3, and presented in their geographical context in Figure 6-8.

The targeted search shows that there is one threatened species within close proximity to the subject site, the Square-tailed Kite which is listed as vulnerable, protected and sensitivity class 3. The Squared-tailed Kite was spotted 1.2 km away east-south-east of the site and also 4 km south-east.

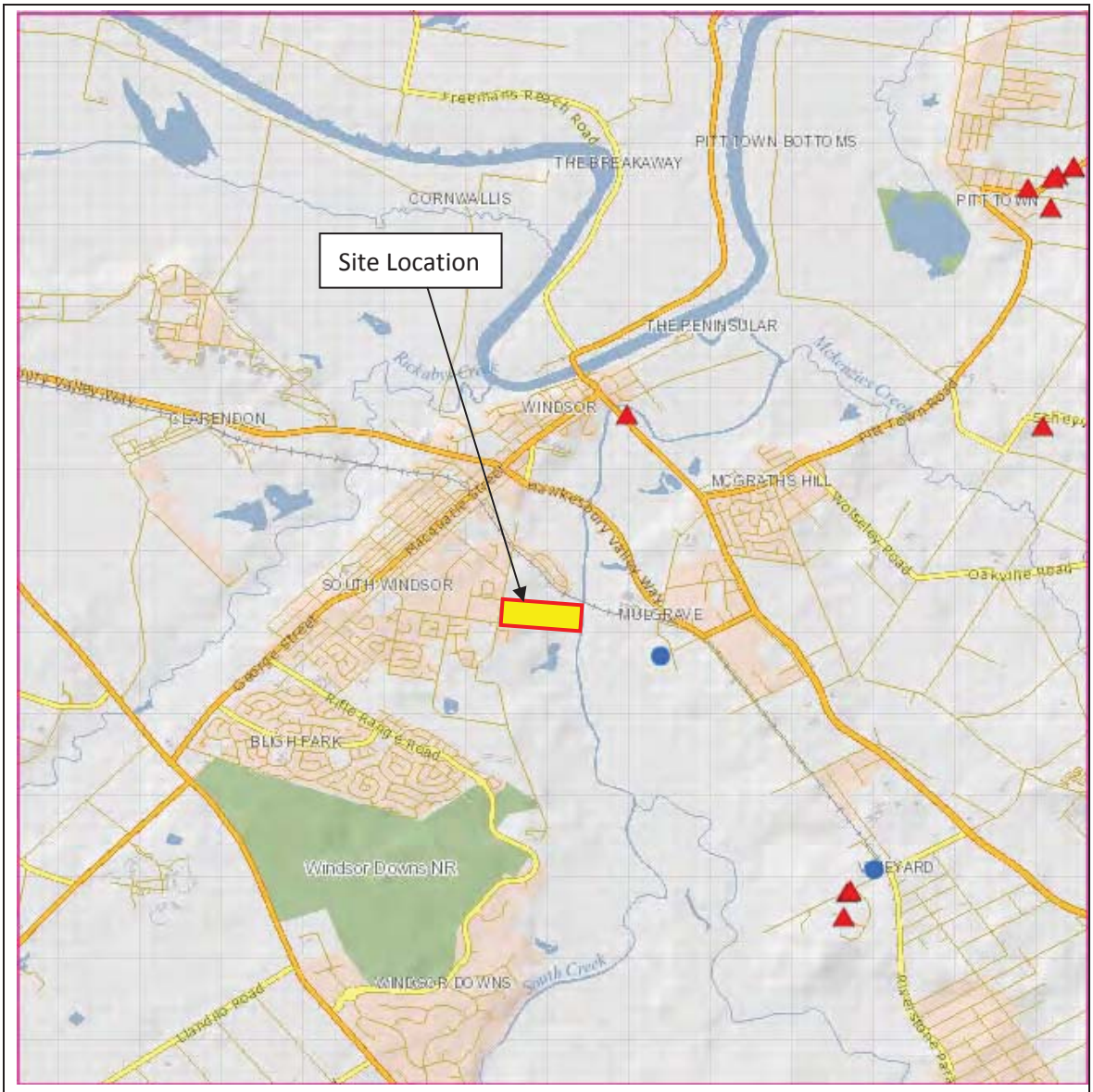
Table 6-3: List of threatened species in the selected area

Kingdom	Scientific Name	Common Name	NSW Status*	Sightings
Animalia	*Lophoictinia isura*	Square-tailed Kite	V, P, 3	2
Animalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V, P	4
Animalia	*Mormopterus norfolkensis*	Eastern Freetail-bat	V, P	3
Animalia	*Miniopterus australis*	Little Bentwing-bat	V, P	1
Animalia	*Miopterus schreibersii oceanensis*	Eastern Bentwing-bat	V, P	3
Animalia	*Myotis macropus*	Southern Myotis	V, P	2
Animalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V, P	3
Plantae	*Grevillea Juniperina*	Juniper-leaved Grevillea	V, P	3

Note: Data correct as of September 2018

** V = Vulnerable, P = Protected, E1 = Endangered, 2 = Sensitivity Class 2, 3 = Sensitivity Class 3.*

Figure 6-8: Flora and Fauna Sightings



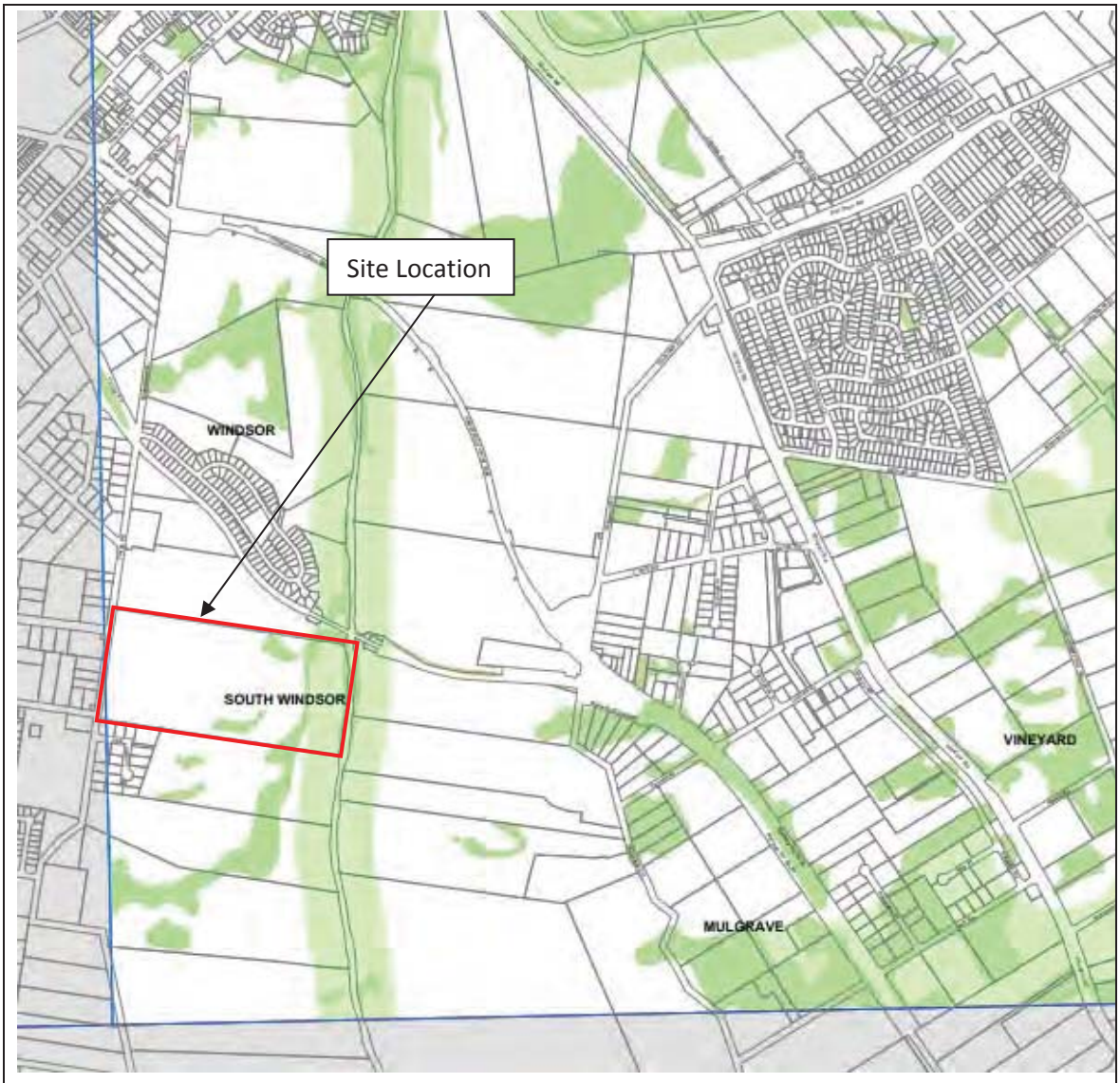
Source: BioNet Atlas of NSW Wildlife (2018)

↑N Not to scale	LEGEND: Category 3 sensitive species Species sighting	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.3.5 Biodiversity Value

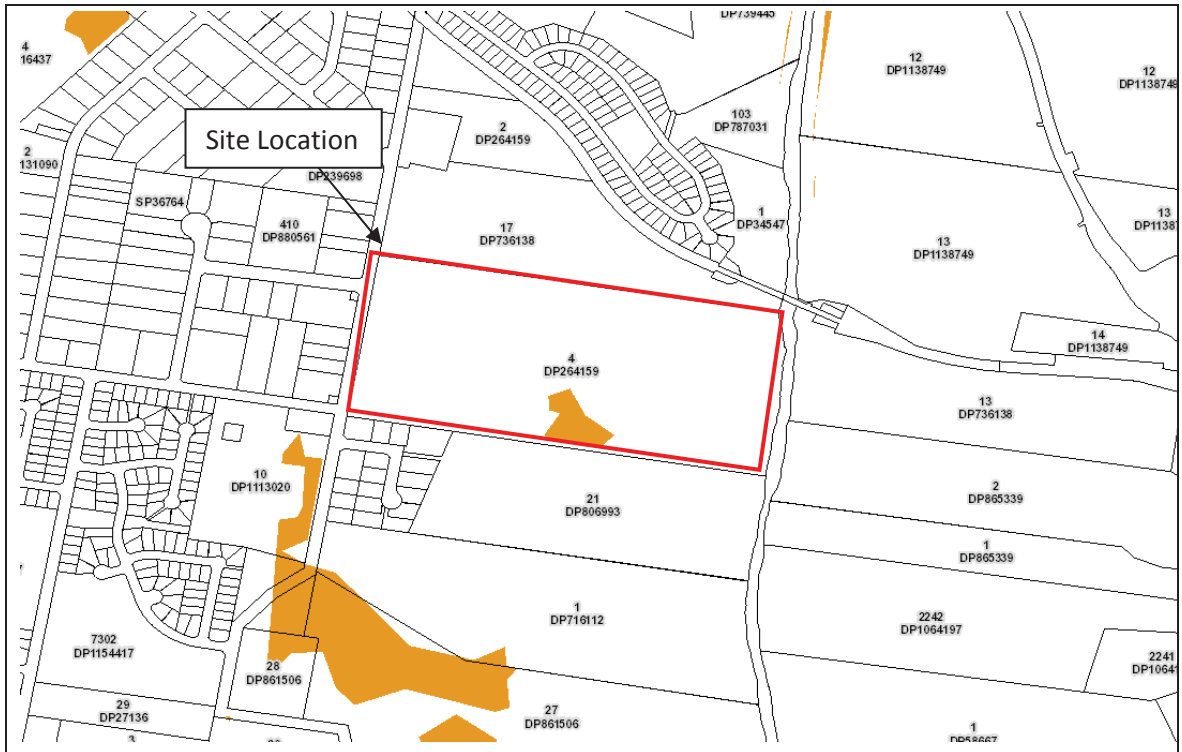
The subject site has been identified as having some significant vegetation to the east of the site with a larger area of connectivity between significant vegetation closer to the creek, as show in Figure 6-9. The site also contains a small area of high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017, as shown in Figure 6-10.

Figure 6-9: Terrestrial Biodiversity Map



Source: Terrestrial Biodiversity Map Sheet BIO_008DB Hawkesbury Local Environmental Plan (2012)

Figure 6-10: Biodiversity Value Map



Source: Biodiversity value map NSW Government

↑N Not to scale	LEGEND: Areas of high biodiversity	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.4 NOISE AMENITY

This section summarises the existing acoustic environment of the area. Further details are provided in the full noise impact assessment, Appendix 5.

6.4.1 Nearest Receptors

Table 6-4 lists the location of representative potentially affected receivers that are considered in this assessment. These are shown in Figure 6-11.

Table 6-4: Nearest Potentially Affected Receptors

Receptor ID	Address	Lot	DP	Separation distance	Type of receiver
R1	180 Fairey Road, South Windsor	28	861506	600 m	Residential
R2	18 Hale Crescent, South Windsor	85	263057	500 m	Residential
R3	10 Beasley Place, South Windsor	48	263057	430 m	Residential
R4	153 Ham Street, South Windsor	24	263057	370 m	Residential
R5	2 James Meehan Street	76	238572	690 m	Residential
R6	30 James Meehan Street	62	238572	550 m	Residential

Table 6-4: Nearest Potentially Affected Receptors

Receptor ID	Address	Lot	DP	Separation distance	Type of receiver
R7	64 James Meehan Street	23	246385	480 m	Residential
R8	6 Chisholm Place, South Windsor	17	246385	500 m	Residential
R9	124 Mulgrave Road, Mulgrave	13	736138	1100 m	Residential
R10	4 Speedwell Place, South Windsor	1	828534	Adjacent	Industrial Premises
R11	1 Speedwell Place, South Windsor	16	806993	Adjacent	Industrial Premises
R12	128 Ham Street, South Windsor	Null	SP33235	Adjacent	Industrial Premises
R13	97 Fairey Road, South Windsor	36	263025	300 m	Industrial Premises

Figure 6-11: Location of Nearest Potentially Affected Receptors

↑N Not to scale	**Source:** SIX Maps 2018 **Legend**: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

6.4.2 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 MEASUREMENT LOCATION

Unattended long-term noise monitoring was undertaken from 4th September 2018 to 19th September 2018 at representative residential receivers at 7 Beasley Place, South Windsor and 6 Chisholm Place, Windsor. Attended noise monitoring was undertaken on 5th September at 7 Beasley Place, South Windsor and 6 Chisholm Place, Windsor.

6.6 MEASURED NOISE LEVELS

6.6.1 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 are summarised in the table below:

Table 6-5: Unattended Noise Logging Results, dB(A)

Location	ABL (L_{90}) Median (RBL)			L_{eq} Logarithmic Average		
	Day	Evening	Night	Day	Evening	Night
Location A 7 Beasley Place	37	35	32	54	42	42
Location B Chisholm Place	35	32	31	50	52	47

6.6.2 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 6-6.

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

Location / Time Period	Noise Descriptor				Comments
	L_{Aeq}	L_{A90}	L_{A10}	L_{A1}	
7 Beasley Place 5/9/2018 14:20	44	39	44	55	*Distant Road Traffic Hawkesbury Valley Way <38 dB(A)* *Occasional Industrial bang, Ham Street <72 dB(A)* *Dog <45 dB(A)* *Birds <66 dB(A)* *Train horn <43 dB(A)* *Cars, Fairey Road and Ham Street <51 dB(A)*
6 Chisholm Place 5/9/2018 14:20	56	37	52	68	*Distant Road Traffic Hawkesbury Valley Way <39 dB(A)* *Train horn <42 dB(A)* *Train passing <55 dB(A)* *Distant grinder <56 dB(A)* *Birds <57 dB(A)* *Aeroplane <47 dB(A)* *Dog <41 dB(A)* *Passing vehicle <68 dB(A)*

6.6.3 Metrological 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.

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. Temperature inversion is considered a feature where this occurs more than 30% of the nights in winter.

Based on 2017 weather data utilising Richmond RAAF AWS source-to receiver wind speeds of 3 m/s or below are not present for more than 30% of the time during any season or time period. Therefore wind effects have not been included in the assessment.

As the site is seeking approval to operate 7am to 6:30pm Monday to Friday and 7am to 1pm on Saturday temperature inversions have not been considered in the noise impact assessment.

6.7 AIR QUALITY

This section provides a description of the background air quality data selected for use in the Air Quality Impact assessment.

6.7.1 Background Air Quality

Ambient air quality data for $PM_{2.5}$ and PM_{10} was obtained for the year 2015 from the NSW EPA Richmond air quality monitoring station located approximately 6.7 km west of the subject site, inside the campus of the University of Western Sydney, Hawkesbury. This station is considered to be site-representative. The relevant data is summarised in Table 6-7.

Table 6-7: Summary of 2015 Data for $PM_{2.5}$ and PM_{10} from Richmond Air Quality Monitoring Station.

Pollutant	Averaging period	Concentration (µg/m^3)
PM_{10}	Maximum 24 hr average for 2015	49.32
	2nd highest 24 hr average for 2015	35.89
	3rd highest 24 hr average for 2015	35.83
	Annual average for 2015	17.6
$PM_{2.5}$	Maximum 24 hr average for 2015	**41.99**
	2nd highest 24 hr average for 2015	**25.58**
	3rd highest 24 hr average for 2015	24.4
	Annual average for 2015	**8.2**

Note: 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 34.5 µg/m^3 for an annual averaging period.

6.8 CLIMATE

This section provides background information on the meteorological conditions of the existing area surrounding the proposed development. The referenced meteorological information for rainfall and temperature has been sourced from the Bureau of Meteorology (BoM) monitoring station at Richmond RAAF, Station No. 067105. This station is located approximately 4.87 km north-west of the subject site, and is considered suitable for reference to general climate conditions in the local area.

6.8.1 Temperature

The mean annual minimum and maximum temperatures at Richmond RAAF are 11.1°C and 24.3°C respectively. The lowest temperatures occur in July, with a mean maximum of 17.7°C and a mean minimum of 3.5°C. The hottest temperatures are recorded during January, with the highest maximum average of 30.5°C. This data is shown in Table 6-8.

Table 6-8: Temperature Statistics at Richmond RAAF

Months / Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Maximum Temperature (ºC)	30.5	29.3	27.1	24.2	20.9	18.0	17.7	19.8	22.8	25.4	27.0	28.9	24.3
Mean Minimum Temperature (ºC)	17.7	17.8	15.8	11.7	7.5	5.3	3.5	4.4	8.0	11.1	14.2	16.2	11.1

Source: Bureau of Meteorology, 2018

Note: Statistics are based on data collected from the Year 1993 to 2018

6.8.2 Rainfall

Rainfall data from Richmond RAAF shows mean annual rainfall of 738.1 mm, which results in a monthly mean of 61.5 mm. February is the wettest month, where the mean rainfall reading is 113.7 mm, while the driest month is July with 27.5 mm mean rainfall. The annual mean number of rainy days (with rainfall above 1 mm) is calculated as 72.4 days. This data is shown in Table 6-9.

Table 6-9: Rainfall Statistics – Richmond RAAF

Months / Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	81.7	113.7	78.4	57.0	44.3	56.5	27.5	32.0	44.2	47.5	77.0	68.6	738.1
Decile 5 (Median) Rainfall (mm)	65.7	101.8	65.3	38.9	34.0	43.0	22.8	16.8	29.8	30.2	71.0	61.1	694.0
Mean No. of Days of Rain ≥ 1 mm	7.7	8.1	8.0	6.0	5.0	5.8	3.9	3.5	4.7	5.4	7.5	6.8	72.4

Source: Bureau of Meteorology, 2018

Note: Statistics are based on data collected from Year 1994 to 2018.

6.8.3 Wind

Seasonal wind rose plots for this site using Richmond RAAF base AWS data from 2015 have been included in Figure 6-12. Annual average wind speeds of 2.49 m/s and a calms frequency of 15.05% were estimated. Annual winds from the south-west were found to be dominant and were present at a frequency of approximately 15%.

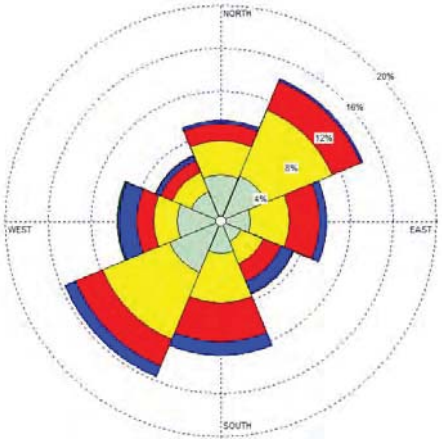
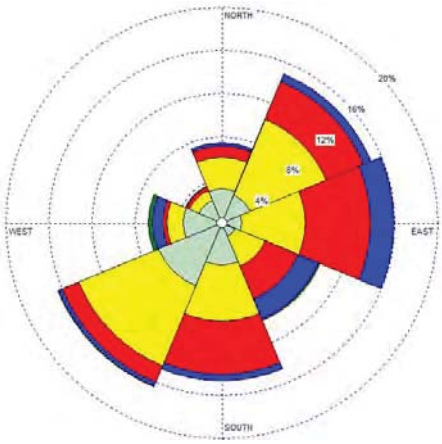
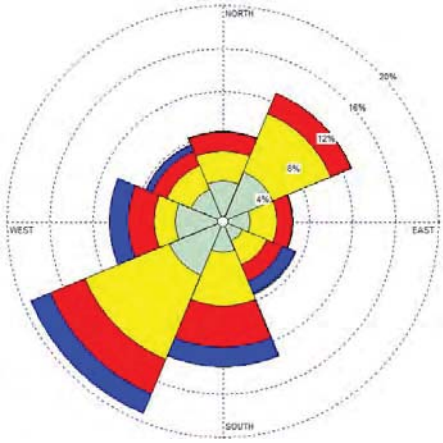
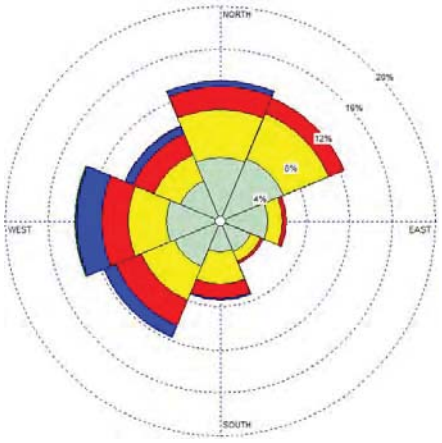
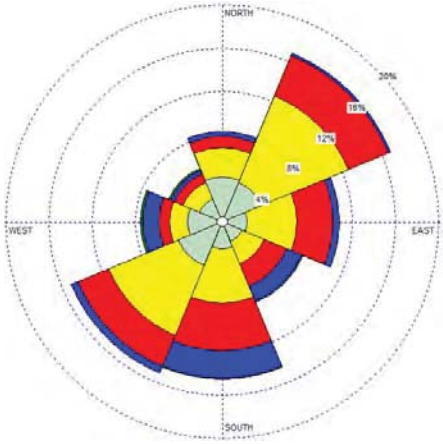
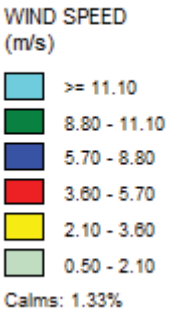
The average summer wind speed was estimated to be 2.78 m/s, with a calms frequency of 10.47%. South-westerly, easterly, and north-easterly winds were found to be dominant at a frequency of around 17%, 16% and 15% respectively.

In autumn, dominant winds blew from the south-west (~19%). The average autumn wind speed was 2.54 m/s with a calms frequency of 14.12%.

The winter season data showed the prevalence of winds from the western and northern directions. The dominant winds blew from the west at a frequency of ~14%. Winds from the south-west, north and north-east were also common, at around 12% frequency each. The average winter wind speed was 1.97 m/s with a calms frequency of 21.92%.

In the spring time, average wind speeds of 2.69 m/s were recorded. Dominant winds were from the north-east (17%), south-west (15%) and south (14%). The spring calms frequency was 13.56%.

Figure 6-12: Wind Rose Plots for the Referenced Meteorological Station – Richmond RAAF base, Bureau of Meteorology (2015)

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.49 m/s Calms Frequency: 15.05% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 2.78 m/s Calms Frequency: 10..47% Axis Frequencies: 4%, 8%, 12%, 16%, 20%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.54 m/s Calms Frequency: 14.12% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 1.97 m/s Calms Frequency: 21.92% Axis Frequencies: 4%, 8%, 12%, 16%, 20%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.69 m/s Calms Frequency: 13.56% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	

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 the nature of the proposal. 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 including the Preliminary Environmental Assessment Report by MacroPlan Dismasi (November 2017) and relevant NSW government/ industry guidelines were reviewed including those listed in Attachment B: Guidance Material of the NSW EPA requirements.

4. Preparation of Scoping Report

Experience with past projects at the site assisted in development of a Scoping Report that outlined the proposal and potential environmental impacts.

5. Consultation with regulatory authorities & stakeholders

Consultation with Hawkesbury 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, NSW Rural Fire Service, NSW Transport Roads & Maritime Services and DPI.

These steps led to the design and 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 1188) were issued on 24 November 2017 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;
- Waste management;
- Hazards and risk;
- Air quality and odour;
- Noise and vibration;
- Soil and water;
- Traffic and transport;
- Biodiversity;
- Visual; and
- Heritage.

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

- Waste management;
- Wastewater management;
- Water management;
- Air quality; and
- Noise.

NSW Rural Fire Service has requested that the EIS should include:

- Bush fire assessment report

The Department of Primary Industries has recommended the following issues be addressed:

- Land Use Conflict Risk Assessment;
- Consideration for impacts to agricultural resources and land;
- Bushfire risk identified and managed suitable and secure water supply;
- Surface & groundwater;

- Biosecurity standards met;
- Suitable traffic movements;
- Adequate consultation with community; and
- Contingency and Environmental Management Plan.

NSW Transport Roads & Maritime Services require the following to be included in the transport and traffic impact assessment of the proposed development:

- Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/ associated funding for upgrading or road improvement works (if required).

Hawkesbury City Council provided advice dated 6 November 2017 (Ref: PD0034/17) in relation to assessment of the proposed development:

- For permissibility of proposed use, limit all use to the IN1 zone;
- Due to proposed development being identified as designated, obtain specific comments from the Department of Planning;
- Determine whether proposal is classified as state significant development and/or regional development;
- Determine whether proposal is classified as integrated development and requires approvals under the *Protection of the Environment Operations Act 1997* or *Water Management Act 2000*;
- Application must demonstrate that the land use is acceptable having regard to Clause 6.3 of LEP 2012 and Council's *Development of Flood Liable Land Policy*;
- Bushfire risk must be considered;
- Flora and Fauna report must be prepared;
- Plantings of native vegetation around the development to provide visual buffers;
- A Water balance report is required;
- Traffic impact assessment is required;
- An acoustic report is required;
- A dust impact assessment report is required;
- A detailed plan of management for the site is required;
- Disabled access and facilities must be addressed;
- Assessment against relevant environmental planning instruments;
- Acid sulfate soils management plan;
- Landscaping plan;
- Concept drainage plan;
- Cost summary report for the development prepared by a quantity surveyor; and
- Schedule of external materials, finishes and colours.

Based on all the above considerations, potential issues have been prioritised under the headings 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 dust generated from the process. Therefore, a quantitative assessment has been undertaken.

- Traffic and transport
  A full traffic assessment has been undertaken due to the potential for traffic increases to impact on the existing road network.

- 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.

- Flora and Fauna
  Preliminary findings determined that land comprises of a wetland and contains areas of significant vegetation and connectivity between significant vegetation. Therefore a flora and fauna assessment is provided.

- Flooding
  The land is identified as being within an "extreme flood risk" and "high flood risk" precinct under the Hawkesbury Floodplain Risk Management Study and Plan. Therefore a flooding assessment is provided.

- Hazards and Risks (including Chemical Management and Fire)
  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 and liquids and is on bush fire prone land. Therefore, the fire risk has been assessed.

- Water
  The proposed operations require some water use for office/amenities, wheel washing and dust suppression purposes, however no wastewater would be generated. Due to the nature of the proposed activities, there is potential for contamination of the stormwater system. Stormwater runoff would be managed by installation of a sediment management system. Therefore, a qualitative water assessment has been undertaken within the Soil and Water Assessment.

- Waste management
  The management of waste has been addressed in a Waste Management Report.

- Soil
  The proposed construction will require excavation for the establishment of a level platform. Further, proposed operations have the potential to impact on soils. Therefore, a Phase I Environmental Site Investigation, & a qualitative soil assessment has been undertaken.

- Visual amenity
  The existing site is adjacent to an industrial area. The development will be in line with the industry in the area. There are residential receptors that have line of sight to the proposed

development. A vegetated barrier is proposed for the northern and western boundaries of the site. Therefore, a detailed assessment is not warranted and a brief discussion has been provided.

- Heritage
  The site does not contain any heritage items. There are however, items of heritage within close proximity to the site. Therefore, a detailed assessment is not warranted, but a discussion is provided.

- Acid Sulfate Soils
  The Phase I report identified the land is within a Class 5 acid sulfate soils area. An acid sulfate soils management plan needs to be prepared if excavations within 500 m of a Class 1,2,3 or 4 land are below 5 metres AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1,2,3 or 4 land. Some areas of the proposed site are within 500m of Class 4 land. Therefore, this aspect is discussed in detail.

- 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
  Preliminary investigations into the potential impacts to human health resulting from construction processing and recycling facilities are either negligible or appropriately mitigated 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, and is included in Appendix 4.

This Air Quality Impact Assessment (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).

This AQIA has been assessed using emission data adopted from the National Pollutant Inventory's *Emission Estimation Technique Manual for Mining* (2012), *Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals* (2014), and *Emission Estimation Technique Manual for Concrete Batching and Concrete Product Manufacturing* (1999).

The air dispersion model AERMOD was used for the prediction of off-site dust impacts associated with the air emissions from the proposed operations. Odour is not considered as a potential emission that would be generated from the proposed development and therefore was not assessed.

TSP emissions at all sensitive receptors were predicted to comply with the *Approved Methods* criterion for an annual averaging period. PM_{10} annual average emissions are also predicted to comply at all residential receptors.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria due to elevated background concentrations. However, contemporaneous addition of the predicted daily increments with daily background levels showed that no additional days of exceedance would result from the proposed site activities at the most impacted sensitive residential receptor. Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

This assessment considers the realistic impacts of the proposed site activities. Appropriate mitigation techniques are proposed at all feasible and reasonable parts of the proposed site activities. Vegetative Environmental Buffers are to be implemented on the western and northern borders of the site and a dust suppression system with water sprayers for the external storage bays would reduce impacts at industrial receptors.

8.2 NOISE

A Noise Impact Assessment has been undertaken for the proposed development, and is included in Appendix 5.

This noise impact assessment has been prepared in accordance with the *NSW Noise Policy for Industry*, *NSW Road Noise Policy* and *NSW Interim Construction Noise Guideline*.

Following the implementation of all recommended noise control measures, noise emissions generated by the proposed facility are predicted to comply with the relevant acoustic criteria at all considered residential and industrial receiver locations.

Road traffic noise levels associated with the development have been considered against the Road Noise Policy, with compliance predicted at all considered receptors.

8.3 SOIL & WATER

A soil and water assessment has been undertaken for the proposed development, and is included in Appendix 6. A Phase I Preliminary Site Investigation was undertaken to determine the contamination status of the proposed development area. The Phase I report is provided in Appendix 7. A Stormwater Assessment prepared by Sparks and Partners is provided as an attachment Appendix 6.

Potential impacts from the proposed development include the release of sediments and contaminants into the stormwater causing contamination of the nearby creek and wetlands. Groundwater and groundwater dependent ecosystems may impacted by contaminants seeping into the groundwater.

The proposed mitigation measures are summarized as follows:

- Installation of a stormwater drainage system consisting of drainage swales, primary and secondary sediment detention basins designed to treat sediment laden runoff and prevent seepage;
- Construction erosion and sediment controls implemented and maintained;
- Water quality testing of sediment detention basins and groundwater;
- Maintenance of all stormwater infrastructure including drainage swales and sediment detention basins;
- Preparation of a flood emergency response plan;
- Staff trained in spill response and emergency procedures, including flood emergency response 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).

8.4 FLORA AND FAUNA (BIODIVERSITY)

A biodiversity assessment has been undertaken by Anderson Environmental for the proposed development and is provided in Appendix 9. The assessment included a Threatened Species Test of Significance.

The survey undertaken at the site as part of the assessment identified that the vegetation in the study area is represented by a cleared pasture improved paddock which no longer represents any native ecological community. Furthermore, no threatened flora species or populations were identified during the surveys and none are considered likely to be present.

The assessment concludes that:

- The proposal is unlikely to significantly affect any threatened species or ecological communities or their habitats according to the 5-part test – (Environmental Planning and Assessment Act (1979) (EP&A) provided for under Section 7.2 of the Biodiversity Conservation Act (2016).
- The proposed development does not exceed the Biodiversity Offsets Scheme (BOS) threshold.
- The proposed development is not being carried out in a declared area of Outstanding Biodiversity Value (OBV).
- A Biodiversity Development Assessment Report (BDAR) is not required.
- Items of ecological significance are not present at the site.
- No impacts on listed matters of national environmental significance under the EPBC Act would occur.

A targeted search undertaken by Benbow Environmental identified one threatened species within close proximity to the subject site, the Square-tailed Kite which is listed as vulnerable, protected and sensitivity class 3. The Squared-tailed Kite was sighted 1.2 km away east-south-east of the site and also 4 km south-east.

It is noted that the proposed activities will be restricted to within the IN1 zoning of the site and excavations within the RU1 zone would be restricted to areas with separation distances of over 40 metres away from the wetlands. Additionally, only modified and grazed paddock vegetation will be removed and a vegetated barrier will be established along three boundaries of the proposed development area.

There will be strict control of stormwater runoff generated on site to prevent release of contaminants and minimise negative impacts to this environment, as well as any water dependent ecosystems.

8.5 VEGETATION MANAGEMENT

The proponent is committed to revegetation of disturbed areas within the rural zone as well as establishment of the vegetated barrier along the site boundaries. The following controls will be implemented.

- Sediment fencing is to be installed below all areas of exposed soil during works;
- Sediment fencing is to be inspected regularly;
- A construction management plan is to be implemented to maintain erosion and sediment controls;
- A suitably qualified restoration ecologist and/or landscape gardener will be engaged to:
  - Oversee site remediation and stabilisation including seeding, watering and weed control in the rural zone;
  - Undertake a landscaping program for the proposed vegetated buffer along the boundaries of the site; and
  - Confirm site has been suitably established and sediment controls can be removed.

8.6 WASTE GENERATION AND MANAGEMENT

A Waste Management Assessment was undertaken for the proposed development and is provided as Appendix 1. The assessment addressed the waste types and quantities proposed to

be received and processed at the site as well as the management of the waste that is expected to be generated from the site activities. Waste associated with the construction works was also assessed. A summary of findings is provided as follows:

- The waste received on site would consist of construction and demolition (C&D) wastes and be sourced from quarries, excavations and demolitions sites in Western Sydney and include bricks, concrete, rock and small quantities of timber, glass, metal, and general waste..
- Maximum daily quantity of waste processed is estimated to be 500 tonnes. Maximum weekly quantity of waste processed is estimated to be 2,500 tonnes. However, average daily and weekly tonnages processed would vary depending upon demand.
- Waste stockpiles would be contained within 4 x 200 m^2 external storage bays that would be enclosed on three (3) sides with 2.5 m high walls and covered with an awning 8m in height. The maximum height of waste stockpiles would be up to 7 metres.
- Waste processing operations would include unloading and loading, material handling and sorting, crushing and screening inside the building, and storage in external covered storage bays.
- There would be one Concrete Jaw Crusher Komatsu BR380JG-1 or similar for the crushing operations and a triple deck screen for the separation and sizing of crushed materials. These would operate within a purpose built building. A 25 tonne excavator and front end loader would be used for transfer and stockpiling of materials.
- Dust suppression would consist of water sprays/water cannon that provide a mist to adequately dampen materials and working areas. This would be a fine mist that would be switched off once stockpiles are damp.
- Waste would be transported to and from the site within a combination of semi-trailers and trucks with dog trailers, each with an approximate capacity of 30 tonnes.
- An incoming waste inspection procedure would be implemented to inspect all incoming loads for evidence of suspect materials. Rejected loads would be sent back to the supplier. Should any suspect material be identified after unloading, measures would be put in place to segregate the material until it can be classified and dealt with appropriately. A sample procedure is provided in the waste assessment.
- The proposed development, being a construction and demolition recycling facility, resource recovery practices implemented at the site would be 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."

8.7 HAZARDS AND RISKS

Potential hazards and risks identified in the SEARs included the use and storage of hazardous chemicals, bushfire hazard, land use conflict, biosecurity and environmental risks.

The site is identified as bushfire prone land in the Planning Certificate no. PC0069/19 issued by Hawkesbury City Council under Section 10.7 of the Environmental Planning and Assessment Act, 1979. Therefore a bushfire hazard assessment was prepared and details provided in Section 8.7.5 below.

An Environmental Risk Assessment (ERA) has been undertaken by Benbow Environmental for the proposed development and is provided in Appendix 2. The ERA addresses chemical use and storage and provides a preliminary risk screening in accordance with *State Environmental Planning Policy No 33 – Hazardous and Offensive Development* (SEPP33). Land use conflict,

biosecurity and other environmental risks associated with the proposed use of the site are also addressed. The following sub-sections provide a summary of the findings of the ERA.

8.7.1 Preliminary Risk Screening

The mobile vehicles and machinery used on site will be refuelled by a tanker. All mobile vehicles and machinery will be serviced by contractors who will bring their own chemicals including lubricant and hydraulic oils. Only water will be used in the wheel wash. No chemicals will be stored on site.

A preliminary risk screening was undertaken and dangerous goods quantities would not exceed the SEPP 33 screening thresholds and therefore, SEPP 33 does not apply and a preliminary hazard analysis is not required.

8.7.2 Land Use Conflict Risk Assessment

A land use conflict risk assessment (LUCRA) is required for the proposed development. *The Department of Primary Industries Land Use Conflict Risk Assessment Guide* (2011) was used as guidance to undertake the risk assessment (Appendix 2).

All risk rankings were found to be 9 or below. Therefore, the potential for land use conflict is low.

8.7.3 Biosecurity Risk Assessment

A biosecurity risk assessment focussing on pests, weeds and disease was requested by the Department of Primary Industries – Agriculture is included in Appendix 2.

The following safeguards to minimise biosecurity risks such as the spread of weed seed, diseases and pests would include the following:

- Incoming load inspection procedure;
- Acceptance of only inert wastes at the site;
- Adequate site security fence and gate;
- Use of a qualified landscape gardener/ecologist and native vegetation plantings only; and
- Implementation of a regular site inspection as part of the Environmental management plan.

The risk to biosecurity from the proposed activities is low. A biosecurity response plan is not considered warranted due to the nature of the proposed use and incoming materials, as well as the source of materials being local and not imported. It is recommended that Biosecurity be addressed within an Environmental Management Plan and measures put in place in the form of a regular site inspection to ensure pests, weeds and diseases can be readily identified. The EMP should also establish measures necessary should pests, weeds or diseases be found on site.

8.7.4 Environmental Risk Assessment

A risk analysis was undertaken and the main environmental site hazards include:

- Generation and release of dust emissions;
- Leaks and spills of fuel and oils;
- Excessive noise from on-site operations and activities;

- Sedimentation of waterways;
- Exposure to silica dust; and
- External Fire.

The above hazards were analysed considering all existing safeguards relating to those hazards and the risk register. All risks were found to be Class III (except for fire as discussed in Table 5-1) indicating an overall low level of risk. No high level risks of Class I were found for the proposed development.

The site is suited for the proposed use. The site represents a low risk to adjoining properties, the environment or premises within the vicinity.

8.7.5 Bushfire Hazard

A bushfire hazard assessment has been undertaken by Anderson Environmental and is provided as Appendix 3. The main findings of this assessment are provided below:

- The subject site is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt.

- The assessment of the subject site and its surrounds followed the amended (1st March 2006) Planning for Bushfire Protection (PBP 2006) guideline by the NSW Rural Fire Service (RFS). The assessment also is undertaken under Australian Standard (AS) 3959: 2009 which was adopted on 1 May 2010.

- The findings of the assessment indicate that the proposal can comply with the required bushfire protection requirements. Lands surrounding the site do not contain any vegetation considered to represent a significant fire threat within the 140 m assessment transect. The vegetation surrounding the site and on the site itself is managed and grazed pasture improved grassland with the land to the south and west being light industrial development.

- An APZ of 10 m is typically required for a commercial development and this is available and already present on this site for this development.

9. SOCIAL IMPACTS AND SAFEGUARDS

This section addresses the most significant social impacts that could result from the proposed development, which are human health and traffic issues. Visual impacts and heritage are also discussed briefly.

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), high noise levels and harmful consequences of a potential fire or 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 the use of appropriate PPE, as well as workplace housekeeping practices. Additionally, occupational hygiene assessments should be carried out initially to monitor levels of airborne particles and ensure that concentrations are below prescribed exposure standards dictated in the NSW *Work Health and Safety Regulation 2017*.

Potential health impacts associated with offsite release of dust are considered to be low based on the results from the Air Quality Impact Assessment (Appendix 4), which show that with all recommended dust control measures in place, 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 Generation of noise

High 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. Additionally, occupational noise assessments can be carried out to monitor noise levels.

Potential health impacts associated with offsite environmental noise are considered to be low based on the results from the Noise Impact Assessment (Appendix 5), which show that with all recommended noise mitigation measures in place are well below the occupational exposure limits.

9.1.3 Fire Risk

Smoke released from a fire would cause a potential risk to human health through inhalation, as well as burns from a fire. With adequate fire services and equipment in place the risk of a fire occurring on site is considered to be low.

9.1.4 Chemical Spill

Potential adverse impacts to health could result from unintended human contact with hazardous chemicals, upon their accidental release to the site, through the stormwater system. The possibility of such an event occurring is considered to be low as no chemicals will be stored on site and only minor quantities of chemicals will be brought onsite for refuelling and maintenance. Therefore, the potential health impacts from the accidental release of 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, dust masks, 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 Regulations 2017.

Employees would be trained in the appropriate safety procedures applicable to their role including use of firefighting equipment.

9.2 VISUAL IMPACTS

The existing site is currently cleared pastoral land with some established isolated trees sparsely scattered in few areas.

The proposed facility would be restricted to the south western area of the site (within the IN1 zoned land). There would be minor changes to the remaining area of the site, being some excavation for cut and fill purposes which would be expected to have negligible impacts to the views of surrounding areas.

Aspects of the proposed facility that would impact on the visual amenity of the surrounding areas include the new building, material storage bays, equipment and machinery including the excavator and front end loader, and the two demountable buildings. An extensive landscaping program would be implemented with native tree planting along the boundaries to improve the appearance of the site. Large native trees along with some smaller shrubs are recommended to provide adequate coverage. This vegetation would provide a visual screen around the proposed facility.

The main visual impact would be from the building and storage bays. All other equipment and buildings would be under 3 metres in height and situated toward the centre or rear (east) of the

proposed development area. Once the vegetated buffers are established, the majority of the development would be adequately screened from surrounding areas to the west and north.

The closest private receptors to the proposed site are located to the west and south west along Ham Street, Beasley Place and Hale Crescent. These receptors do not have a direct line of sight to the subject site and are separated by several other industrial sheds and buildings. These existing buildings shield these receptors from views of the subject site.

Private receptors along James Meehan Street to the north of the site have a direct line of sight to the proposed development area. These receptors are located beyond the railway line shown in Photograph 4. These receptors are separated by a distance of 300 metres from the northern boundary of the proposed development area. The vegetated buffer would run along the entire northern and western boundary of the proposed facility and is expected to adequately screen the proposed development from these receptors.

There are no public vantage points from which to site can be viewed. The Blacktown Richmond Railway line runs south east to north east and the site can be seen from this location. The vegetated buffer would restrict views of the site operations from the railway.

The following photographs of the existing site were taken on 12th September 2018 and are provided for perspective.

Photograph 1: View of the site along the southern boundary from the main entrance gate. This photo shows the existing access road and the buildings associated with the adjacent concrete batching plant to the right.

Photograph 2: View across the site towards the north-east from the south-west corner.

Photograph 3: View of site along the existing access road showing the conveyor and concrete batching plant to the south of the site.

Photograph 4: View from the centre of the site towards the north-east with the railway line in the background. Private receptors are located on James Meehan Street beyond the railway line.

Photograph 5: Healthy wetlands area to the north-east of the site.

Photograph 6: View from the centre of the site towards the west. Industrial facilities can be seen along Fairey Road.

Photograph 7: View from the middle of the northern boundary towards the north-west.

Photograph 8: View of site towards the east from western boundary.

Photograph 9: View facing north from the west of the site.

Photograph 10: View to the south-east of the site from the west. On the right, part of the concrete batching plant structures can be seen.

The existing site is cleared pastoral land. The proposed development would significantly change the visual aspects of the site, however, the site operations would be adequately screened from private receptors and the surrounding areas by a vegetated buffer along western and northern boundaries of the project area.

9.3 HERITAGE

9.3.1 General Heritage

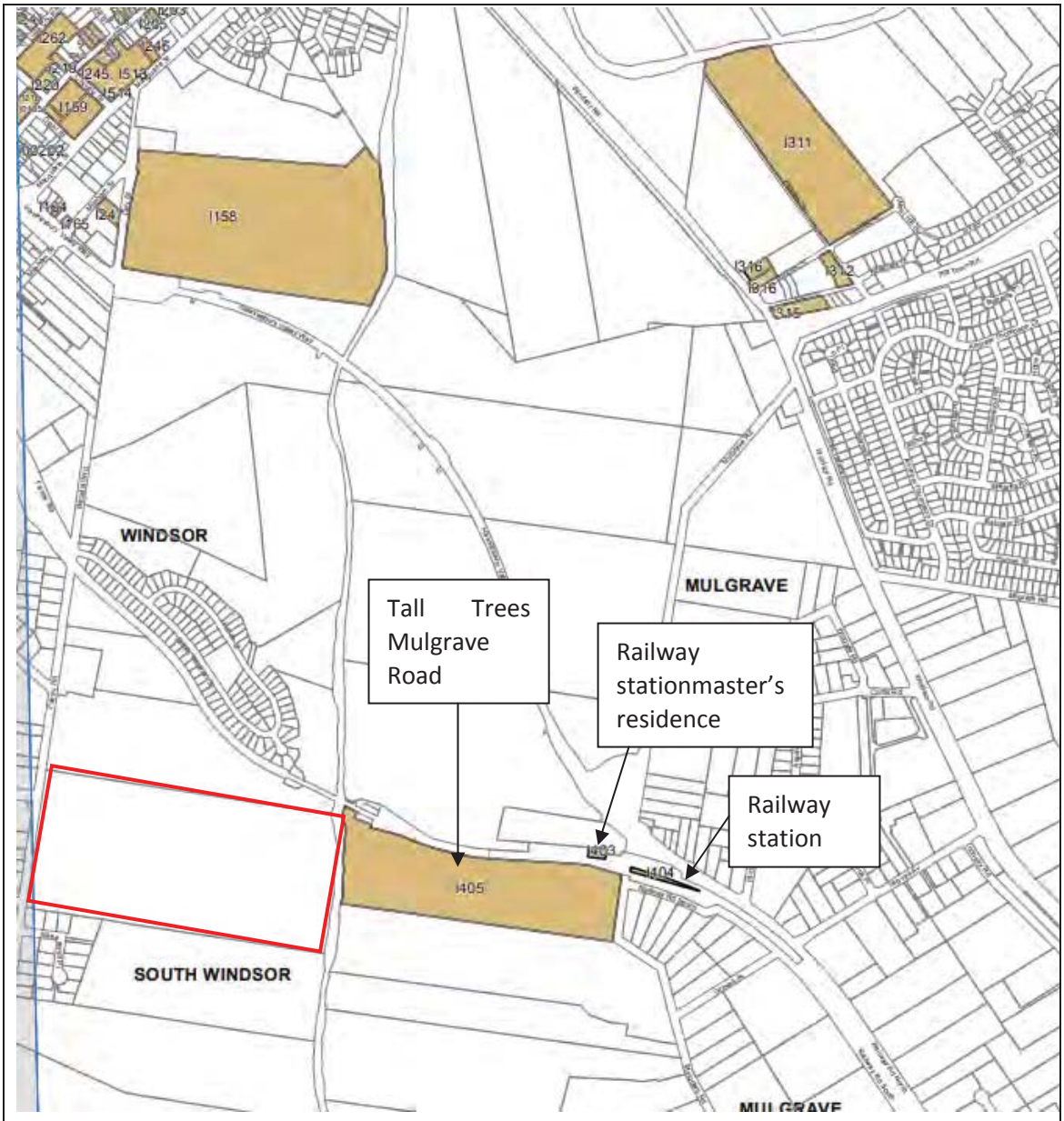
A search for heritage places and items was conducted via the OE&H State Heritage Inventory, an online heritage database which includes listings from Aboriginal Places, State Heritage Register, Interim Heritage Orders, State Agency Heritage Registers and Local Environmental Plans.

The subject land was found not to be affected by an Interim Heritage Order under the provisions of the NSW *Heritage Act 1997*. 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 Hawkesbury LEP 2012.

The nearest general heritage item is the adjacent field, across South Creek to the east of the site near Mulgrave Road where there are "Tall Trees". Just north of that field along the railway line is the Railway stationmaster's residence and Railway station which are both general heritage items.

Figure 9-1: Hawkesbury Heritage Map

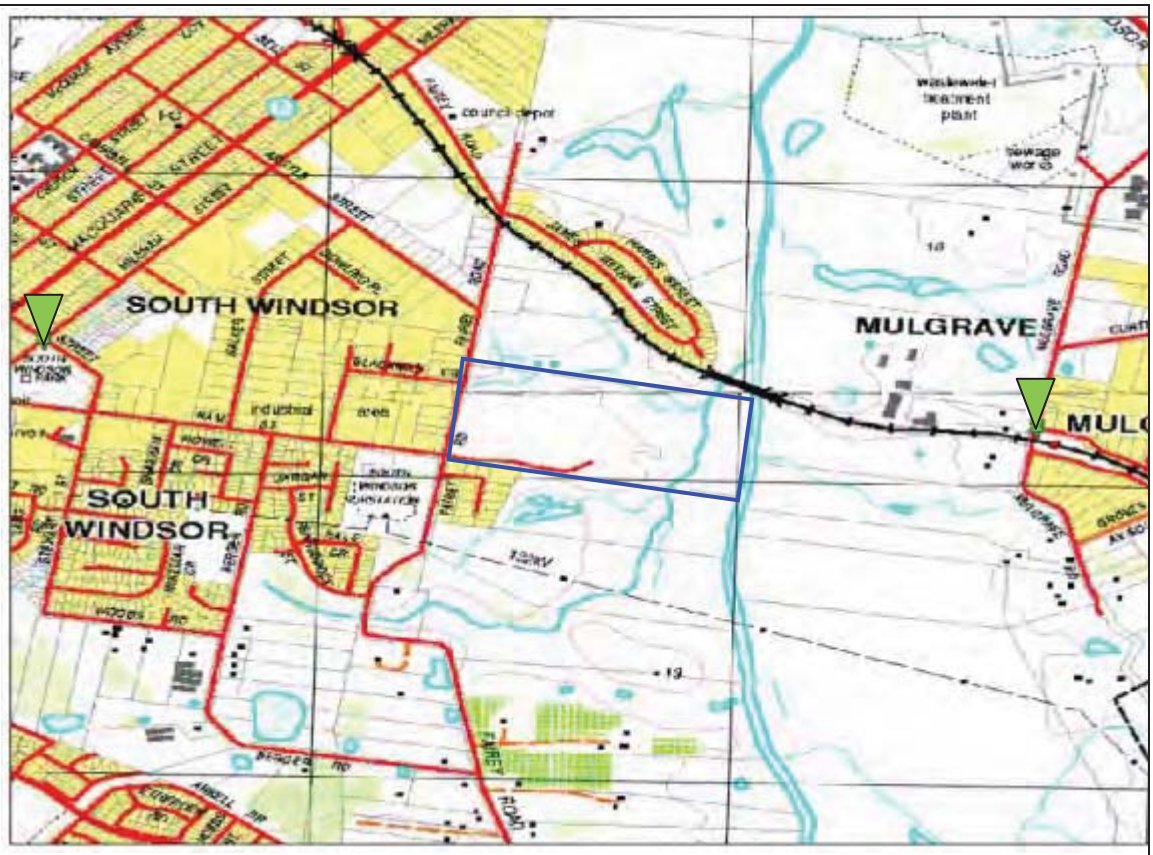


Source: Hawkesbury LEP 2012 Heritage Map – Sheet HER_008DB

9.3.2 Aboriginal Heritage

There are no aboriginal sites or places located on the site but two aboriginal sites are recorded within 1 km of the site, at Mulgrave and South Windsor Park.

Figure 9-2: Aboriginal Heritage Map



Source: Aboriginal Heritage Information Management Systems (AHIMS) Web Services

↑N Not to scale	LEGEND: Approximate site location Aboriginal site location	Benbow Environmental 25-27 Sherwood St Northmead NSW 2152

The proposed use of the site is restricted to the IN1 zoned area in the south western area of the site. The site activities would be separated by considerable distance from the items of heritage and adequate safeguards are to be implemented to ensure that the risk for impacts to items of heritage is extremely low.

9.4 ROAD, TRAFFIC AND TRANSPORT

A traffic impact assessment was undertaken by Transport and Urban Planning. A summary of the outcomes of this assessment are provided below:

- The proposal will receive, process and recycle approximately 98,000 tonnes of concrete materials at full operation (post Year 2020). All materials will arrive at the site via medium to large articulated trucks. Large semi trailer and truck trailer combinations will remove all recycled materials.
- Under full operating conditions the site is expected to generate 52 vehicle trips (including 4 trucks) in the AM and PM Monday to Friday peak hour. Four additional truck per hour on Argyle Street should not adversely impact upon the existing level of residential amenity between Mileham Street to Macquarie Street.
- The existing signalised intersection of Argyle Street with Macquarie Street may require an RMS operational review based on current accident levels and delay times.

- Existing and post development mid block traffic service levels on Fairey Road and Argyle Street will remain at favourable level of service LoS A performance standards.
- Peak hour articulated truck movements will be less than 4 movements per hour in peak times.
- The existing access intersections with Macquarie Street/Argyle Street and Argyle Street/Fairey Road has been (SIDRA) modelled for projected Year 2020 peak hour traffic flows with the additional traffic generation by the proposal. The post development results indicate there will be no significant change in existing traffic service levels at these intersections, due to this proposal.
- 100% of all end product materials will depart the site via Fairey Road to Argyle Street then to Macquarie Street and thence the regional main road network.
- Fairey Road and Argyle Street to Macquarie Street are existing, moderate volume truck routes into the existing light industrial precinct during business hours 6am to 6pm.
- The projected additional 2 trucks in and 2 trucks out per hour during peak times should have no adverse impacts upon the amenity or safety of Argyle Street during business hours.
- Incoming materials will arrive via the Macquarie Street and Argyle Street to Fairey Road. Recycled concrete would still be generated without this facility but would go elsewhere.
- During construction the majority of vehicles are expected to arrive and depart the site outside the peak hours on the surrounding road network. Even with the addition of construction based traffic, the volumes on the main routes leading to the site will be well below those experienced during peak hours.
- All proposed internal vehicle movements parking and circulation can be adequately accommodated within the site and are free of conflict and should be designed to comply with Councils DCP 2002 and Australian/NZ Standard 2890.2 at the Development Application stage.

9.5 AGRICULTURAL RESOURCES & LAND

Important Agricultural Land is not currently mapped for the Hawkesbury Local Government Area. The site and immediate surrounding areas are zoned RU1 – Primary Production and IN1 – General Industrial. The area of the site to be used for the proposed development is fully within the IN1 zone.

As the nature of the incoming materials is inert, there would be no storage of hazardous chemicals and the area to be used for site activities would be covered with a hardstand roadbase material, the potential for groundwater and soil contamination of the adjacent agricultural land is low.

Adequate safeguards are proposed to be implemented to significantly minimise off site impacts from the proposed site activities on the adjacent agricultural land. The main potential impact identified throughout this EIS is sediment laden stormwater runoff. This would be managed using a surface water management system that includes drainage channels, a primary and secondary sediment basin and gravel filters to ensure that releases of stormwater are free of sediment.

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

The air quality impact from the proposed development has been assessed in accordance with the NSW EPA *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016*. This document specifies particular pollutants which are assessed as a cumulative impact (incremental impact from site + background). The pollutants assessed cumulatively relevant to the subject site are PM_{10}, $PM_{2.5}$ and TSP.

Odour is not considered as a potential emission that would be generated from the proposed development and therefore was not assessed.

The subject site is located in a region that can experience elevated background PM_{10} and $PM_{2.5}$ levels.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria due to elevated background concentrations. However, contemporaneous addition of the predicted daily increments with daily background levels showed that no additional days of exceedance would result from the proposed site activities at the most impacted sensitive residential receptor. Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

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 was assessed in the road traffic noise study included in the Noise Impact Assessment (Appendix 5). All relevant noise criteria were satisfied at nearest residential receivers, provided that all the noise controls are maintained throughout the operative life of the facility.

10.3 SURFACE WATERS

Collective contributions from the various rural and industrial facilities in the South Creek 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 drainage channels, sediment detention basins and a water monitoring program. The potential release of sediments, chemicals or waste from subject site would be unlikely, and any accidental release could be easily contained on site as a result of the current safeguards in place. Therefore, contribution of the individual site 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 measure 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.

However, waste generated from the site that cannot be processed could also increase pressure on the ability of the waste management market to absorb cumulative waste streams. The proposed development would more likely reduce this pressure by recycling and reusing a significant amount of the waste. Furthermore the area already handles significant volumes of waste in the, from various sources including domestic, rural, commercial and industrial premises. Nevertheless, waste facilities likely to receive the site's waste materials are considered to have sufficient capacity to handle the type and volume of waste to be generated by the proposal, in combination with those generated by the broader region.

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 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 chemicals 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 current safeguards and procedures in place. Additionally, sufficient fire services are provided to address any potential fire incidents.

10.6 TRAFFIC AND TRANSPORT

The traffic impact assessment for the proposed development, undertaken by Transport and Urban Planning, 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.

Results of this assessment are presented in Appendix 8. The report concludes that the traffic service levels on Fairey Road and Argyle Street will remain at a favourable level of LoS A performance standards. There will be no change in existing traffic service levels at Macquarie Street/ Argyle Street and Argyle Street/ Fairey Road modelled for projected Year 2020 peak hour traffic flows. The proposal would have an acceptable traffic impact and there is no requirement for provision of any new traffic capacity roadworks.

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:

- Construction of a purpose built industrial building for conducting the processing operations to minimise noise and dust emissions;
- Storage of materials within enclosed and covered storage bays;
- Implementation of dust suppression system for air quality control;
- Stormwater pollution control, including site specifically designed stormwater management system including drainage swales, sediment basins and filters to manage potentially sediment laden runoff;
- Fire protection services;
- Waste management and stringent procedures to manage the incoming and outgoing waste; and
- Environmental Management Plan (EMP).

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 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; • No net reduction in the existing landscaping of the site; • 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 used on site is also provided, together with a description of incident management procedures.

12.1 SUMMARY OF CONTROLS AND MITIGATION MEASURES

Table 12-1 presents a summary of the potential impacts of the site activities discussed in Sections 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.	**Construction 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; • Dust suppression/water application to material stockpiles; • Limit stockpile height to 5 m (maximum); • Vehicles leaving the site to be cleaned of dirt and other materials to avoid tracking onto public roads; • Enforce appropriate speed limits for vehicle 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. **Operational Control Measures** • Crushing and screening activities limited to inside the building; • Enclosed and covered storage bays for stockpiles of materials; • Dust suppression (water sprayers) used on storage bays; • Vegetative buffers; and • Limit stockpile height to 7 m within covered storage bays

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 mobile equipment on site and vehicle movements exceeding compliance levels and resulting in impacts to acoustic amenity and complaints from the community. Residual impacts after management and mitigation measures: noise levels found to comply at all residential receptors.	**Construction Noise** • Construction activities to take place during standard **construction** hours only. **Operational Noise** • The crusher and screen are to only operate within the building. • Maintain vehicles paths onsite so all trucks may enter and leave the site in the forward direction, preventing the use of truck reverse beepers; • All onsite mobile equipment is to be fitted with reversing lights and/or broadband/white noise (also known as squawkers) reversing alarms. • Prohibition of extended periods of on-site revving/idling; • Minimisation of the use of truck exhaust brakes on site; and • Enforcement of low on-site speed limits.
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.	• On-site sediment control system to manage stormwater runoff; • Water monitoring program of sediment basins, groundwater, sediment basin system outlet; • Flood Emergency Response Plan; • Preventative Maintenance Schedule for all stormwater infrastructure including drainage channels, stormwater pits, sediment basins, gravel filters, etc; • Staff trained in spill response and emergency procedures, including firefighting techniques; • Regular workplace inspection and high standard of housekeeping; and • Segregated and designated waste bays and bins.

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 and potential release of waste to surrounding environment. Risk associated with receipt of unauthorised wastes such as asbestos. Residual impacts after management and mitigation measures:	• Segregated and designated storage bins for appropriate storage of waste (to landfill); • Incoming and processed waste to be stored in external covered storage bays; • Licenced waste contractors for collection; • Waste minimisation and resource recovery practices implemented; • Weighbridge for recording of incoming and outgoing loads. • Incoming waste inspection procedure; and • Waste Management Procedure.
Hazards and Risk	
Incident involving the potential for a spill, fire or release of contaminated stormwater. Residual impacts after management and mitigation measures: potential for fire to cause serious material damage and impact on human life is low.	• Control of ignition sources, including "no smoking" policy; • Adequate provision for escape; • Adequate fire services; • Site security; • On-site sediment management basins; • Forklift driver training; and • Emergency plan and emergency response training.
Human Health	
Impacts stemming from other aspects including air quality, noise and hazards and risk: airborne tissue fibres, 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 (inc. incoming waste inspection procedure); • Use of Personal Protective Equipment; • Undertake occupational health assessments post after commencement of operations; • 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.
Traffic and transport	
Low to moderate traffic impact	No requirement for road upgrades

Table 12-1: Summary of Potential Impacts, Environmental Safeguards and Control Measures

Potential Impacts	Safeguards and Control Measures
Visual Amenity	
Potential decrease in visual amenity of the area from residential areas.	• Implementation of a vegetated barrier along the western, and northern boundaries of the development to provide an adequate visual screen of site activities; • Stockpiled materials to be stored within covered and enclosed storage bays.

12.2 SITE MANAGEMENT PLANS

Site management plans would need to be prepared by Andy's Earthworks prior to the operation commencing, to ensure that proposed operations will be undertaken in an environmentally safe manner and with consideration to work health and safety. The most important site management plans include the following:

- Construction Environmental Management Plan (CEMP);
- Emergency Plan (EP); and
- Environmental Management Plan (EMP).

An outline of these reports is provided in the following sub-sections.

12.2.1 Construction Environmental Management Plan (CEMP)

A CEMP is required to be implemented for the construction phase of the development. The CEMP would address the following elements in relation to the construction works associated with the proposed development:

- Identify the legal requirements and statutory approvals required for the construction phase of the development;
- Describe the activities to be undertaken on site during the construction of the development;
- Assign roles and responsibilities to relevant employees involved in the construction works;
- Identify hazards and risks to the environment in relation to the construction works and describe the controls that would be implemented to minimise these risks;
- Outline environmental management practices and procedures to be following during construction works; and
- Include management plans and procedures such as:
  - Erosion and Sediment Control Plan;
  - Flood Emergency Response Plan;
  - Dust Control Procedure;
  - Noise Management Procedure;
  - Construction Traffic Management Plan;
  - Construction Waste Management Plan; and
  - Unexpected Finds Protocol.

12.2.2 Emergency Plan

An emergency plan is required to be implemented for the operational phase of the development and should be prepared to be consistent 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*;

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 regularly updated as continually improving guidelines to support site management and handling of unanticipated situations.

An Incident Management procedure should be included in the plan. Details are provided in the following sub-section.

12.2.2.1 Incident Management

Incident management would be addressed within the Emergency Plan to include all aspects of responding to, investigation of and the reporting of an incident that has the potential to cause serious injury/death, property damage or poses a risk of material harm to the environment. An incident management procedure would address the following aspects and actions:

- Establishment of an Incident Response Team (IRT) at the site that would include a Chief Warden, Deputy Warden, First Aid Officers and Traffic Controllers and set the responsibilities and training requirements for each role;
- Immediate actions and steps to take in the event of an incident;
- Identification of potential site hazards;
- Safeguards provided at the site such as spill containment kits, firefighting equipment, first aid and other medical or clean up equipment;
- Reporting requirements including who to notify, what to notify and when to notify;
- Incident investigation procedures to be undertaken, especially if multiple incidents occur or if the incident results in serious injury/death, property damage or material harm to the environment; and
- Monitor and review of incidents to determine follow-up actions, prevent the recurrence of the incident and ensure that follow-up actions are implemented.

12.2.3 Environmental Management Plan

Andy's Earthworks will require a site specific Environmental Management Plan (EMP). The EMP should address the following major elements:

- Legal and regulatory requirements including compliance obligations;
- Site description including environmental characteristics and general infrastructure;
- Description of site activities;
- Identification of significant environmental aspects of site activities;
- Environmental management controls in relation to particular aspects and impacts;
- Reporting, staffing and training requirements;
- Environmental monitoring and review; and
- Environmental procedures may include:
  - Incoming Waste Inspection Procedure;
  - Noise Management Plan;
  - Air Quality Management;
  - Waste Management Procedure;
  - Stormwater Management Procedure (including water monitoring program); and
  - 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.

13. LIST OF APPROVALS AND LICENCES

Table 13-1: Licences, approvals and permits

Type	Relevant Legislation	Required?	Agency
LICENCES			
Environment Protection Licence	Schedule 1 of the Protection of the Environment Operations Act 1997	**Yes**	NSW EPA
Surface Water Licence	Water Act 1912	No	Office of Water
Groundwater Licence	Water Act 1912	No	Office of Water
Controlled Activity Approval	Water Management Act 2000	**Yes**	Office of Water
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	Environmental Planning and Assessment Act 1979	**Yes**	Hawkesbury 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

14. STATEMENT OF COMMITMENTS

Andy's Earthworks Pty Ltd commits to the following course of action during the installation and operation of the proposed development:

1. Andy's Earthworks Pty Ltd will abide by all legal requirements, licence conditions and approvals pertaining to the site.
2. Andy's Earthworks Pty Ltd will ensure vegetation management controls stated in this EIS will be implemented during earthworks and construction.
3. Andy's Earthworks Pty Ltd will ensure the external areas are kept tidy and free of items and debris to facilitate movement of vehicles on site and minimise potential pollution.
4. Andy's Earthworks Pty Ltd will implement and maintain the following safeguards and mitigation measures at the site, as detailed in this EIS.
5. Andy's Earthworks Pty Ltd must implement all the specified noise controls detailed in the Noise Impact Assessment.
6. Air quality control equipment must be used and maintained.
7. Water monitoring must be undertaken to ensure groundwater or surface water contamination is minimised and below the relevant criteria.
8. Stormwater drainage swales, on site detention tanks, and all stormwater infrastructure and pollution control devices are to be regularly inspected and/or cleaned and maintained in good working condition.
9. Staff must be trained in spill response and emergency procedures, including firefighting techniques.
10. Regular sweeping and good housekeeping must be undertaken for all operational and storage areas at the site.
11. All waste must be segregated and stored in designated areas/storage bays.
12. Fire services and equipment must be provided, and the existing ones should be maintained, in accordance with BCA and relevant Australian Standards.
13. All equipment should be regularly inspected and maintained.
14. All staff must wear PPE relevant to their role.
15. Andy's Earthworks Pty Ltd will implement an Environmental Management Plan and ensure it incorporates the commitments, safeguards, mitigation measures and recommendations documented in this EIS.
16. Andy's Earthworks Pty Ltd will implement an Emergency Plan.

15. JUSTIFICATION AND CONCLUDING REMARKS

15.1 PROJECT JUSTIFICATION

The local demand for processing construction and demolition waste, is expected to increase in following years, which will lead to moderate industry growth on the domestic market. The construction of the airport and the demand for residential developments means this region generates significant quantities of construction and demolition waste. Andy's Earthworks Pty Ltd expects an increase in demolition and construction waste within its own business and from external sources. Therefore, the project has been driven, and is justified, by the need to match market demands. In order to reduce transport costs for both the receipt of (C&D) waste and the supply of final product it is ideal to situate a resource recovery facility in this area.

The justifications for selecting the subject site and for implementing the proposed expansion are listed as follows:

- The subject site has ample room available to cater for the proposed operations;
- The cost of establishing the business on this site is relatively low;
- The site is not in a sensitive land use area;
- The development is a permitted use with consent;
- The development is a beneficial use which would fulfil the principles of ecologically sustainable development and is to be encouraged;
- The development generates local employment;
- Transport routes are readily available;
- The site has sufficient room for on-site parking and truck manoeuvring;
- The proposed development will recycle construction and demolition waste, therefore reducing the amount of waste for disposal; and
- 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 construction and demolition recycling facility to be evaluated, and control strategies to be devised in order to ensure compliance with regulatory standards.

Being readily able to prevent the rise of amenity impacts on the residential community is a benefit of this site.

The nature of the recycling process is considered to be suited to this site and the request is made that approval be granted.

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APPENDICES

EIS Appendix 1: Waste Assessment, Benbow Environmental

WASTE MANAGEMENT ASSESSMENT
FOR
ANDY'S EARTHWORKS PTY LTD
100 FAIREY ROAD, SOUTH WINDSOR NSW

Prepared for: Andy's Earthworks Pty Ltd
MacroPlan Dimasi

Prepared by: Linda Zanotto, Senior Environmental Engineer
R T Benbow, Principal Consultant

Report No: 181025_Waste_Rep_Rev3
September 2019
(Released: 11 September 2019)

Benbow
ENVIRONMENTAL

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1. INTRODUCTION

This report presents a waste management assessment to support an Environmental Impact Statement for the proposed construction and demolition recycling facility to be located at 100 Fairey Road, South Windsor NSW 2756.

The proposed facility will receive, handle and process up to 98,000 tonnes of construction and demolition (C&D) waste per year. This includes virgin excavated natural material (VENM) and excavated natural material (ENM).

This assessment identifies, quantifies, describes and classifies the waste types associated with the demolition, construction and proposed use of the site in accordance with the *Waste Classification Guidelines*. A description of how the waste would be transported, stored, processed or disposed of and procedures for the acceptance of waste at the facility is provided. Compliance with the EPA's record keeping and reporting requirements is addressed.

Measures to be implemented to ensure the project is consistent with the *NSW Waste Avoidance and Resource Recovery Strategy 2014-2021* as well as other relevant NSW government policies are identified.

1.1 SEARs Requirements

Waste management is listed in the Secretary's Environmental Assessment Requirements (SEAR 1188) dated 15/12/2017 as a key issue and the following table provides the details of requirements to be addressed.

Table 1-1: SEARs Requirements for Waste Management

Requirement	Comment
A description of waste streams that would be accepted at the site including the type, classification, maximum daily, weekly and annual throughputs and the maximum size and heights for stockpiles.	Section 2.3
Details of the source of the waste streams to justify the need for the proposed processing capacity.	Section 2.3.3
A description of waste processing operations, including a description of the technology to be installed, resource outputs, and the quality control measures that would be implemented.	Section 2.3
Details of how waste would be stored and handled on site, and transported to and from the site including details of how the receipt of non-conforming waste would be dealt with.	Sections 3 and 4
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 1.2.5

1.2 RELEVANT LEGISLATION AND GUIDELINES

The main legislation and guidelines that have been addressed in the writing of this report are:

- *Waste Classification Guidelines – Part 1: Classification of waste* (NSW EPA, 2014);
- *Protection of the Environment Operations Act 1997*;
- *Protection of the Environment Operations (Waste) Regulation 2014;* and
- *Waste Avoidance and Resource Recovery Act 2001.*

The relevance of each piece of legislation and guideline is described in the following sections. Legislation and guidelines are then addressed in regards to planning issues and regulatory compliance.

1.2.1 Waste Classification Guidelines

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 1-2: 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.

Table 1-2: Classes of Waste from Waste Classification Guidelines

Class	Definitions / Examples
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

1.2.2 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. The POEO Act also establishes the ability to set various waste management requirements via the *Protection of the Environment Operations (Waste) Regulation 2014*.

Under the POEO Act, the proposed development is defined as a scheduled activity and is required to hold an environment protection licence (EPL).

The proposed development involves recovery of general waste and the processing of up to 98,000 tonnes of these waste materials per year. Furthermore, the proposed development would have the capacity store more than 1,000 tonnes of waste at any time. Therefore, the proposed development meets the definitions under Clause 34 – Resource recovery, Clause 41 – Waste Processing (Non-thermal treatment) or Clause 42 – Waste Storage.

1.2.3 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. Specifically, it provides for contributions to be paid by occupiers of scheduled waste facilities for each tonne of waste received at the facility or generated in a particular area, exempts certain occupiers or types of waste from these contributions, and allows deductions to be claimed in relation to certain types of waste. The Waste Regulation also sets out provisions covering:

- the proximity principle;
- record-keeping requirements, measurement of waste and monitoring for waste facilities;
- tracking of certain wastes (listed in Schedule 1 of this legislation);
- reporting;
- transportation of waste;
- transportation and management of asbestos waste;
- recycling of consumer packaging; and
- the classification of waste containing immobilised contaminants.

The development as proposed is a scheduled facility, as identified in the previous section. Therefore, the above provisions would apply to the site.

Part 4 of the *Protection of the Environment Operations (Waste) Regulation 2014*, referred to as 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 proposed development is not expected to generate, receive, handle or process waste types that require tracking under the Waste Regulation. An incoming waste inspection procedure would be implemented at the site and addresses how the receipt of non-conforming waste would be dealt with.

1.2.4 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.

1.2.5 NSW Waste Avoidance and Resource Recovery Strategy 2014-2021

The proposed development, being a construction and demolition recycling facility, resource recovery practices implemented at the site would be 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."

The proposed development's consistency with the WARR Strategy 2014-21 objectives and targets is demonstrated in the following table.

Table 1-3: Consistency with WARR Strategy 2014-21 Objectives and Targets

WARR Strategy 2014-21 Objectives and Targets	Comment
Avoid and reduce waste generation By 2021–22, reduce the rate of waste generation per capita	The proposed development would avoid and reduce waste generation by implementing the following measures: Re-circulating wheel wash to avoid generation of wastewater.
Increase recycling By 2021–22, increase recycling rates for: • municipal solid waste from 52% (in 2010–11) to 70% • commercial and industrial waste from 57% (in 2010–11) to 70% • construction and demolition waste from 75% (in 2010–11) to 80%	The proposed development would contribute to achieving increasing recycling rates of construction and demolition waste.
Divert more waste from landfill By 2021–22, increase the waste diverted from landfill from 63% (in 2010–11) to 75%	The proposed development would enable 98,000 tonnes per year of construction and demolition waste to be diverted from landfill.

Table 1-3: Consistency with WARR Strategy 2014-21 Objectives and Targets

WARR Strategy 2014-21 Objectives and Targets	Comment
Manage problem wastes better By 2021–22, establish or upgrade 86 drop-off facilities or services for managing household problem wastes statewide	Not applicable.
Reduce litter By 2016–17, reduce the number of litter items by 40% compared with 2011–12 levels and then continue to reduce litter items to 2021–22	The proposed development would indirectly contribute to reducing litter by having in place designated waste bins and a regular workplace inspection to enable prompt clean up of any litter identified at the site.
Reduce illegal dumping From 2013–14, implement the NSW Illegal Dumping Strategy 2014–16 to reduce the incidence of illegal dumping statewide. As part of this strategy, by 2016–17: • reduce the incidence of illegal dumping in Sydney and the Illawarra, Hunter and Central Coast regions by 30% compared with 2010-11 • establish baseline data to allow target-setting in other parts of the state	The proposed development would encourage the reduction of illegal dumping by providing a facility that accepts construction and demolition waste.

2. SITE DETAILS

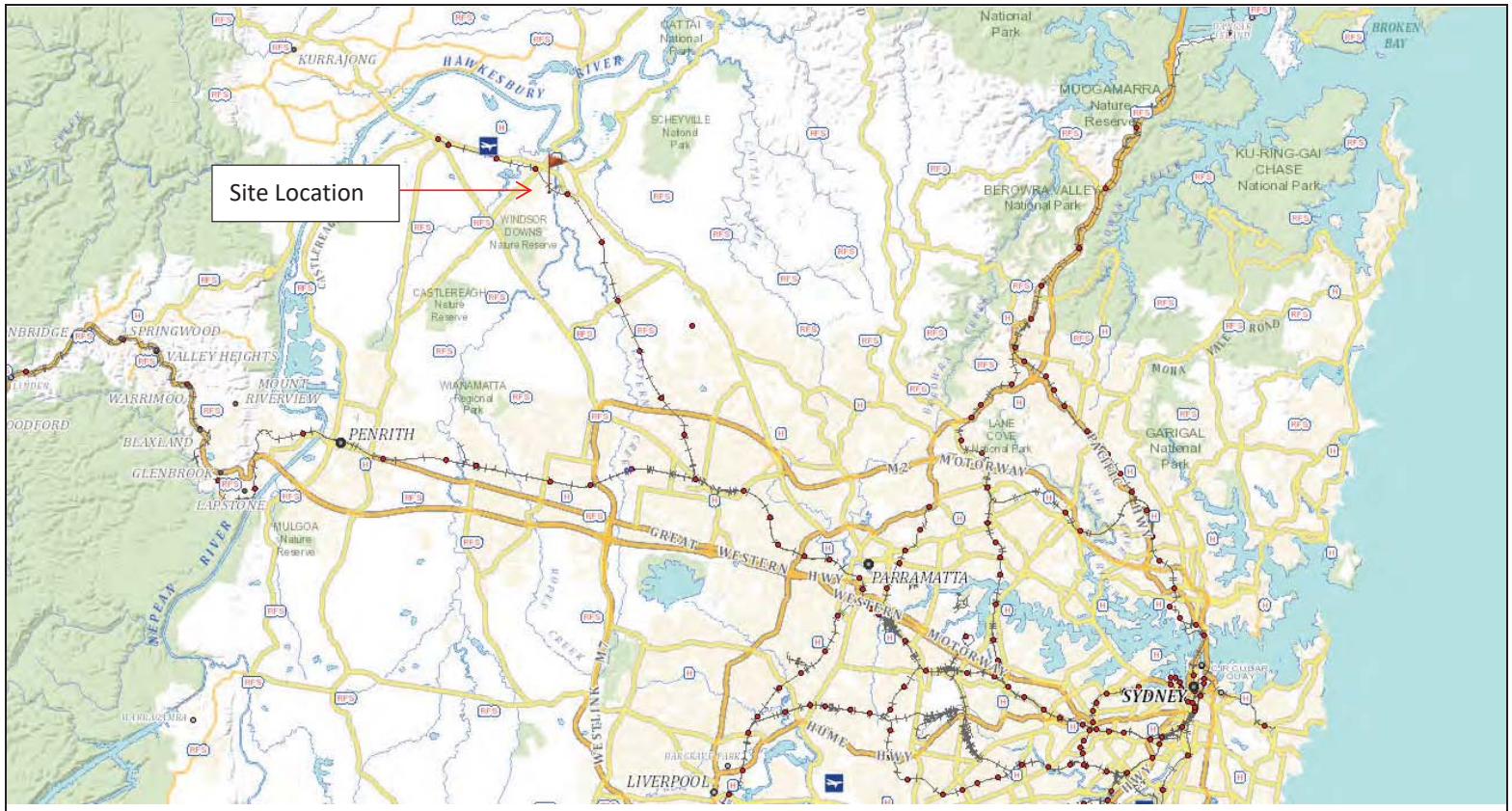
This section presents details of the site location, description of the site and surrounds and a description of the proposed activities to be undertaken at the site.

2.1 SITE LOCATION

The land is located 100 Fairey Road, South Windsor NSW 2756, also known as Lot 4 DP264159. The site is located within the Hawkesbury City Council Local Government Area.

Figure 2-1 shows the location of the proposed site in a regional context. Figure 2-2 shows an aerial photograph of the local area. Figure 2-3 shows an aerial photograph of the site.

Figure 2-1: Site Location in a Regional Context



Source: Six MAPS, 2017

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

Figure 2-2: Aerial Photograph of the Local Area

Source: Six MAPS 2017

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

Figure 2-3: Aerial of the Site

Source: Six MAPS 2017

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

2.2 DESCRIPTION OF THE SITE AND SURROUNDINGS

The proposed facility will be located at 100 Fairey Road, South Windsor NSW 2756.

The 100 Fairey Road property has two zonings. The south west corner of the site is covered by the IN1 General Industrial zoning under the Hawkesbury Local Environmental Plan 2012. The remainder of the property on the north and east of the lot is covered by the RU1 Primary Production zoning. All works associated with the proposed development are to be contained within the project area inside the area zoned IN1. The site can be accessed from Fairey Road.

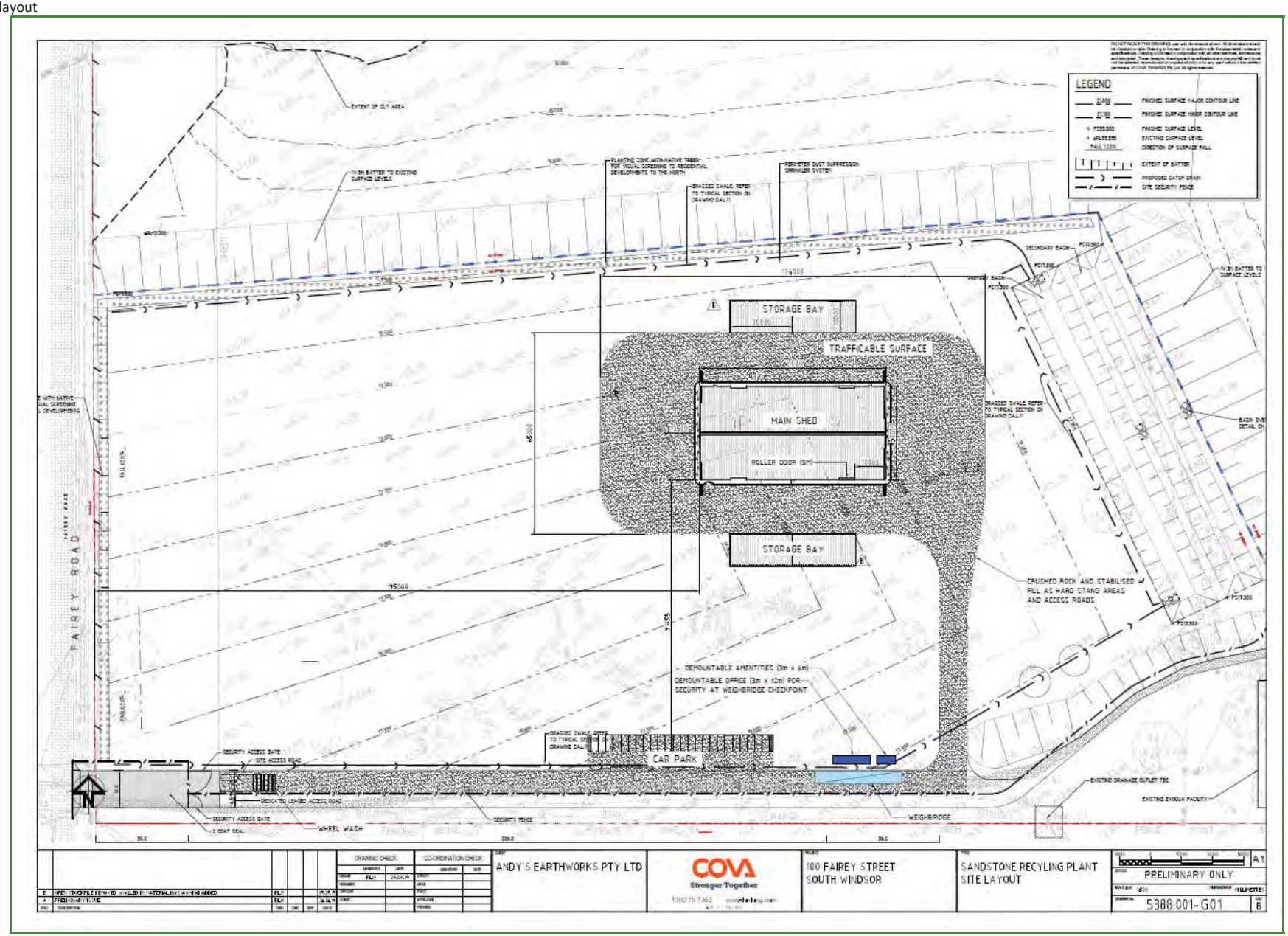
To the south and west of the site are industrial properties, which are also covered by the IN1 General Industrial zoning. To the immediate north and east of the site are rural lands covered by the RU1 Primary production zoning. The eastern edge of the site falls away into South Creek.

The nearest residential receivers to the site are located to the south west off Beasley Place in South Windsor, and to the north east off James Meehan Street in Windsor.

The site consists predominantly of cleared land that was previously used for agricultural and farming purposes. A microfiltration and research facility operated by Evoqua exists on the site within a building located toward the middle of the southern area of the site.

The site layout is shown in the Figure 2-4.

Figure 2-4: Site layout



2.3 PROPOSED DEVELOPMENT

The proposed facility will receive, handle and process up to 98,000 tonnes of materials per year of construction and demolition (C&D) waste including recycled crushed concrete, brick, tiles, excavated rock products, VENM and ENM. This material will be transported via tipper trucks from quarries, excavations and demolitions sites in Western Sydney. Waste would be stored in external covered storage bays and processed inside a purpose built building on site.

2.3.1 Processing Operations

The operation of the facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of recycled crushed concrete, brick and excavated rock products within the building; and
- Material storage in external covered storage bays.

Waste would be transported to and from the site within a combination of semi-trailers and trucks with dog trailers, each with an approximate capacity of 30 tonnes.

There would be one Concrete Jaw Crusher Komatsu BR380JG-1 or similar for the crushing operations and a triple deck screen for the separation and sizing of crushed materials. These would operate within a purpose built building. A 25 tonne excavator and front end loader would be used for transfer and stockpiling of materials.

Processed materials would be stored in external covered storage bays on the site. Vegetation would be planted along the western and northern borders of the site to minimise dust and provide a visual screen of the operations from residential areas.

A weighbridge will be located on the access road in close proximity of the site entrance to weigh all incoming and outgoing loads. A closed-loop wheel wash will be installed immediately beyond the weighbridge for washing the wheels of trucks entering and exiting the property. Water used in the wheel wash will be recycled and reused within the system.

Final processed product would be sold to recycling facilities for further processing or to facilities for reuse as aggregates for road base projects or as a binder in composite material.

A small office and amenities building would be constructed.

No demolition is required.

2.3.2 Hours of Operation

The proposed hours of operation for the site are 7.00am to 6.00pm during Monday to Friday and 7.00am to 1.00pm on Saturdays.

2.3.3 Waste Streams

The waste streams to be accepted at the site would consist of construction and demolition (C&D) wastes and be sourced from quarries, excavations and demolitions sites in Western Sydney. Up to 98,000 tonnes of this waste would be processed at the site per year.

Maximum daily quantity of waste processed is estimated to be 500 tonnes. Maximum weekly quantity of waste processed is estimated to be 2,500 tonnes. However, average daily and weekly tonnages processed would vary depending upon demand.

An incoming waste inspection procedure would be implemented at the site and addresses how the receipt of non-conforming waste would be dealt with. Further details are provided in Section 4.2.

2.3.4 Waste Storage Bays

Waste would be stored in external covered storage bays at the site. These are shown on the site plan and would be located to the north and south of the proposed building. The storage bays would be enclosed on three (3) sides with walls and covered with an 8m high awning. The maximum height of the stockpiles within the external storage bays would be up to 7m.

Vegetation along the western and northern site boundaries would provide a visual screen so that storage areas are barely visible from residential areas. A perimeter dust suppression sprinkler system would be installed along with mobile water sprays on the storage bays that would be used for dust suppression purposes. Any sediment laden stormwater runoff would be managed via drainage channels and an on-site detention system consisting of primary and secondary basins.

2.3.5 Water Management

Water use would include use of mains water and rainwater captured within the sediment detention basins. Mains water would be used in office and amenities, and replenishment of the wheel wash when required. Mains water and rainwater would be used for dust suppression and landscaping purposes.

Dust suppression would consist of water sprays/water cannon that provide a mist to adequately dampen materials and working areas. This would be a fine mist that would be switched off once materials are damp. Therefore no excess water runoff would be generated.

The potential for release of sediments would be controlled using drainage channels and an on-site sediment detention system shown on the site plan.

3. WASTE GENERATION AND MANAGEMENT

The following sections list and describe the expected wastes associated with construction and ongoing use of the site, as well as the waste management proposed. This information is similarly presented in the Waste Management Plan completed for Hawkesbury City Council as a requirement of the DA process, and is provided in Attachment 1. All waste described have been classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014).

3.1 DEMOLITION WASTE

No demolition is required for the proposed development. Existing infrastructure will remain.

3.2 CONSTRUCTION WASTE

Construction activities will include:

- Levelling of the land by cut and fill;
- Stabilising the area using road base material;
- Establishment of sediment basins, drainage channels and stormwater management controls;
- Planting of vegetation;
- Construction of external covered storage bays;
- Construction of a purpose built building for operations to take place;
- Installation of small demountable buildings for use as office and amenities; and
- Installation of mains water storage tanks, weighbridge, wheel wash facilities and mobile water sprays for dust suppression.

The type, quantity and fate of wastes expected to be generated during construction activities are outlined in the following table.

Table 3-1: Construction Waste

Waste Type	Estimated Quantity Generated	EPA Waste Classification	Proposed Management
Excavated Material	0 – 10 m^3	TBA	Any excess excavated material would be used for fill and to establish earth berms at the boundaries of the site. Any excess material would be sent off site for recycling to landscaping suppliers and composting facilities.
Greenwaste	<1 m^3	General solid waste (putrescible)	Reused on site Mulched for reuse for establishment of vegetated areas of the site.
Bricks	0	General solid waste (non-putrescible)	N/A

Table 3-1: Construction Waste

Waste Type	Estimated Quantity Generated	EPA Waste Classification	Proposed Management
Concrete	90 m^3	General solid waste (non-putrescible)	Re-used onsite/recycled offsite Concrete will be crushed and re-used as fill material. Residual concrete will be recycled offsite by a licensed waste recovery facility.
Timber (Pallets, board finishes)	5 tonne	General solid waste (non-putrescible)	Recycled offsite Timber will be sent offsite for recycling to landscaping suppliers and composting facilities.
Plasterboard	0	General solid waste (non-putrescible)	N/A
Metals (Copper, aluminium)	2 - 3 tonnes	General solid waste (non-putrescible)	Recycled offsite To be re-used or recycled offsite by recycling facility.
Other wastes (Electrical fittings, PVC Plastic, etc.)	0.5 tonne	Expected to be General solid waste (non-putrescible)	Recycled offsite/Landfill To be re-used or recycled offsite where possible, otherwise sent to landfill for disposal.

3.3 ONGOING WASTE

Day to day operations at the proposed construction and demolition recycling facility will involve acceptance of incoming C&D waste material for processing and may result in the generation of some waste that requires disposal or reuse off site. Therefore the incoming waste and waste generation has been separated into two sections:

- On-going waste – operational for waste that is expected to be generated on site; and
- On-going waste – business line for incoming waste and how this will be managed on site.

3.3.1.1 Ongoing Waste – Operational

The expected type, quantity and fate of wastes are outlined in the following table.

Waste Type	Estimated Quantity Generated	EPA Waste Classification	Proposed Management
General waste from office and amenities (including kitchen scraps)	6 tonnes per year	General solid waste (putrescible)	Disposed offsite Stored in a designated general waste bin and collected by a waste contractor appointed by Council.

Waste Type	Estimated Quantity Generated	EPA Waste Classification	Proposed Management
Recyclable general waste from office and amenities (i.e. paper and cardboard)	4 tonnes per year	General solid waste (non-putrescible)	Recycled offsite Stored in a designated recycling waste bins and collected for recycling by a waste contractor appointed by Council.

3.3.1.2 Ongoing Waste – Business Line

The purpose of the proposed facility is to accept a variety of wastes from the C&D sector for processing and reuse. Generally, batches of mixed C&D waste would be received on site and then sorted into the following categories: bricks, concrete, timber, glass, metal, and general waste, which is the residual waste from the sorting process.

The expected type, quantity, onsite management and offsite fate of these wastes are outlined in the following table. The expected quantity is a gross estimation based on current experience of similar projects. In fact, the quantity for each waste type will vary significantly depending on the source that generated the waste.

Table 3-2: Ongoing Waste – Business Line

Waste Type	Estimated Incoming Quantity	Estimated Waste Generation (tonnes)	EPA Waste Classification	Management
Mixed C&D Waste (including VENM & ENM)	98,000 tonnes per year	0	General Solid Waste (Non-putrescible)	This waste is the incoming material processed on site the majority of which is turned into usable product for reuse off site.
Timber	N/A	2,100 tonnes per year	General solid waste (non-putrescible)	Timber is sorted from mixed C&D waste and stored until transfer offsite for further processing by a licensed recycling facility.
Glass	N/A	25 tonnes per year	General solid waste (non-putrescible)	Glass is sorted from mixed C&D waste, stored until transfer offsite for further processing by a licensed recycling facility.
Metal	N/A	230 tonnes per year	General solid waste (non-putrescible)	Metal is sorted from mixed C&D waste, stored until transfer offsite for further processing by a licensed recycling facility.

Table 3-2: Ongoing Waste – Business Line

Waste Type	Estimated Incoming Quantity	Estimated Waste Generation (tonnes)	EPA Waste Classification	Management
Residual general waste	N/A	2,500 tonnes per year	*Expected to be* General solid waste (non-putrescible)	Residual C&D waste that cannot be recovered from the sorting process would be stored in skip bins until collection by a licensed waste contractor for final disposal offsite.
Wheel wash residual waste	N/A	1-2 tonnes per year	Liquid waste	Residual waste from the wheel wash may be generated from time to time. Any sediment removed during regular maintenance would be removed periodically by a licensed waste contractor for final disposal offsite.

4. WASTE MANAGEMENT

The main waste type generated as a result of the proposed development during construction and ongoing operations would be General solid waste (non-putrescible), together with minor quantities of General solid waste (putrescible). The main waste type accepted on site would be General solid waste (non-putrescible).

All expected wastes generated during construction works to be undertaken at the subject site will be either re-used on site or recycled/re-used offsite at licensed waste management facilities. Waste would be segregated on site into storage bays if needed for excavated material and green waste, and into designated industrial sized waste bins for all other materials.

An *unexpected finds protocol* would provide instruction on what to do in the event that suspect materials are encountered during any stage of earthworks, site preparation and construction. Details are provided in Section 4.1.

Ongoing operational waste such as general office and amenities waste, as well as recyclable kitchen waste and office paper will be stored, until collection by waste contractors, in standard bins for general waste and recycling waste.

The recovered and processed wastes will be stored in external covered storage bays until transfer to recycling facility for further processing. Crushed rocks, bricks and concrete would be re-used as road base or as a binder in composite materials for use in construction. Any waste that is not suitable for resource recovery will be collected by licensed waste contractor for final disposal to landfill.

Waste resulting from the wheel wash during regular maintenance would be collected by a licensed waste contractor for final disposal to landfill.

Overall, waste management practices to be implemented at the subject site are considered adequate and, if undertaken correctly, would ensure that the proposed development is compliant with the *Protection of the Environment Operations Act 1997*, in particular, it will not wilfully or negligently dispose of waste in a manner that harms or is likely to harm the environment (Section 115); and will not transport waste to a place that cannot lawfully be used as a waste facility for that waste, or cause or permit waste to be so transported (Section 143).

Furthermore, the on site management of waste would continue to be improved through the implementation of an Environmental Management Plan (EMP). The site's EMP would include an *incoming waste inspection procedure*, to confirm the type of C&D wastes arriving on site and to deal with any non-conforming wastes. This procedure would be implemented from the first load accepted at the facility. Details are provided in Section 4.2.

Additional recommendations for best practice waste management include the option of undertaking regular waste audits via workplace inspections. Voluntary audits would assist in ensuring that wastes are appropriately segregated, housekeeping and storage is adequate, and that records of waste management, transport and disposal are up to date and accurate.

A Waste Management Plan is required to be completed as part of the Hawkesbury City Council development application process and is provided as Attachment 1.

4.1 UNEXPECTED FINDS PROTOCOL

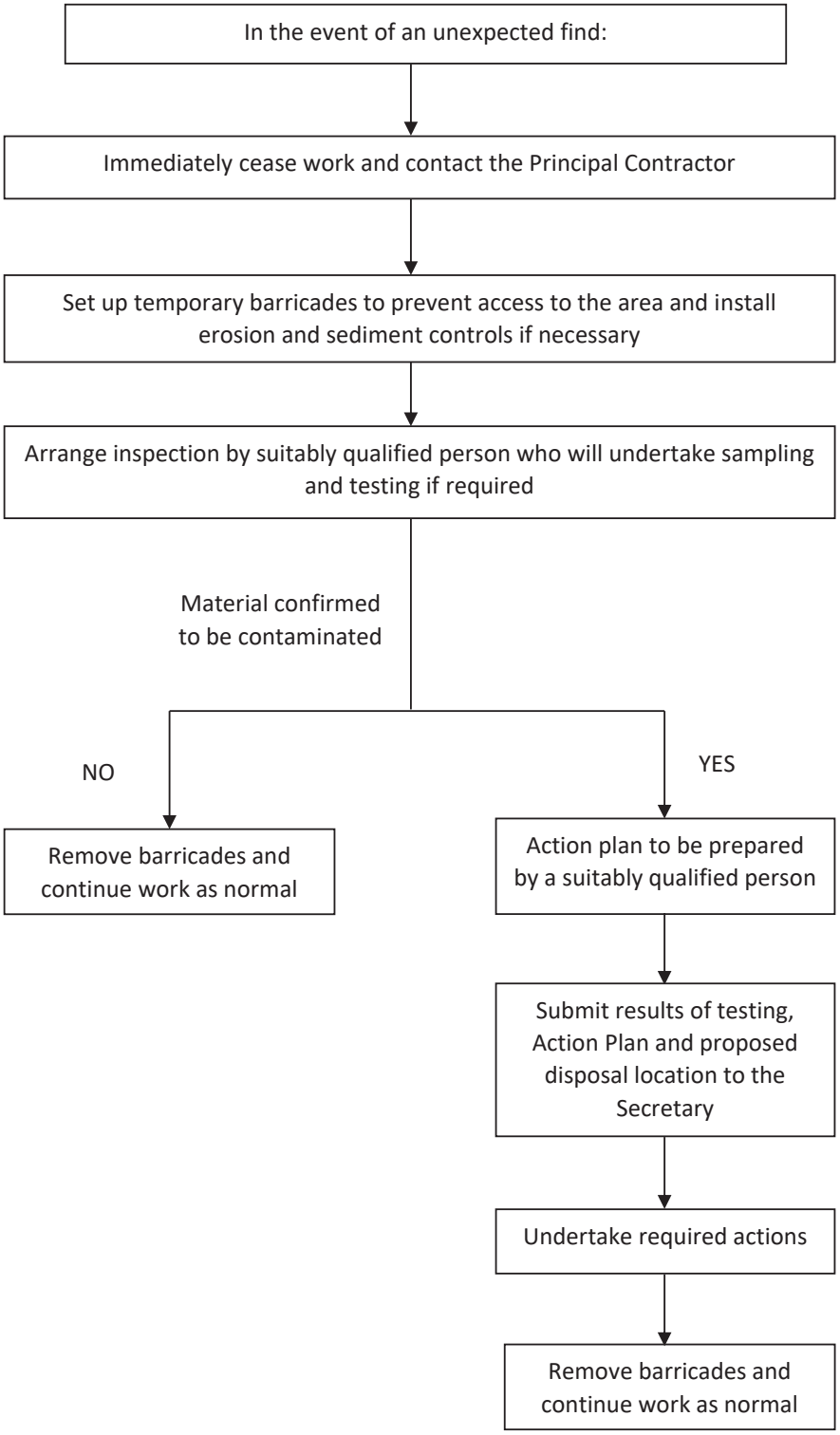
This section provides an example unexpected finds protocol that would be implemented at the site to ensure any unexpected finds during the site preparation and construction are dealt with appropriately.

An unexpected find includes:

> *Suspect materials identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos, ash material, animal material etc.*

If such material is encountered at any stage of earthworks, site preparation, construction then such works must cease immediately.

As a precautionary measure to ensure the protection of site workers and contractors and the occupants of nearby land, should an unexpected find be encountered, the procedure below needs to be followed.



4.2 INCOMING WASTE INSPECTION

The following provides an example of an incoming waste inspection procedure. For the purposes of this procedure, the following definitions for acceptable wastes and suspect material are used:

Acceptable wastes

Acceptable wastes include mixed inert building and demolition (C&D) waste including a combination of the following materials:

- Bricks;
- Concrete;
- Timber;
- Glass;
- Metal;
- Crushed rock;
- Virgin excavated natural material;
- Excavated natural material; and
- Other (general waste which can include small quantities of excavated materials such as waste asphalt, plasterboard and vegetation)

Suspect material / Not accepted

Any unexpected or non-conforming wastes such as:

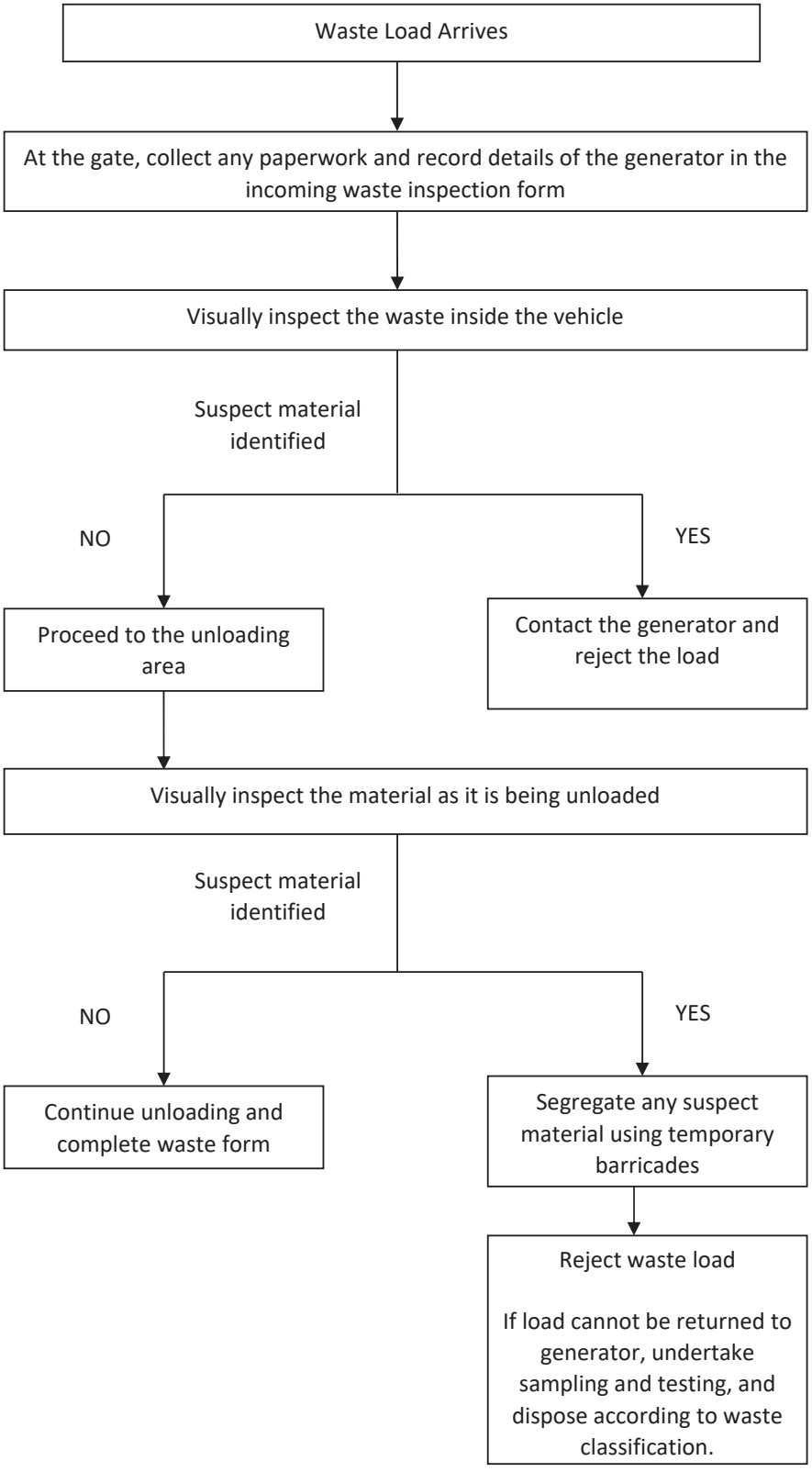
- Hazardous wastes;
- Drums of chemicals;
- Asbestos;
- Contaminated soil;
- Full loads of excavated soil and rock above and beyond small quantities mixed in with C&D waste;
- White goods, appliances; and
- Any of the above mixed with accepted waste types.

The incoming load inspection flowchart provided on the following page should be implemented.

Upon the finding of suspect material and rejection of a load, if the load cannot be returned to the generator, the following actions are required:

- Secure the material using temporary barricades;
- Contact waste contractor or suitably qualified consultant to undertake sampling and testing of the material in accordance with regulatory guidelines to determine the appropriate waste classification; and
- Once the waste classification for the material is known, dispose of this lawfully using a licensed waste contractor.

INCOMING LOAD INSPECTION:



5. CONCLUDING REMARKS

This report provides a Waste Management Assessment (WMA) for the proposed construction and demolition recycling facility to be located at 100 Fairey Road, South Windsor NSW 2756. Waste generated would be approximately 5% of the materials proposed to be processed and stored at the site. The main waste type to be handled on site is general solid (non-putrescible) waste. No hazardous waste would be accepted.

The assessment was conducted in accordance with the following guidelines and legislation: the *Waste Classification Guidelines – Part 1: Classification of waste* (NSW EPA, 2014), *Protection of the Environment Operations Act 1997*, *Protection of the Environment Operations (Waste) Regulation 2014* and *Waste Avoidance and Resource Recovery Act 2001*.

The proposed development would implement mitigation measures to ensure that waste receipt, handling and storage activities are undertaken with minimal impact to the surrounding environment. These include a vegetated buffer along the western and northern boundary, dust suppression for stored materials, recirculating truck wheel wash system, an on-site stormwater detention system, an unexpected finds protocol and incoming waste inspection procedure.

As demonstrated in this report, proposed development is considered to be consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21.*

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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

ATTACHMENTS

Attachment 1: Waste Management Plan

Hawkesbury City Council

366 George Street (PO Box 146) Windsor NSW 2756 DX 8601 WINDSOR
Phone: (02) 4560 4444 Facsimile: (02) 4587 7740 Email: council@hawkesbury.nsw.gov.au

waste management plan

demolition, construction and use of a premises

The applicable sections of this table must be completed and submitted with your development application.

The information provided on this form (and on your plans) will be assessed against the provisions of the Management of Construction and Demolition Waste chapter of the Hawkesbury Development Control Plan.

Should the space provided in this form be insufficient, please attach additional details.

Outline of the Proposal

Site Address	100 Fairey Road, South Windsor
Name of Applicant	Andy's Earthworks Pty Ltd
Applicant Address	1 Puttand Place, Vineyard NSW 2746

Phone		Mobile	0418472 968
Fax			

Buildings and other structures currently on the site

The site is predominantly cleared land with an access road entry from Fairey Road along the southern boundary. There is a shed located along this access road which is used by Evoqua for microfiltration and research purposes.

Description of proposal

The development as proposed, is for the establishment of a facility which will receive, and handle and process mixed construction and demolition waste and sort this into individual stream products for reuse. It is proposed that the site would process up to 98,000 tonnes per annum of construction and demolition waste that includes virgin excavated natural material (VENM) and excavated natural material (ENM).

Applicant's signature _____ Date _____

Hawkesbury City Council

Section 1: Demolition				
Materials		**Destination**		
		Re-Use and Recycling		**Disposal**
Material	**Estimated Volume (m^2 or m^3)**	**On-Site Specify proposed Re-Use or On- Site**	**Off-Site Specify Contractor and Recycling Outlet**	**Specify Contractor and Landfill Site**
Excavation Material	NA	NA	NA	NA
Green Waste	NA	NA	NA	NA
Bricks	NA	NA	NA	NA
Concrete	NA	NA	NA	NA
Timber What kind?	NA	NA	NA	NA
Plasterboard	NA	NA	NA	NA
Metals What kind?	NA	NA	NA	NA
Other	NA	NA	NA	NA

Note: Details of on-site waste management should be provided on the plans accompanying your application (ie - location of on-site storage areas/containers, vehicular access point)

Hawkesbury City Council

Section 2: Construction				
Materials		**Destination**		
		Re-Use and Recycling		**Disposal**
Materials	**Estimated Volume (m^2 or m^3)**	**On-Site Specify proposed Re-Use or On-Site Recycling**	**Off-Site Specify Contractor and Recycling Outlet**	**Specify Contract or and Landfill Site**
Excavation Material	0 – 10 m^3	Excavated material would be used for fill and to establish earth berms at the boundaries of the site.	Any excess material would be sent off site for recycling to landscaping suppliers and composting facilities.	
Green Waste	<1m^3	Mulched for reuse for establishment of vegetated areas of the site.		
Bricks	0	N/A	N/A	
Concrete	90 m^3	Concrete will be crushed and re-used as fill material.	Residual concrete will be recycled offsite by a licensed waste recovery facility.	
Timber What Kind? Pallets, board finishes)	1 tonne		Timber will be sent offsite for recycling to landscaping suppliers and composting facilities.	
Plasterboard	0			
Metals What Kind? (Copper, Aluminium)	2-3 tonne		To be re-used or recycled offsite by recycling facility.	
Other (Electrical fittings, PVC Plastic, etc.)	0.5 tonne		To be re-used or recycled offsite where possible, otherwise sent to landfill for disposal.	

Note: Details of on-site waste management should be provided on the plans accompanying your application (ie - location of on-site storage areas/containers, vehicular access point)

Section 3: On-going use of a premise

Type of waste to be generated	Expected volume (per	Proposed on-site storage and treatment	Destination
General waste from office and amenities (including kitchen scraps)	125 L per week	Stored in a designated general 250 L wheelie bin	Collected by a waste contractor appointed by Council for disposal to Hawkesbury City Waste Management Facility.
Recyclable office waste (i.e. paper and cardboard)	100 L per week	Stored in a designated recycling wheelie bin	Collected by a waste contractor appointed by Council for recycling at Hawkesbury City Waste Management Facility.
Residual general waste	50 tonnes per week	2 x 12 m^3 skip bins or 1 x 20 m^3 skip bin on site	Collected by a licensed waste contractor for final disposal to landfill.
Wheel wash residual waste	50 kg per week	A recirculating truck wheel wash would generate sludge that would be removed intermittently during regular maintenance of the system.	Removed by a licensed waste contractor such as Cleanaway.

Note: Attach plans showing the location of waste storage and collection areas, and access routes for tenants and collection vehicles.

Section 4: On-going management of a premise

Describe how you intend to ensure the on-going management of waste on-site. (eg: lease conditions, caretaker/manager on-site)

The on-going management of waste on site is described in detail in the waste management assessment report prepared by Benbow Environmental (Ref: 181025_Waste_Rep_Rev3). In summary, incoming waste would be subject to an inspection procedure to ensure that non-complying wastes are not accepted. A weighbridge would be installed to ensure quantities of incoming and outgoing waste and other material are recorded. Waste would be stored in designated storage bays on site or within enclosed waste skip bins and mitigation measures for materials in storage bays include dust suppression system, vegetated earth berm and an on-site sediment detention system.

EIS Appendix 2: Environmental Risk Assessment, Benbow Environmental

ENVIRONMENTAL RISK ASSESSMENT
PREPARED FOR
ANDY'S EARTHWORKS PTY LTD
100 FAIREY ROAD, SOUTH WINDSOR NSW

Prepared for: Andy's Earthworks Pty Ltd
MacroPlan Dimasi

Prepared by: Emma Hansma, Senior Engineer
R T Benbow, Principal Consultant

Report No: 181025_ERA_Rev3
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(Released: 11 September 2019)

Benbow ENVIRONMENTAL

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1. INTRODUCTION

This report presents the results of an Environmental Risk Assessment (ERA) for the proposed construction materials processing and recycling facility located at 100 Fairey Road, South Windsor NSW 2756.

Andy's Earthworks propose to receive, handle and process up to 98,000 tonnes of construction and demolition (C&D) materials per year. This includes virgin excavated natural material (VENM) and excavated natural material (ENM).

The ERA includes a preliminary risk screening in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2001).

The ERA assesses the potential hazards to the environment from activities proposed to occur on-site. The ERA follows the principles established in the following standards and guidelines:

- AS/NZS ISO 31000:2009 *Risk management –Principles and guidelines*;
- SA/SNZ HB 436:2013 *Risk management guidelines* – Companion to AS/NZS ISO 31000:2009; and
- HB 203:2012 – *Managing Environment-Related Risk*.

The purpose of the ERA is to identify major risks associated with the proposed site's activities and ensure that adequate safeguards are in place to protect the health and safety of workers, surrounding businesses and the environment. Impacts on organisations and communities from environment related matters are also considered.

1.1 SCOPE OF WORKS

The scope of this report extends to the following:

- Present details of the site, proposed site activities and surrounding area;
- Examine the details and properties of the raw materials and finished goods of the proposed facility;
- Conduct a preliminary risk screening in accordance with SEPP 33;
- Determine the potential effects of the site's proposed activities on the environment;
- Undertake a qualitative risk assessment. This is conducted by assessing proposed controls to be implemented at the site, identifying additional controls and assessing any residual risks. Present the findings of this as a Hazard and Risk Register; and
- Prepare a report which presents the above, the risk assessment methodology, hazard and risk register, major risk issues and any additional recommendations as found necessary.

2. SITE DETAILS AND EXISTING ACTIVITIES

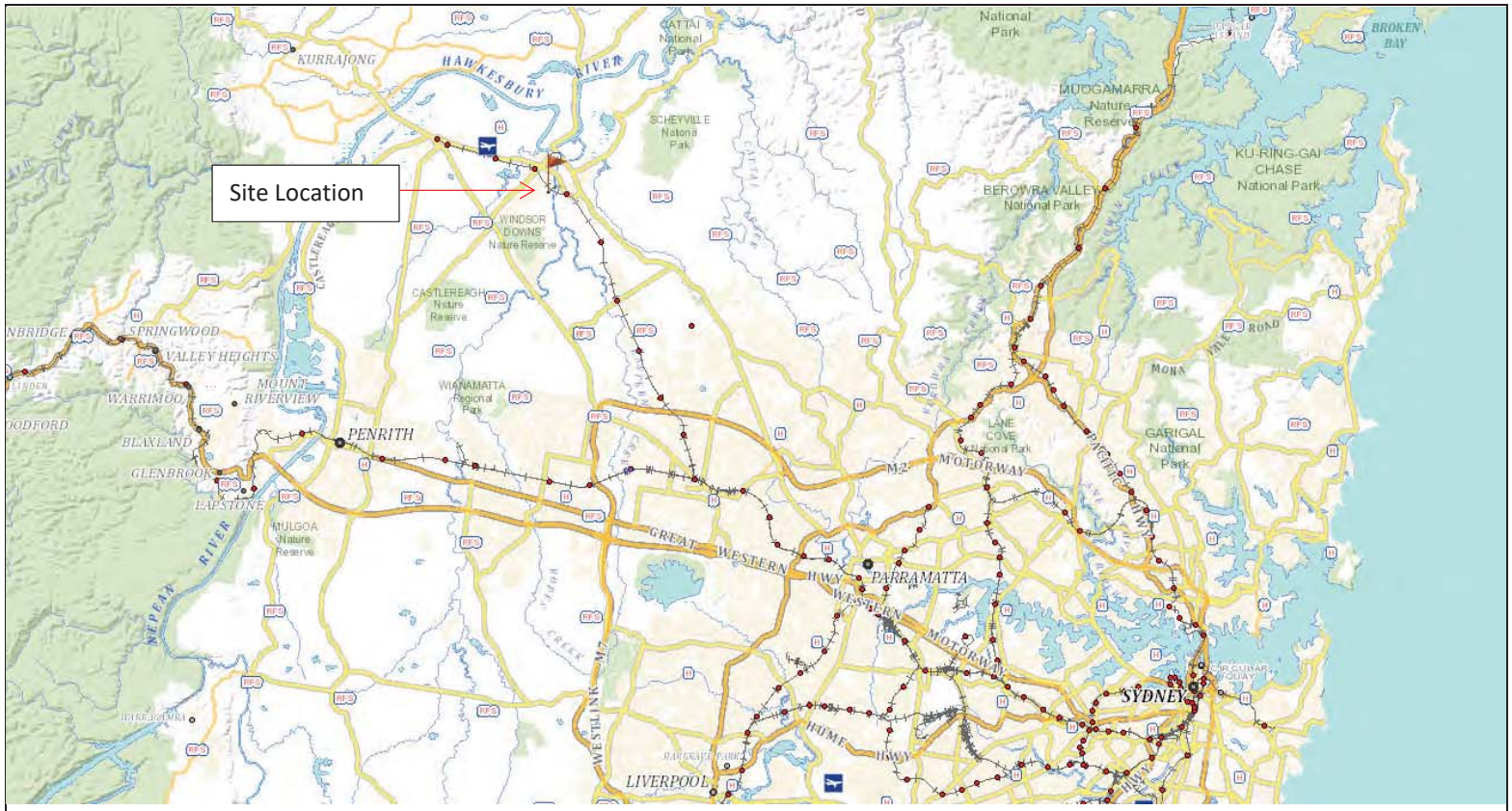
This section presents the site location, description of the site and surrounds and a description of the proposed activities to be undertaken at the site.

2.1 SITE LOCATION

The land is located 100 Fairey Road, South Windsor NSW 2756, also known as Lot 4 DP264159. The site is located within the Hawkesbury City Council Local Government Area.

Figure 2-1 shows the location of the proposed site in a regional context. Figure 2-2 shows an aerial photograph of the local area. Figure 2-3 shows an aerial photograph of the site.

Figure 2-1: Site Location in a Regional Context



Source: Six MAPS, 2017

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

Figure 2-2: Aerial Photograph of the Local area

Source: Six MAPS 2017

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

Figure 2-3: Aerial of the Site

Source: Six MAPS 2017

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

2.2 DESCRIPTION OF THE SITE AND SURROUNDINGS

The proposed facility will be located at 100 Fairey Road, South Windsor NSW 2756.

The 100 Fairey Road property has two zonings. The south west corner of the site is covered by the IN1 General Industrial zoning under the Hawkesbury Local Environmental Plan 2012. The remainder of the property on the north and east of the lot is covered by the RU1 Primary Production zoning. All works associated with the proposed development are to be contained within the project area inside the area zoned IN1. The site can be accessed from Fairey Road.

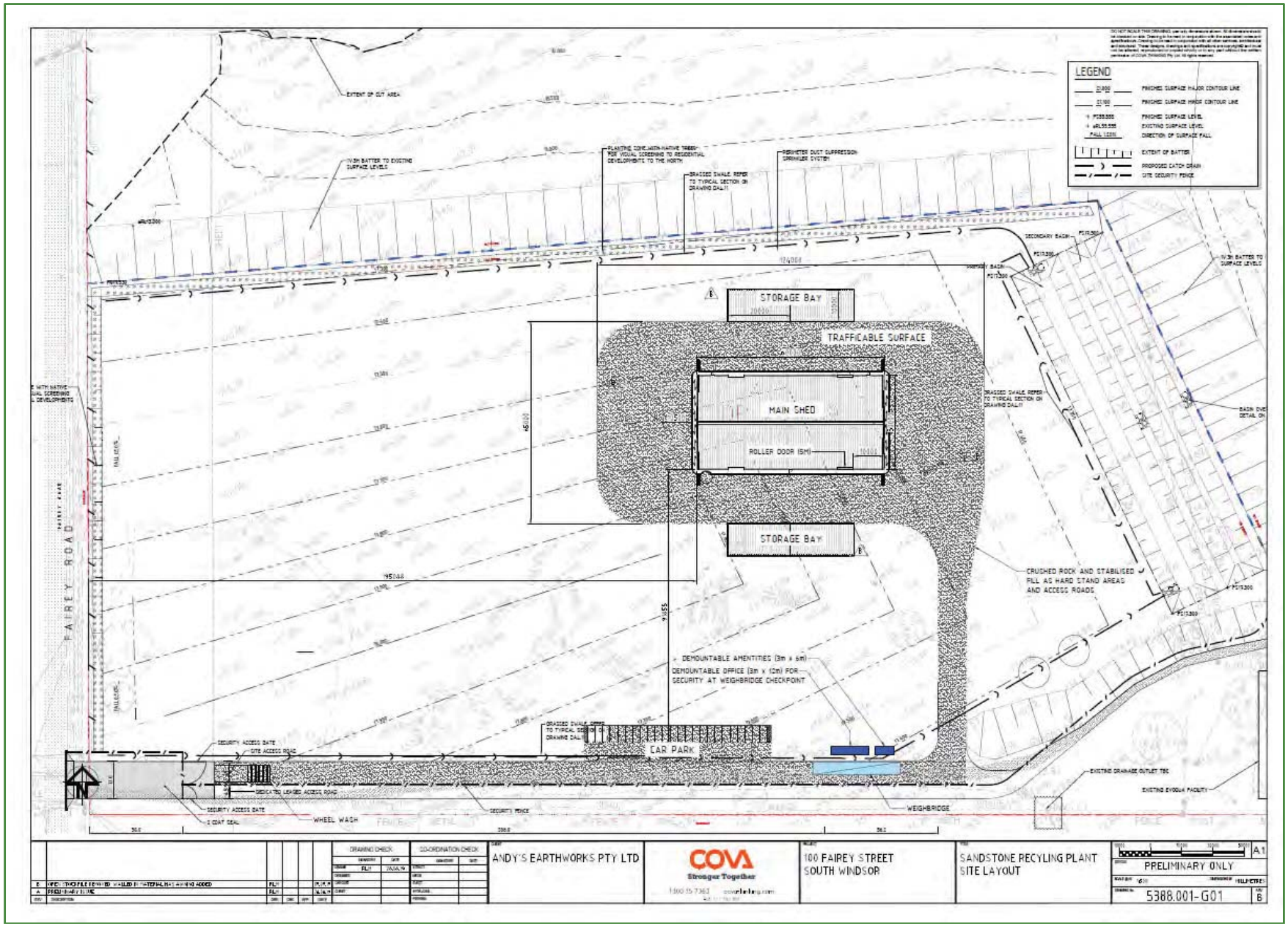
To the south and west of the site are industrial properties, which are also covered by the IN1 General Industrial zoning. To the immediate north and east of the site are rural lands covered by the RU1 Primary production zoning. The eastern edge of the site falls away into South Creek.

The nearest residential receivers to the site are located to the south west off Beasley Place in South Windsor, and to the north east off James Meehan Street in Windsor.

A drive way composing of compacted road base material runs along the southern boundary to half way along the site. Evoqua Water Technologies research facility is currently located on the site where they use the water from the stream to test their micro-filtration systems. There are two caravans opposite Evoqua where a groundskeeper resides. Adjacent to this are a few shipping containers and empty water tanks and chemical storage containers. There is evidence that the rest of the land is used as paddocks for cattle, but they are currently not occupied.

The site layout is shown in the Figure 2-4.

Figure 2-4: Site layout



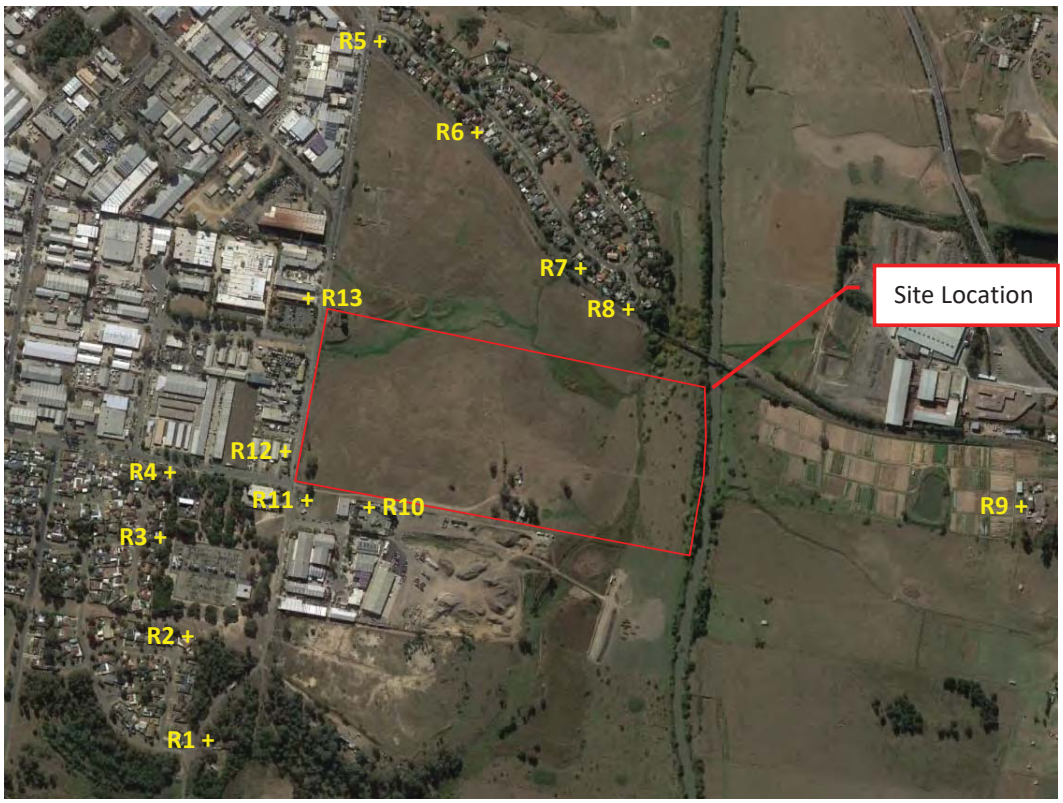
2.3 NEAREST SENSITIVE RECEPTORS

Table 2-1 lists the location of representative potentially affected receivers that are considered in this assessment. These are shown in Figure 2-5.

Table 2-1: Nearest Potentially Affected Receptors

Receptor ID	Address	Lot	DP	Separation distance	Type of receiver
R1	180 Fairey Road, South Windsor	28	861506	600 m	Residential
R2	18 Hale Crescent, South Windsor	85	263057	500 m	Residential
R3	10 Beasley Place, South Windsor	48	263057	430 m	Residential
R4	153 Ham Street, South Windsor	24	263057	370 m	Residential
R5	2 James Meehan Street	76	238572	690 m	Residential
R6	30 James Meehan Street	62	238572	550 m	Residential
R7	64 James Meehan Street	23	246385	480 m	Residential
R8	6 Chisholm Place, South Windsor	17	246385	500 m	Residential
R9	124 Mulgrave Road, Mulgrave	13	736138	1100 m	Residential
R10	4 Speedwell Place, South Windsor	1	828534	Adjacent	Industrial Premises
R11	1 Speedwell Place, South Windsor	16	806993	Adjacent	Industrial Premises
R12	128 Ham Street, South Windsor	Null	SP33235	Adjacent	Industrial Premises
R13	97 Fairey Road, South Windsor	36	263025	300 m	Industrial Premises

Figure 2-5: Location of Nearest Potentially Affected Receptors



Source: SIX Maps 2018

N Not to scale	**LEGEND**: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

2.4 SITE ACTIVITIES

The proposed facility will receive, handle and process up to 98,000 tonnes of construction and demolition (C&D) waste per year including recycled crushed concrete, brick, tiles and excavated rock products. This material will be transported via tipper trucks from quarries, excavations and demolitions sites in Western Sydney.

The operation of the facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of recycled crushed concrete, brick and excavated rock products; and
- Material storage in stockpiles.

Processed materials would be stored in stockpiles on the site.

The crushing and screening operations would take place within a purpose built building. A weighbridge will be located on the access road to weigh all incoming and outgoing loads. A closed-loop wheel wash will be installed immediately beyond the weighbridge for washing the wheels of trucks entering and exiting the property. Water used in the wheel wash will be recycled and reused within the system.

A small office and amenities buildings would be constructed.

2.4.1 Chemicals and Dangerous Goods

The mobile vehicles and machinery used on site will be refuelled by a tanker. All mobile vehicles and machinery will be serviced by contractors who will bring their own chemicals including lubricant and hydraulic oils. Only water will be used in the wheel wash. No chemicals will be stored on site.

2.4.2 Water Management and Use

Water use would include use of mains water and rainwater captured in within the sediment detention basins. Mains water would be used in office and amenities, and replenishment of the wheel wash when required. Mains water and rainwater would be used for dust suppression and landscaping purposes.

Dust suppression would consist of water sprays/water cannon that provide a mist to adequately dampen stockpiles and working areas. This would be a fine mist that would be switched off once stockpiles are damp. Therefore no excess water runoff would be generated.

The potential for release of sediments in stormwater runoff would be controlled using drainage channels and an on-site sediment detention system, as shown in the site plans.

2.4.3 Hours of Operation

The proposed hours of operation for the site are 7.00am to 6.00pm during Monday to Friday and 7.00am to 1.00pm on Saturdays.

3. PRELIMINARY RISK SCREENING – SEPP33

The chemicals stored on site are presented in Table 3-1.

A preliminary risk screening of the proposed development in accordance with State Environment Planning Policy No. 33 – Hazardous and Offensive Development has been undertaken with results provided below.

Table 3-1: Comparison of Screening Threshold Quantities by SEPP 33

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored based on separation distances	Triggers SEPP33
Class 1.2	5 tonne	Explosives	None on site	None	No
Class 1.3	10 tonne	Explosives	None on site	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	(LPG only – Not including auto retail outlets) Flammable Gases	None on site	None	**No**
Class 2.2	Not Relevant	Not relevant	Not relevant	None	Not relevant
Combustible Liquid C1	**Not relevant**	**Combustible liquid such as diesel**	**Minor quantities within mobile equipment/machinery**	**Minor Quantities**	**Not Applicable**
Combustible Liquid C2	Not relevant	Lubricating oils/hydraulic oils	None on site	None	Not Applicable
Class 2.3	5 tonne	Anhydrous ammonia, kept in the same manner as for liquefied flammable gases and not kept for sale	None on site	None	No
	1 tonne	Chlorine and sulphur dioxide stored as liquefied gas in contains <100 kg	None on site	None	No
	2.5 tonne	Chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg	None on site	None	No

Table 3-1: Comparison of Screening Threshold Quantities by SEPP 33

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored based on separation distances	Triggers SEPP33
	100 kg	Liquefied gas kept in or on premises	None on site	None	No
	100 kg	Other poisonous gases	None on site	None	No
Class 3	Assessed by reference to figures 8 & 9 of applying Sepp 33	Flammable liquids PG I, II and III	None on site	None	No
Class 4.1	5 tonne	Flammable Solids	None on site	None	No
Class 4.2	1 tonne	Reactive in the air	None on site	None	No
Class 4.3	1 tonne	Spontaneous combustion in contact with water	None on site	None	No
Class 5.1	25 tonne	Ammonium nitrate – high density fertiliser grade, kept on land zoned rural where rural industry is carried out, if the depot is at least 50 metres from the site boundary.	None on site	None	No
Class 5.1	5 tonne	Oxidising substances	None on site	None	No
Class 5.1	2.5 tonne	Dry pool chlorine – if at a dedicated pool supply shop, in containers <30 kg	None on site	None	No
Class 5.1	1 tonne	Dry pool chlorine – if at a dedicated pool supply shop, in containers >30 kg	None on site	None	No
Class 5.1	5 tonne	Any other Class 5.1	None on site	None	No
Class 5.2	10 tonne	Organic peroxide	None on site	None	No
Class 6.1 PG1	0.5 tonne	Toxic substances	None on site	None	No
Class 6.1 PGII & III	2.5 tonne	Toxic substances	None on site	None	No
Class 6.2	0.5 tonne	Includes clinical waste	None on site	None	No

Table 3-1: Comparison of Screening Threshold Quantities by SEPP 33

Class	Screening Threshold	Description	Site Specific Description	Quantity to be stored based on separation distances	Triggers SEPP33
Class 7	All	Should demonstrate compliance with Australian codes	None on site	None	No
Class 8 PGI	5 tonne	Corrosive substance	None on site	None	No
Class 8 PGII	25 tonne	Corrosive substance	None on site	None	No
Class 8 PGIII	50 tonne	Corrosive substance	None on site	Not relevant	No

As shown in the table, dangerous goods quantities would not exceed the SEPP 33 screening thresholds and therefore, SEPP 33 does not apply and a preliminary hazard analysis is not required.

4. ENVIRONMENTAL RISK ASSESSMENT

4.1 METHODOLOGY

The following methodology was used in assessing risks associated with the site's activities. A qualitative method was used and a review conducted of whether a quantitative assessment was required.

4.1.1 Hazard Identification

This is the first step in the risk assessment. It involves the identification of all theoretically possible hazardous events as the basis for further quantification and analysis. This does not in any way imply that the hazard identified or its theoretically possible impact will occur in practice. Essentially, it identifies the particular characteristics and nature of hazards to be further evaluated in order to quantify potential risks.

To identify hazards, a survey of operations was carried out to isolate the events which are outside normal operating conditions and which have the potential to impact outside the boundaries of the site. In accordance with the NSW Department of Planning's Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – *Guidelines for Hazard Analysis*, these events do not include occurrences that are a normal part of the operational cycles of the site but rather the atypical and abnormal, such as the occurrence of a significant liquid spill during product transfer operations.

4.1.2 Risk Criteria

The following sub-section defines the risk criteria used in this assessment.

4.1.2.1 Consequence Estimation

This aspect involves the analysis of events carried forward from the hazard identification process in order to quantify their potential on-site and off-site impacts. In this case, these events typically include fire and the potential effects on people, the environment, damage to property and the financial loss as a result of this damage.

Categories of consequences have been defined in terms of environmental, health and financial impacts and include the following:

Table 4-1: Consequence or Impact

Level	Descriptor	Description
1	Insignificant	Confined on-site environmental impacts able to be promptly rectified. No injuries. Financial loss less than $2,000
2	Minor	Confined environmental impacts requiring short term recovery with potentially little or no off-site impacts. First Aid treatment. Financial loss $2,000 to $20,000
3	Moderate	Confined environmental impacts requiring medium term recovery both on-site and off-site. Medical treatment required. Financial loss $20,000 to $200,000
4	Severe	Unconfined environmental impacts requiring long term recovery and leaving residual damage both on-site and off-site. Extensive injuries, loss of product capability. Financial loss $200,000 to $1M
5	Catastrophic	Widespread environmental impact requiring long term recovery and leaving major damage both on-site and off-site. Death. Financial loss more than $1M

4.1.2.2 Likelihood Estimation

This aspect involves determining how likely an event is to occur. Likelihood is the chance that something might happen and is defined for the purposes of this assessment in the following table.

Table 4-2: Likelihood

Level	Descriptor	Description
A	Almost Certain	Very likely. The event is expected to occur in most circumstances.
B	Likely	Strong possibility. The event will probably occur in most circumstances.
C	Possible	The event might occur at some time.
D	Unlikely	Not expected. There is a slight possibility the event could occur at some time.
E	Rare	Highly unlikely. The event may occur only in exceptional circumstances.

4.1.2.3 Level of Risk

The level of risk is defined by the following table.

Table 4-3: Level of Risk

Likelihood	Consequence					
		Insignificant 1	Minor 2	Moderate 3	Severe 4	Catastrophic 5
	A (almost certain)	III	II	I	I	I
	B (likely)	III	II	I	I	I
	C (possible)	III	II	II	I	I
	D (unlikely)	III	III	II	II	II
	E (rare)	III	III	III	II	II

The Class I area shown in red indicates a high level of risk which is intolerable and where risk reduction is required. This requires the reduction of frequency and/or consequence.

The Class II area shown in yellow indicates a moderate level of risk. Whilst the risk is not unacceptable, there should be practical measures taken to lower the risk if economically viable. For risks where further mitigation is not economically viable, judgment needs to be exercised as to whether the level of risk is acceptable or not. This area is the beginning of the "As Low as Reasonably Practicable" (ALARP) region which means that while risk of an accident may be tolerable, steps still need to be taken to reduce the risk level to as low as reasonably practicable. A risk that satisfies ALARP would be considered acceptable.

The Class III area shown in green indicates a low level of risk and is broadly considered to be acceptable. Further risk mitigation may not be required/appropriate. However, low and accepted risks should be monitored and routinely reviewed to ensure that they remain acceptable. Few risks remain static. This area includes ALARP as well as what are known as trivial or negligible risks.

5. RISK CHARACTERISATION & IDENTIFICATION

5.1.1 Identification of Hazards

HB 203–2012: Managing Environment-Related Risk defines a **risk source** as:

> *a tangible or intangible element that alone or in combination has the intrinsic potential to give rise to risk. It is thus an encompassing term that includes the terms 'hazard' (a source of potential harm) and 'environmental aspect'*

An **environmental aspect** could be *a "licensed discharge or emission, waste, or the consumption or reuse of a material. They could also involve noise, odour, light or vibration."*

The process of identifying hazards associated with the activities undertaken at the site was to firstly carry out a site inspection and a review of environmental documentation. The next step was a brainstorming session with a team of consultants to systematically break down each step in the process and identify environmental aspects and therefore potential hazards associated with each activity. These hazards were then divided into environmental risk areas of air, water, land, noise, chemicals and human health.

The results of this process are presented in Table 5-1.

Table 5-1: Identification of Hazards

Risk Source/Activity	Hazards	Risk Area
PROCESS: Aggregate Unloading and Storage		
Unloading of materials	Generation of dust emissions Generation of noise Accidental receipt of hazardous materials (e.g. asbestos)	AIR, HUMAN HEALTH, NOISE
Traffic movements	Noise from reversing beepers, engines	NOISE
	Tracking of sediment off site onto roads and into stormwater drains.	WATER
	Generation of dust.	AIR, HUMAN HEALTH
	Vehicle leakages of oil and fuel causing staining of surface	LAND, WATER
	Diesel consumption adding to air pollution load	AIR
Storage of materials in stockpiles	Excessive stockpile height resulting in release of dust emissions & causing sedimentation of waterways.	AIR, WATER, HUMAN HEALTH
	Sediment build up resulting in generation of dust particularly on windy days. Sedimentation of waterways from dust.	AIR, WATER, HUMAN HEALTH

Table 5-1: Identification of Hazards

Risk Source/Activity	Hazards	Risk Area
PROCESS: Sorting Using Excavator and Loader		
Excavator and Loader moving material	Generation of dust. Vehicle leakages of oil and fuel Tracking sediment around building. Sedimentation of waterways. Generation of noise, and high levels of impact noise	AIR LAND, WATER WATER NOISE
PROCESS: Crushing and Screening		
Movements of mobile crushing and screening equipment	Generation of dust emissions Generation of noise Vehicle leakages of oil and fuel causing surface water and groundwater contamination	AIR NOISE LAND, WATER
Crushing and screening of material	Generation of dust emissions Generation of noise Accidental crushing of hazardous materials (e.g. asbestos) particles polluting air & water	AIR, WATER, LAND, HUMAN HEALTH NOISE AIR, WATER, LAND, HUMAN HEALTH
PROCESS: Chemical Use		
Refueling of vehicles and equipment	Vehicle leakages of oil and fuel surface water and groundwater contamination	LAND, WATER
Maintenance of vehicles and equipment	Vehicle leakages of oil and fuel causing surface water and groundwater contamination	LAND, WATER
PROCESS: On-site Water Treatment and Use		
Surface water drainage using drainage channels	Failure of drainage channels resulting in sediment runoff	WATER
Surface water collection in detention basins	Failure of detention basins resulting in sediment runoff	WATER
Use of water mist for dust suppression	Excessive water use resulting in leachate/sediment runoff Water mist containing particulates/dust leaving premises and adding to the air pollution load	WATER AIR

Table 5-1: Identification of Hazards

Risk Source/Activity	Hazards	Risk Area
Use of wheel wash	Generation of wastewater and potential for contamination of water and land	LAND, WATER
PROCESS: General Plant Activities		
Car parking and yard areas	Leakages of oil and fuel causing staining, leading to land and water contamination	LAND, WATER
NATURAL DISASTERS		
Flood	Sediment and other material potentially overflowing the drainage system. Contamination of water and land. Potential sedimentation and contamination of stormwater system	WATER WATER
Severe Storm (including hail)	Sediment and other material potentially overflowing the drainage system. Contamination of water and land. Potential sedimentation and contamination of stormwater system	WATER WATER
Fire	Fire from offsite or onsite sources causing damage to property, human health and/or air pollution. Contaminated firefighting water. Contamination of water and land.	HUMAN HEALTH, AIR LAND, WATER

Analysis of the risks associated with the hazards identified above is presented in Section 6.

6. RISK ANALYSIS

The risk analysis was undertaken using the hazard identification table in Section 4.1.1 and the risk criteria established in Section 4.1.2. Risk assessment was undertaken firstly based on the proposed site activities and safeguards to determine the Existing Risk Rating. Additional safeguards were recommended to hazards that presented a high or medium risk (Risk Level Classes II and III) and an assessment of these hazards was undertaken to determine the residual risk.

The results are presented as a Hazard and Risk Register in Table 6-1.

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
1. AIR													
1	Generation and release of dust emissions	- Reduction in the local air quality and visibility; - Potential health effects on respiratory, cardiovascular systems, asthma and other health related issues - Ecological effects including impacts on plants, changes to soil chemistry and impacts on aquatic life if dust settles on nearby waterways. - Dust deposition on cars, buildings, within waterways and on other surfaces - Damage to vehicle surfaces and other equipment - Complaints from neighbouring properties	Unloading of material	Loads covered whilst unloading Dust suppression sprays Undertaken within building Environmental Management Procedures Vegetative buffer	Insignificant	Almost Certain	III	YES	Awareness signage within unloading area to instruct drivers to keep loads covered at all times	Insignificant	Almost Certain	III	YES
			Tracking of sediment by on-site traffic movements stirring up sediment in the yard areas	Wheel wash	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
			Movement of materials with excavator and loader	Undertaken within building Dust suppression sprays Environmental Management Procedures Vegetative buffer	Moderate	Rare	III	YES	None required	Moderate	Rare	III	YES
			Crushing and Screening	Undertaken within building Dust suppression sprays Environmental Management Procedures Vegetative buffer	Insignificant	Unlikely	III	YES	None required	Insignificant	Unlikely	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
		and the public	Loading of material into trucks	Undertaken within building Dust suppression sprays Environmental Management Procedures Vegetative buffer	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
2	Release of water mist containing dust	- Reduction in air quality and visibility within immediate area - Potential health effects of dust within water mist - Impacts on quality of local waterways and aquatic life within these waters	Use of water sprays for wetting down areas for dust suppression	Vegetative buffer	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
3	Release of products of combustion adding to air pollution load	- Reduction in local air quality and release of gases including carbon monoxide, a known greenhouse gas	Diesel consumption of on-site vehicles and trucks/tankers	Well maintained vehicles, regularly serviced	Insignificant	Likely	III	YES	None required	Insignificant	Likely	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
2. LAND													
4	Soil contamination and staining of surfaces due to release of materials, spills, leakages	-Fuel/oils/other chemicals could spill/leak onto ground (roadbase hardstand) and contaminate the soil. - Contamination of stormwater and nearby creeks - Potential health related impacts of exposure to contaminants within the land - Ecological effects including changes to soil chemistry, effects on plant growth and effects on aquatic life if contamination enters waterways	-Poorly managed refuelling activities -Vehicle/equipment maintenance -wheel wash liquid leakage	Regular inspections Experienced contractors to provide preventative maintenance Preventative maintenance schedule	Moderate	Rare	III	YES	None required	Moderate	Rare	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
5	Release of sediment resulting in pollution of land	- Sedimentation of nearby creeks - Contamination of land including changes to soil, effects on plants and aquatic life.	Sediment build up in yard Failure of sediment detention system	Sediment detention system Regular maintenance of Sediment detention system	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
3. WATER													
6	Sediment runoff resulting in pollution of water	- Poor housekeeping standards - Generation of dust resulting in reduced air quality - Sedimentation of nearby creeks - Complaints from neighbouring properties	Tracking of sediment offsite and into the stormwater system	Wheel wash Dust generating activities undertaken within building Sediment detention system Environmental Management Procedures	Minor	Unlikely	III	YES	None required	Insignificant	Possible	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
7	Deposition of dust on waterways	- Impacts on aquatic life - Reduction in water quality of local waterways - Sedimentation of local waterways	Generation of dust emissions from bulk storage of aggregates and unloading activities	Awareness signage within unloading area to instruct drivers to keep loads covered at all times Dust generating activities undertaken within building Use of water sprays for dust suppression Vegetative buffer	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
8	Chemical leaks and spills	- Contamination of soil, stormwater and nearby creeks - Potential health related impacts of exposure to chemicals - Effects on aquatic life if chemicals enter waterways	-Poorly managed refuelling activities -Vehicle/equipment maintenance -wheel wash liquid leakage	Regular inspections Experienced contractors to provide preventative maintenance Preventative maintenance schedule	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
4. NOISE													
9	Excessive noise	- Disturbance to neighbouring properties and the public using Fairey Road - Excessive noise levels exceeding criteria resulting in fines and/or complaints - In extreme cases, health effects related to excessive noise	Use of reversing beepers by on-site traffic	Use of reversing lights, and white noise/squawkers/broadband alarms on mobile equipment. Trucks paths to avoid truck reversing.	Insignificant	Unlikely	III	NO	None required	Insignificant	Unlikely	III	YES
			Unloading of materials	Minimise material drop heights (environmental management procedures).	Insignificant	Possible	III	NO	None required	Insignificant	Possible	III	YES
			Process noise including conveyor belts, crushing screening	Processing undertaken within building; Select equipment with low sound power level; Preventative Maintenance	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES
			Truck wheel wash	Preventative maintenance	Insignificant	Possible	III	YES	None required	Insignificant	Possible	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
5. HUMAN HEALTH													
10	Exposure to chemicals	- irritation of the eyes, nose, throat and lungs - Other health related effects associated with long term exposure	-Poorly managed refuelling activities -Vehicle/equipment maintenance -wheel wash liquid leakage	Regular inspections Experienced contractors to provide preventative maintenance Preventative maintenance schedule	Minor	Unlikely	III	YES	None required	Minor	Unlikely	III	YES
11	Exposure to silica dust	- Health effects of silica dust such as silicosis	Generation of dust containing crystalline free silica such as crushing of concrete.	Undertaken within building PPE Gear provided to all workers Awareness signage within unloading area to instruct drivers to keep loads covered at all times Use of water sprays for dust suppression	Minor	Unlikely	III	YES	None required.	Minor	Unlikely	III	YES

Table 6-1: Hazard and Risk Register

Event Number	Hazard	Consequences	Causes	Proposed Prevention & Mitigation Safeguards	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Additional Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
6. GENERAL SITE RISKS													
12	External Fire / Explosion – Under worst case conditions	- Damage to vehicle and/or property - Release of toxic products of combustion - Rupturing of containers and contaminated fire water runoff	Brake fire Tyre fire Fuel leak Smoking Lightning strike Adjacent property fires Arson Appliance fire Broken fluorescent light	Maintenance of vehicles No smoking on site Fire extinguishers Fire water available from hydrants and hand-held hoses Emergency response plan includes actions to take if a fire occurs Fully fenced site and locked gates during after hours Smoke detectors within selected buildings Inert raw materials present on site	Severe	Rare	II	YES	No further controls available. Fires are considered to be a relatively rare event at such facilities but are possible; hence the Risk Rating remains at II despite best practice measures being undertaken.	Severe	Rare	II	YES

7. LAND USE CONFLICT RISK ASSESSMENT

A land use conflict risk assessment (LUCRA) is required for the proposed development. *The Department of Primary Industries Land Use Conflict Risk Assessment Guide* (2011) was used as guidance to undertaken the risk assessment.

Land use conflicts can occur when one land user is perceived to trigger negative impacts on adjacent land uses. In rural areas land use conflicts can occur between agricultural and residential uses and between different agricultural activities or primary industries such as mining, forestry and aquaculture.

This LUCRA aims to:

- identify and address potential land use conflict issues and risk of occurrence strategies associated with the proposed development;
- assess the potential impacts of the proposed land use on neighbouring land uses; and
- if required, recommend strategies to help minimise the potential for land use conflicts to occur.

To achieve the aims listed, a four step approach was used:

1. Gathering of information including the site characteristics, nature of the proposed development and surrounding land uses.
2. Identification of potential land use conflicts associated with each proposed activity;
3. Identification of risk reduction management strategies that would either lower the probability of the event occurring or lower the consequences.
4. Evaluation of the level of risk using the risk ranking matrix with the management strategies in place and presentation of the results.

7.1.1 Gathering of Information

The site characteristics, nature of the proposed development and description of the surrounding land uses are described in detail throughout this report. A summary of the information is provided below.

7.1.1.1 Site Characteristics

The site is located within the suburb of South Windsor, and the land where the proposed development would take place is within an IN1 – General Industrial zone and is approximately 6 hectares. The remaining area of the site is within a RU1 – Primary Production land zoning. The total land holding is 22 hectares in area.

More detailed information about the site location can be found in Section 2.

7.1.1.2 Nature of Proposed Development

The proposed development involves the establishment of a construction materials processing and recycling facility involving processing of up to 98,000 tonnes of construction and demolition (C&D) waste per year. This includes virgin excavated natural material (VENM) and excavated natural material (ENM). The following would be undertaken:

- Receipt of up to 98,000 tonnes per year of C&D waste materials. Noise from the crusher would be minimised as it will be enclosed in a building.

- Storage of these materials on the land within covered stockpile bays. Dust would be controlled using water sprays situated along the boundary of the development.

- Levelling of the land for the proposed development to above flood planning level to minimise the risk of flooding. Stormwater runoff would be managed using drainage channels, sediment basins and gravel filters.

- A vegetated buffer would be established along the western and northern boundaries of the development for the purposes of a visual screen.

7.1.1.3 Surrounding Land Uses

Existing land uses surrounding the site within about 500 m are shown in Figure 7-1. These include:

Industrial operations
IN1 – General Industrial zoned land is located to both the west and south with facilities including Boral Concrete, Moits trucking operations, screening and plant yard and Australian Security fencing immediately to the south and the businesses on the western side of Fairey Road, opposite the Project Area including:

- Worth Recycling;
- Holcim Australia – Windsor Concrete;
- Snowflake Blast and Powdercoat; and
- Nanna's Autohouse

RU1 – Primary Production zoned land exists to the north of the site with four large rural allotments which are all vacant. There are also large rural allotments located to the east of the site, on the eastern side of South Creek which forms the eastern boundary of the site.

R2 – Low Density Residential land containing a small residential housing estate is located north of the Main Northern Railway Line. There is also a residential area of this zoning to the south west of the site.

Figure 7-1: Surrounding land uses

Source: Six Maps

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

7.1.2 Evaluation of Risk Level

7.1.2.1 Risk Criteria

The following defines the risk criteria used in this assessment.

The probability table allows for determining how likely an event is to occur. Likelihood is the chance that something might happen and is defined for the purposes of this assessment in the following table.

Table 7-1: Probability Table – to score the likelihood of the consequence occurring

Level	Descriptor	Description
A	Almost Certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

Source: *The Department of Primary Industries* (2011)

The measure of consequence involves the analysis of events to identify their potential on-site and off-site impacts and is described in terms of land use conflict in the following table.

Table 7-2: Measure of Consequence

Level	Descriptor	Description
1	Severe	• Severe and/or permanent damage to the environment • Irreversible • Severe impact on the community • Neighbours are in prolonged dispute and legal action involved
2	Major	• Serious and/or long-term impact to the environment • Long-term management implications • Serious impact on the community • Neighbours are in serious dispute
3	Moderate	• Moderate and/or medium-term impact to the environment and community • Some ongoing management implications • Neighbour disputes occur
4	Minor	• Minor and/or short-term impact to the environment and community • Can be effectively managed as part of normal operations • Infrequent disputes between neighbours
5	Negligible	• Very minor impact to the environment and community • Can be effectively managed as part of normal operations • Neighbour disputes unlikely

Source: *The Department of Primary Industries* (2011)

Each identified potential land use conflict is ranked based on the environmental, public health and amenity impacts according to the Risk Ranking Matrix shown in Table 6-3.

Table 7-3: Risk Ranking Matrix

Probability	A	B	C	D	E
Consequence					
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

Source: *The Department of Primary Industries* (2011)

In the Department of Primary Industry's *Land Use Conflict Risk Assessment Guide* (2011), the method of risk ranking is described as follows. (Note Table 3 refers to Table 7-1 in this report and Table 4 refers to Table 7-2):

> *The risk ranking matrix yields a risk ranking from 25 to 1. It covers each combination of five levels of 'probability' (a letter A to E as defined in Table 3) and 5 levels of 'consequence', (a number 1 to 5 as defined in Table 4) to identify the risk ranking of each impact. For example an activity with a 'probability' of D and a 'consequence' of 3 yields a risk rank of 9.*
>
> *A rank of 25 is the highest magnitude of risk; a highly likely, very serious event. A rank of 1 represents the lowest magnitude or risk an almost impossible, very low consequence event. Priority is given to those activities listed as high risk. This will help rank multiple effects and provide a priority list when developing management strategies.*

7.1.2.2 Identification of potential land use conflicts

Results of the initial risk evaluation are presented in Table 7-4.

Table 7-4: Initial Risk Evaluation

ID	Identified Potential Conflict	Source
1	Generation of dust and particulate matter impacting on neighbouring residences	Loading/Unloading of material Stockpiling/Wind erosion Crushing Screening
2	Excessive noise at nearby residences and adjoining properties	Truck movements Loading/Unloading of material Stockpiling Crushing Screening
3	Spread of waste materials and associated releases of odour and litter impacting on the nearby residences and adjoining properties.	Non-conforming waste
4	Flooding resulting in contamination of waterways from sediment laden flood waters and excessive flooding in adjacent agricultural areas.	Flooding of the site
5	Contamination of waterways as a result of release of sediment laden stormwater runoff resulting in impacts to water quality and water users downstream	Stormwater runoff from stockpile areas

7.1.3 Risk Reduction Management Strategies

Risk reduction management strategies have been identified for each event. These include the safeguards that would be designed into the facility and management measures that would be undertaken during operation. These are summarised in point form below:

- Establishment of a raised, levelled area to minimise flooding of the site area to be used for site activities;

- Creating a hardstand area of compacted roadbase aggregate with drainage to a primary and secondary sediment basin with gravel filters to manage stormwater runoff;
- Purpose built building for crushing and screening equipment to minimise noise and dust emissions;
- Dust suppression of stockpiles areas;
- Incoming load inspection to ensure no non-conforming wastes or materials are accepted onto site; and
- Establishment of vegetated areas along the western and northern boundaries of the site.

7.1.4 Results

Risk was re-evaluated with risk reduction management strategies identified in place. Results are provided in Table 7-5.

Table 7-5: LUCRA Results

Identified Potential Conflict	Management Strategy (Method of Control)	Likelihood	Consequence	Risk Ranking
Generation of dust and particulate matter impacting on neighbouring residences	• Dust generating activities confined to building • Dust suppression • Hardstand area • Vegetated barrier	D	4	5
Excessive noise at nearby residences and adjoining properties	• Purpose built building for crushing and screening operations • Regular equipment maintenance • No night time truck movements or operations	D	4	5
Spread of waste materials and associated releases of odour and litter impacting on the nearby residences and adjoining properties.	• >250 m separation distances between operational area and residences • Incoming waste inspection procedure	C	4	8
Flooding resulting in contamination of waterways from sediment laden flood waters and excessive flooding in adjacent agricultural areas.	• Raised levelled working area to reduce flood risk • Installation of surface water management system and controls	D	3	9
Contamination of waterways as a result of release of sediment laden stormwater runoff resulting in impacts to water quality and water users downstream		D	3	9

All risk rankings were found to be 9 or below. Therefore, the potential for land use conflict is low.

8. BIOSECURITY RISK ASSESSMENT

A biosecurity risk assessment focussing on pests, weeds and disease was requested by the Department of Primary Industries – Agriculture to be included in the EIS. The risk assessment has been undertaken to assess the likely plant animal and community risks associated with pests, weeds and disease that may be brought onto site as a result of the proposed activities. The following sub-sections describe the methodology used in assessing the biosecurity risk. A table identifying the risks, causes, mitigations measures and level of risk is provided as Table 8-1.

It should be noted that incoming material would be from local businesses and no imported material would be received at the site.

8.1 RISK CRITERIA

The following sub-section defines the risk criteria used in this assessment.

8.1.1 Consequence Estimation

This aspect involves the analysis of the potential on-site and off-site impacts of the introduction of a pest, weed or disease. In this case, the consequences would typically include impact on productivity of adjoining agricultural land, local communities, production costs and damage to native species.

Categories of consequences have been defined in terms of environmental, land productivity, health and financial impacts and include the following:

WHAT ARE THE WORST CASE SCENARIO CONSEQUENCES?

CONSEQUENCES OR IMPACT

Level	Descriptor	Description
1	Insignificant	Very minor, often undetected impacts on production with insignificant changes to native plant species, and any damage confined within site boundaries.
2	Minor	Minor impacts to the site and potentially spread to adjoining lands reducing productivity.
3	Moderate	Measurable impacts to production and impacts to productivity on adjoining lands including reduction in yield, crop quality and production costs. Potential health impacts to community.
4	Severe	Severe impacts on production including host mortality and significance impacts on crop quality and losses. High health impacts to community.
5	Catastrophic	Widespread impact requiring long term recovery and leaving major damage both on-site and off-site. Death. Financial loss more than $1M.

8.1.2 Likelihood Estimation

This aspect involves determining how likely an event is to occur. Likelihood is the potential for pests, weeds and/or diseases to enter, establish and spread, and is defined for the purposes of this assessment in the following table.

HOW LIKELY IS AN EVENT TO OCCUR?

LIKELIHOOD

Level	Descriptor	Description
A	Almost Certain	Very likely. The event is expected to occur in most circumstances.
B	Likely	Strong possibility. The event will probably occur in most circumstances.
C	Possible	The event might occur at some time.
D	Unlikely	Not expected. There is a slight possibility the event could occur at some time.
E	Rare	Highly unlikely. The event may occur only in exceptional circumstances.

8.1.3 Level of Risk

The level of risk is defined by the following table.

LEVEL OF RISK

Likelihood **Consequence**

	Insignificant 1	Minor 2	Moderate 3	Severe 4	Catastrophic 5
A (almost certain)	III	II	I	I	I
B (likely)	III	II	I	I	I
C (possible)	III	II	II	I	I
D (unlikely)	III	III	II	II	II
E (rare)	III	III	III	II	II

The Class I area shown in red indicates a high level of risk which is intolerable and where risk reduction is required. This requires the reduction of frequency and/or consequence.

The Class II area shown in yellow indicates a moderate level of risk. Whilst the risk is not unacceptable, there should be practical measures taken to lower the risk if economically viable. For risks where further mitigation is not economically viable, judgment needs to be exercised as to whether the level of risk is acceptable or not. This area is the beginning of the "As Low as Reasonably Practicable" (ALARP) region which means that while risk of an accident may be tolerable, steps still need to be taken to reduce the risk level to as low as reasonably practicable. A risk that satisfies ALARP would be considered acceptable.

The Class III area shown in green indicates a low level of risk and is broadly considered to be acceptable. Further risk mitigation may not be required/appropriate. However, low and accepted risks should be monitored and routinely reviewed to ensure that they remain acceptable. Few risks remain static. This area includes ALARP as well as what are known as trivial or negligible risks.

8.2 IDENTIFICATION OF HAZARDS

HB 203-2012: *Managing Environment-Related Risk* defines a **risk source** as:

> *a tangible or intangible element that alone or in combination has the intrinsic potential to give rise to risk. It is thus an encompassing term that includes the terms 'hazard' (a source of potential harm) and 'environmental aspect'*

A **biosecurity risk** is the risk of *"transmission of infectious diseases in crops and livestock, quarantined pests, invasive alien species, and living modified organisms*" (Koblentz, 2010).

The process of identifying biosecurity risks associated with the activities undertaken at the site was to firstly carry out a site inspection and a review of environmental documentation. The next step was a brainstorming session to systematically break down each step in the process and identify aspects and therefore potential hazards associated with each activity. These hazards were then assessed in accordance with the risk criteria below. The main hazards were identified as:

- Spread of pests;
- Spread of disease; and
- Spread of weed seed.

8.3 RISK ANALYSIS

Risk was determined firstly based on the existing site activities and safeguards to establish the Existing Risk Rating. Additional safeguards were recommended to hazards that presented a high or medium risk (Risk Level Classes II and III) and an assessment of these hazards was undertaken to determine the residual risk.

The results are presented in Table 8-1.

Table 8-1: Biosecurity Risk Assessment

Event Number	Hazard	Consequences	Causes	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
1	Spread of pests such as insects, rodents	- Alteration of ecosystem function including competition with native animals for food and shelter; - Reduction of primary industry productivity of adjoining properties through destruction of pastures and crops - Destruction of natural resources including soil disturbance and removal of vegetation. - Increased threat to human and animal health through the potential spread of disease - Predation of livestock and native flora and fauna	Pests present within incoming loads	Minor	Unlikely	III	No	• Implement an incoming load inspection procedure to ensure all loads comply and instructions on how to deal with non-complying loads	Insignificant	Rare	III	YES
			Non-complying loads accepted onto site that contain meat and/or food wastes	Minor	Rare	III	No	• Acceptance of inert wastes only. No meat or food waste would be accepted on site. • Incoming load inspection procedure	Insignificant	Rare	III	YES
			Stockpiles attracting pests	Minor	Unlikely	III	No	• Stockpiling of inert material only	Insignificant	Rare	III	YES
			Livestock from other sites entering the facility	Minor	Unlikely	III	No	• Adequate site security fencing and gate to prevent livestock from entering	Minor	Rare	III	YES
2	Spread of disease	- Soil-borne plant pathogens may cause crop plant diseases, resulting in significant economic losses - Spread of bacteria causing diseases in humans.	Contaminated loads containing pathogens brought onto site	Minor	Rare	III	No	• No putrescible waste accepted onto site. • Incoming load inspection procedure	Insignificant	Rare	III	YES
			Livestock from other sites entering the facility	Minor	Unlikely	III	No	• Adequate site security fencing and gate to prevent livestock from entering	Minor	Rare	III	YES

Table 8-1: Biosecurity Risk Assessment

Event Number	Hazard	Consequences	Causes	Consequences	Likelihood	Existing Risk Rating	Is the risk ALARP?	Recommended Safeguards	Consequence	Likelihood	Residual Risk Rating	Meet ALARP?
3	Spread of weed seed	- Weeds can become a major threat to the natural environment, threatening the survival of native plants and animals. - Weeds can impact on the price of food, human health through allergies and asthma, recreational activities and the economy	Weed seed brought onto site within raw materials & being placed in stockpiles	Minor	Possible	II	No	• Incoming load inspection procedure • Regular Site Inspection as part of the Environmental Management Plan.	Insignificant	Rare	III	YES
			Weed seed brought onto site during landscaping	Minor	Possible	II	No	• Use qualified landscape gardener. • Native vegetation only. • Regular site inspection to identify the presence of any weeds and eliminate them before they go to seed as part of the Environmental Management Plan.	Minor	Rare	III	Yes

8.4 RECOMMENDED SAFEGUARDS

The following safeguards to minimise biosecurity risks such as the spread of weed seed, diseases and pests would include the following:

- Incoming load inspection procedure;
- Acceptance of only inert wastes at the site;
- Adequate site security fence and gate;
- Use of a qualified landscape gardener and native vegetation plantings only; and
- Implementation of a regular site inspection as part of the Environmental management plan.

The risk to biosecurity from the proposed activities is low. A biosecurity response plan is not considered warranted due to the nature of the proposed use and incoming materials, as well as the source of materials being local and not imported. It is recommended that Biosecurity be addressed within an Environmental Management Plan and measures put in place in the form of a regular site inspection to ensure pests, weeds and diseases can be readily identified. The EMP should also establish measures necessary should pests, weeds or diseases be found on site.

9. RECOMMENDATIONS & CONCLUDING REMARKS

From the risk analysis undertaken in the previous section, the main environmental site hazards include:

- Generation and release of dust emissions;
- Leaks and spills of fuel and oils;
- Excessive noise from on-site operations and activities;
- Sedimentation of waterways;
- Exposure to silica dust; and
- External Fire.

The above hazards were analysed considering all existing safeguards relating to those hazards and the risk register. All risks were found to be Class III (except for fire as discussed in Table 5-1) indicating an overall low level of risk. No high level risks of Class I were found for the proposed development.

The site is suited for the proposed use. The site represents a low risk to adjoining properties, the environment or premises within the vicinity.

This concludes the report.

Emma Hansma
Senior Engineer

R T Benbow
Principal Consultant

10. 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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

11. REFERENCES

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EIS Appendix 3: Bushfire Assessment, Anderson Environmental

BUSHFIRE HAZARD ASSESSMENT
FOR A PROPOSED DEVELOPMENT AT

100 FAIREY ROAD
SOUTH WINDSOR

HAWKESBURY CITY COUNCIL
LOCAL GOVERNMENT AREA

Job number: 2289

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Version 1

Version	Date drafted	Drafted by
	18/08/2018	Jason Anderson
Version	**Date reviewed**	**Reviewed by**
	20/08/2018	Jason Anderson
Approved by		**Date**
Jason Anderson (Director)		20/08/2018

EXECUTIVE SUMMARY

Introduction

Anderson Environmental was engaged to conduct a Bushfire Hazard Assessment for a proposed development at Lot 4 DP264159 - 100 Fairey Road, South Windsor, in the Hawkesbury City Council Local Government Area (LGA), hereafter referred to as the subject site.

The subject site is proposed to be developed as Concrete Recycling Facility. Andy's Earthworks Pty Ltd is seeking development consent to establish a construction materials crushing and recycling plant.

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

The subject site is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt.

Methodology

The assessment of the subject site and its surrounds followed the amended (1st March 2006) Planning for Bushfire Protection (PBP 2006) guideline by the NSW Rural Fire Service (RFS). The assessment also is undertaken under Australian Standard (AS) 3959: 2009 which was adopted on 1 May 2010.

As the proposed development is for commercial purposes, the provisions for 'infill development' under PBP 2006 apply. The development is also exempt from the building standards detailed in AS 3595: 2009 with the general bushfire safety construction provisions of the Building Council of Australia (BCA) are considered adequate. Although the assessment criteria for residential developments do not apply for the proposed development, commercial developments must demonstrate that they can meet the objectives in **Section 1.1** of the PBP 2006.

The bushfire hazard rating system is based on the slope and maximum fuel loadings as determined by the vegetation type. The risk is related to the chance of a fire starting and spreading. The aim of the assessment process is to reduce the risk to life and property. As has been shown however in extreme fire situations all dwellings near to bushland are at risk.

The subject site was inspected on 30/07/2018 by Anderson Environmental staff. This inspection consisted of the assessment of the fire threat along four 140m transects from the edge of the subject site in the main cardinal directions (North, South, East and West). Distances were measured using a handheld Global Positioning System (GPS) device and slope was calculated using a clinometer. As the location of proposed dwellings had not been provided at the time of writing, the assessment was conducted from the boundaries of the development area.

Along each transect the topographic profile, vegetation type and land use was recorded. This data was used to determine the Asset Protection Zone (APZ) distances required for the proposed development, following the PBP 2006 guidelines.

Bushfire Hazard Assessment

The findings of the assessment and this report indicate that the proposal can comply with the required bushfire protection requirements. Lands surrounding the site do not contain any vegetation considered to represent a significant fire threat within the 140m assessment transect. The vegetation surrounding the site and on the site itself is managed and grazed pasture improved grassland with the land to the south and west being light industrial development.

An APZ of 10m is typically required for a commercial development and this is available and already present on this site for this development.

Conclusion and recommendations

The proposal can meet the requirements for appropriate fire safety under the PBP 2006. Due to the relatively gentle local topography and the type of proposed development (commercial) APZs of 10m are considered adequate. The site and its surrounds are cleared and grazed improved pastures with commercial development on the southern and western sides.

CONTENTS

1. INTRODUCTION

1.1 Background

Anderson Environmental was engaged to conduct a Bushfire Hazard Assessment for a proposed development at Lot 4 DP264159 - 100 Fairey Road, South Windsor, in the Hawkesbury City Council Local Government Area (LGA), hereafter referred to as the subject site.

The subject site is proposed to be developed as Concrete Recycling Facility. Andy's Earthworks Pty Ltd is seeking development consent to establish a construction materials crushing and recycling plant.

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

The subject site is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt.

The subject site is proposed to be developed as a concrete recycling facility utilising the south-western quarter of the subject site (see **Appendix 4**).

1.2 Subject site

The subject site and local context is shown in **Figure 1.1** below.

The subject site is composed of mainly pasture improved grassland for cattle grazing. There is a wetland on the north-eastern quarter of the site. The site drains to the east where it adjoins South Creek. South Creek is part of the Hawkesbury-Nepean catchment, located on the Cumberland Plain, Greater Western Sydney, New South Wales.

Figure 1.1: Subject site showing local context – Source: Six Maps

2. METHODOLOGY

The assessment of the subject site and its surrounds followed the amended (1st March 2006) Planning for Bushfire Protection (PBP 2006) guideline by the NSW Rural Fire Service (RFS). This guideline replaced the PBP 2001 document which itself replaced the discussion document originally released in May 1991 by the then Department of Bushfire Services; and *Circular 10 Planning in Fire Prone Areas* issued by the Department of Urban Affairs and Planning in 1989. The assessment also is undertaken under Australian Standard (AS) 3959: 2009 which was adopted on 1 May 2010.

Bushfire prone areas are those areas mapped on a bushfire prone land map. **Section 79C** of the *Environmental Planning and Assessment Act 1979* (EPA Act) sets out provisions to be applied for residential subdivision, rural-residential subdivision and development, infill development and special protection development for bushfire prone areas. The provisions to be applied are:

- Development and maintenance of Asset Protection Zones (APZs) on the hazard sides of the development;
- Provision and maintenance of adequate access;
- Design, staging and siting of the development; and
- Provision of an appropriate water supply and availability during times of bushfire emergency.

As the subject site is proposed to be developed for commercial purposes, the infill provisions of the PBP for commercial and industrial development apply. **Section 4.3.6(f)** of the PBP 2006 describes the bushfire protection requirements for buildings of class 5 to 8 and 10 (offices, factories, warehouses, public car parks and other commercial or industrial facilities) under the Building Code of Australia (BCA):

The BCA does not provide for any bush fire specific performance requirements and as such AS 3959 does not apply as a set of 'deemed to satisfy' provisions. The general fire safety construction provisions are taken as acceptable solutions, but the aim and objectives of PBP apply in relation to other matters such as access, water and services, emergency planning and landscaping/vegetation management.

*In circumstances where the aim and objectives of PBP (**Section 1.1**) are not met, then the construction requirements for bush fire protection will need to be considered on a case-by-case basis.*

Consequently, the development is assessed against the objectives of **Section 1.1** of the PBP:

I. Afford occupants of any building adequate protection from exposure to a bush fire;
II. Provide for a defendable space to be located around buildings;
III. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
IV. Ensure that safe operational access and egress for emergency service personnel and residents is available;
V. Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ); and
VI. Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).

The bushfire hazard rating system is based on the slope and maximum fuel loadings as determined by the vegetation type. The risk is related to the chance of a fire starting and spreading. The aim of the assessment process is to reduce the risk to life and property. As has been shown however in extreme fire situations all dwellings near to bushland are at risk. The subject site was assessed in terms of its location, aspect, slope and vegetation present on all boundaries.

2.1 Legislative Requirements/Planning Policies

The following legislation relates to bushfire protection;

- AS 3959: 2009;
- EPA Act;
- *Rural Fires Act 1997* (RF Act); and
- PBP 2006.

2.2 Site inspection

The subject site was inspected by Anderson Environmental staff on 30/07/2018. These inspections consisted of surveys of the fire threat level from the subject site boundary for the four major cardinal directions (North, South, East and West) along 140m transects, as stipulated

under the PBP 2006 guidelines. Representative photographs from the base of each assessment transect are provided in **Appendix 3**.

Using the data collected in the field, the required APZs for each face of the development area were calculated based on the methodology from the PBP 2006 guidelines (see **Appendix 2**).

3. BUSHFIRE HAZARD ASSESSMENT

The PBP 2006 guidelines provide an assessment methodology designed to reduce risk to life and property. The overall intention of bushfire protection measures is to prevent flame contact to any structure, reduce radiant heat, to minimise potential for embers to cause ignition and to reduce the effects of smoke to residents and firefighters. This legislation works in conjunction with the EPA Act and the RF Act as the overriding legislation for the protection of life and property.

AS 3959: 2009 categorises the fire threat. AS 3959: 2009 takes in matters such as the area FDI (Fire Danger Index), the site's ground slope, vegetation type and density to determine the intensity of fire attack, split into six levels. The six levels relate to the intensity of radiant heat exposure, referred to as the Bushfire Attack Level (BAL):

- BAL-LOW (no threat or construction changes needed);
- BAL-12.5 (radiant heat levels would calculate 12.5kWm^2);
- BAL-19 (19kWm^2);
- BAL-29 (29kWm^2);
- BAL-40 (40kWm^2); and
- BAL-FZ (Flame Zone, which can be as high as 100kWm^2).

The NSW RFS provides mapping for bushfire prone areas. A search of the NSW RFS online mapping indicates that this site falls within a bushfire prone area.

3.1 Vegetation (Fuel Type)

The highest threat vegetation type within the assessed transects was classified as grassland. The NSW RFS BAL Risk Assessment Application Kit defines forests as below:

> *Dominated by perennial grasses and the presence of woody plants. Plants include grasses, daisies, legumes, geraniums, saltbushes and copperburrs.*

The RFS guidelines compares vegetation classifications between the AS 3959:2009 and PBP 2006, as shown in **Table 3.1** below. The David Keith vegetation classifications are used in this assessment.

Table 3.1: Conversion of vegetation types between AS3595:2009 and PBP 2006

David Keith's Ocean Shores to Desert Dunes (PBP 2006)	AUSLIG (1990) Pictorial Analysis (AS3595:2009)
Rainforests	Rainforest
Forested Wetlands	Forest
Wet Sclerophyll Forest	Forest
Dry Sclerophyll Forest	Forest
Woodlands (grassy)	Woodland
Plantations (pine)	Forest
Tall Heath (scrub)	Scrub
Short Heath (open scrub)	Shrubland

Table 3.2 below shows the assessment results for the fire threat level for the four transects assessed. It provides several estimates for the required APZ, based on the provisions of PBP 2006. A commercial or industrial development typically requires a minimum of 10m APZ;

however, it must also demonstrate that it meets the objectives of PBP 2006, outlined in **Section 2** above.

Table 3.2: Threat Categories and APZs Required

Aspect	North	East	South	West
Highest vegetation classification in profile	Grassland	Grassland	Developed site, yard and sheds	Road, developed area, vacant land, cleared.
Greatest slope in profile (decimal degrees)	5^0 Downslope	6^0 Downslope (3^0 downslope for 27 metres then 6^0 downslope up to 140 metres)	1^0 Upslope	2^0 Upslope (2^0 upslope for 24 metres-road, 2^0 upslope up to 100 metres-road/developed area, 2^0 upslope up to 140 metres-cleared.
Commercial APZ required based on PBP 2006	10 metres Inner Protection Area	10 metres Inner Protection Area	10 metres Inner Protection Area	10 metres Inner Protection Area

3.2 Fire Danger Index (FDI)

The FDI for all Sydney metropolitan councils is 100.

3.3 Access/Evacuation

The access and evacuation would occur through the internal roads/parking areas onto Fairey Road to the west.

3.4 Water Supply

The proposed development will have access to the local reticulated water supply. All services should be installed underground.

3.5 Protection Zone Required

APZs as outlined will be required. Maintenance will be required on an annual basis in September and/or before bushfire season commences.

3.6 Construction Standards

As the proposed development is for commercial purposes, the construction standards detailed in AS 3595: 2009 do not apply. The general fire safety construction provisions of the Building Council of Australia (BCA) are considered adequate.

It is however recommended that all structures incorporate ember protection measures detailed in AS 3595: 2009. These include provision such as:

- Openable windows to be screened with fire-resistant mesh with an aperture no greater than 2mm;
- External doors to be fitted with draft excluders; and
- All vents and weepholes to be sealed or screened with fire-resistant mesh.

4 CONCLUSION AND RECOMMENDATIONS

The development can meet the requirements for appropriate fire safety under the PBP 2006. Land in each compass direction did not contain any vegetation considered to represent a significant bushfire threat as defined under the PBP 2006 guidelines.

To meet the objectives of PBP 2006, a 10m minimum APZ is required around the development area. The provision of these APZs will allow for the creation of a defendable space for firefighting personnel as well as providing a standoff distance for the occupants of future buildings adjacent to the fire threat. All structures abutting the fire threat must be designed to allow for easy firefighter egress into the APZ area and for occupant evacuation through the side of the buildings opposite to the fire threat.

These IPA (Inner Protection Area) will be required to be maintained as detailed in the PBP 2006:

> *An IPA should provide a tree canopy cover of less than 15% and should be located greater than 2 meters from any part of the roofline of a dwelling. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 meters from an exposed window or door. Trees should have lower limbs removed up to a height of 2 meters above the ground.*
>
> *An OPA should provide a tree canopy cover of less than 30% and should have understory managed (mowed) to treat all shrubs and grasses on an annual basis in advance of the fire season (usually September)*

The PBP 2006 also provides the following guidelines for garden layouts within an APZ:

> *When creating and maintaining a garden that is part of an APZ you should:*
>
> - *Ensure that vegetation does not provide a continuous path to the house;*
> - *Remove all noxious and environmental weeds;*
> - *Plant or clear vegetation into clumps rather than continuous rows;*
> - *Prune low branches two meters from the ground to prevent a ground fire from spreading into trees;*
> - *Locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;*
> - *Plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively,*

provide non-flammable pathways directly around the dwelling;

- *Ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and*
- *Avoid erecting brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable.*

Although these recommendations are intended for residential developments, they have been provided in this report to inform potential future landscaping design.

5. REFERENCES

Australian Standard 3959: 2009 (with amendments and corrections)

Environmental Planning and Assessment Act 1995

NSW Rural Fire Service (2006 as amended following AS3959-2009). Planning for Bushfire Protection. ISBN 0 9751033 2 6. NSW Rural Fire Service

Rural Fires Act 1997

6. APPENDIX 1: DISCLAIMER AND LIMITATION OF LIABILITY

The use of this report is for the client only and is based on an assessment of the site at the point in time of assessment. The material in this report reflects the judgement of Anderson Environmental Pty Ltd in light of background information and site conditions at the time of assessment and we take no responsibility for any database inaccuracies or other inaccuracies in background and or other information. The report is not to be reproduced or released to any other party, in whole or in part, without the express written consent of Anderson Environmental Pty Ltd. This report is Copyright protected and is not to be reproduced in part or whole or used by a third party without the express written permission of Anderson Environmental Pty Ltd. If you are not the client who commissioned this report or a local government authority for which approval is being sought as part of the formal DA process and are in possession of this report you are in breach of the law and we reserve the right to recover damages from any individuals, companies or other parties as a result of such breaches. Any use, which a third party makes of this report, or any reliance or discussions based on it, is the responsibility of such Third Parties and as outlined above is in breach of the law. Anderson Environmental and its staff accepts no responsibility for damages, if any, suffered by any third party because of decisions made or actions taken based on this report and reserves the right to recover damages from the third party from breaches as outlined above.

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7. APPENDIX 2: APZ AND BAL CALCULATION VALUES FROM PBP 2006 AND AS 3959-2009

Table A2.4 Minimum Specifications for Asset Protection Zones (m) for Residential and Rural Residential Subdivision Purposes (for Class 1 and 2 buildings) in FDI 100 Fire Areas (≤29kW/m²)

	Effective Slopes				
Vegetation Formation	**Upslope/Flat**	**>0°-5°**	**>5°-10°**	**>10°-15°**	**>15°-18°**
Rainforests	10	10	15	20	25
Forests	20	25	35	50	60
Woodland (Grassy)	10	15	20	25	30
Plantations (Pine)	20	25	30	45	50
Tall Heath (Scrub)	15	15	20	20	20
Short Heath (Open Scrub)	10	10	10	15	15
Freshwater Wetlands	10	10	10	15	15
Forested Wetlands	15	20	25	35	45

Figure A2.1: Minimum specifications for APZ for residential and rural residential subdivision purposes

Table A2.7 Determining Allowable Outer Protection Areas (m) for forest vegetation within an APZ

	Effective Slopes				
	Upslope/Flat	**>0°-5°**	**>5°-10°**	**>10°-15°**	**>15°-18°**
Forests FDI 100 - subdivision	10	10	15	25	30
Forests FDI 80 - subdivision	10	5	15	20	20
Forests SFPP	20	20	25	30	25

Note: Vegetation Formations based on Keith D. (2004) - see pages 54 - 55

Figure A2.2: Determining allowable outer protection areas for forest vegetation within an APZ

TABLE 2.4.2

DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 100 (1090 K)

Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL—FZ	BAL—40	BAL—29	BAL—19	BAL—12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<19	19–<25	25–<35	35–<48	48–<100
B. Woodland	<12	12–<16	16–<24	24–<33	33–<100
C. Shrubland	<10	10–<13	13–<19	19–<27	27–<100
D. Scrub	<7	7–<9	9–<13	13–<19	19–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<8	8–<11	11–<16	16–<23	23–<100
	Downslope >0 to 5 degrees				
A. Forest	<24	24–<32	32–<43	43–<57	57–<100
B. Woodland	<15	15–<21	21–<29	29–<41	41–<100
C. Shrubland	<11	11–<15	15–<22	22–<31	31–<100
D. Scrub	<7	7–<10	10–<15	15–<22	22–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<10	10–<14	14–<20	20–<29	29–<100
	Downslope >5 to 10 degrees				
A. Forest	<31	31–<39	39–<53	53–<69	69–<100
B. Woodland	<20	20–<26	26–<37	37–<50	50–<100
C. Shrubland	<12	12–<17	17–<24	24–<35	35–<100
D. Scrub	<8	8–<11	11–<17	17–<25	25–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<13	13–<18	18–<26	26–<36	36–<100
	Downslope >10 to 15 degrees				
A. Forest	<39	39–<49	49–<64	64–<82	82–<100
B. Woodland	<25	25–<33	33–<45	45–<60	60–<100
C. Shrubland	<14	14–<19	19–<28	28–<39	39–<100
D. Scrub	<9	9–<13	13–<19	19–<28	28–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<17	17–<23	23–<33	33–<45	45–<100
	Downslope >15 to 20 degrees				
A. Forest	<50	50–<61	61–<78	78–<98	98–<100
B. Woodland	<32	32–<41	41–<56	56–<73	73–<100
C. Shrubland	<15	15–<21	21–<31	31–<43	43–<100
D. Scrub	<10	10–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<22	22–<29	29–<42	42–<56	56–<100

Figure A2.3: Determination of bushfire attack level (BAL)

8. APPENDIX 3: ASSESSMENT TRANSECT PHOTOS

Photograph A3.1: North profile

Photograph A3.2: East profile

Photograph A3.3: South profile

Photograph A3.4: West profile

9. APPENDIX 4: SITE PLAN

Figure A4.1: Site plan

EIS Appendix 4: Air Quality Impact Assessment, Benbow Environmental

AIR QUALITY IMPACT ASSESSMENT
PREPARED FOR
ANDY'S EARTHWORKS PTY LTD
100 FAIREY ROAD, SOUTH WINDSOR NSW 2756

Prepared for: Andy's Earthworks Pty Ltd
MacroPlan Dimasi

Prepared by: Matthew Taylor, Graduate Environmental Scientist
Emma Hansma, Senior Engineer
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Report No: 181025_AQIA_Rev4
September 2019
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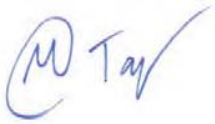
Matthew Taylor	Graduate Environmental Scientist		12 September 2019

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EXECUTIVE SUMMARY

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd to undertake an Air Quality Impact Assessment (AQIA) for the proposed development located at 100 Fairey Road, South Windsor NSW 2756. The assessment determines the predicted dust and particulate matter contribution from the proposed site operations. The proposed operation is a construction materials processing and recycling facility that would receive up to 98,000 tonnes per year of construction and demolition (C&D) waste including virgin excavated natural material (VENM) and excavated natural material (ENM). This material would be processed within a purpose built building on the site with storage of incoming materials and finished goods in external stockpiles of materials for recycling.

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 of the construction and demolition recycling facility to assess the cumulative air quality impacts.

This AQIA has been assessed using emission data adopted from the National Pollutant Inventory's *Emission Estimation Technique Manual for Mining* (2012), *Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals* (2014), and *Emission Estimation Technique Manual for Concrete Batching and Concrete Product Manufacturing* (1999).

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

TSP emissions at all sensitive receptors were predicted to comply with the *Approved Methods* criterion for an annual averaging period. PM_{10} annual average emissions are also predicted to comply at all residential receptors.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria due to elevated background concentrations.

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

Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

Contents

Tables

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Attachments

1. INTRODUCTION

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd to undertake an Air Quality Impact Assessment (AQIA) for the proposed development located at 100 Fairey Road, South Windsor NSW 2756. 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), which shall henceforth be referred to as the *Approved Methods*.

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 concrete recycling facility to assess the cumulative air quality impacts.

2. SITE DETAILS

This section presents the site location, a description of the site and surrounds and a description of the existing development on the site.

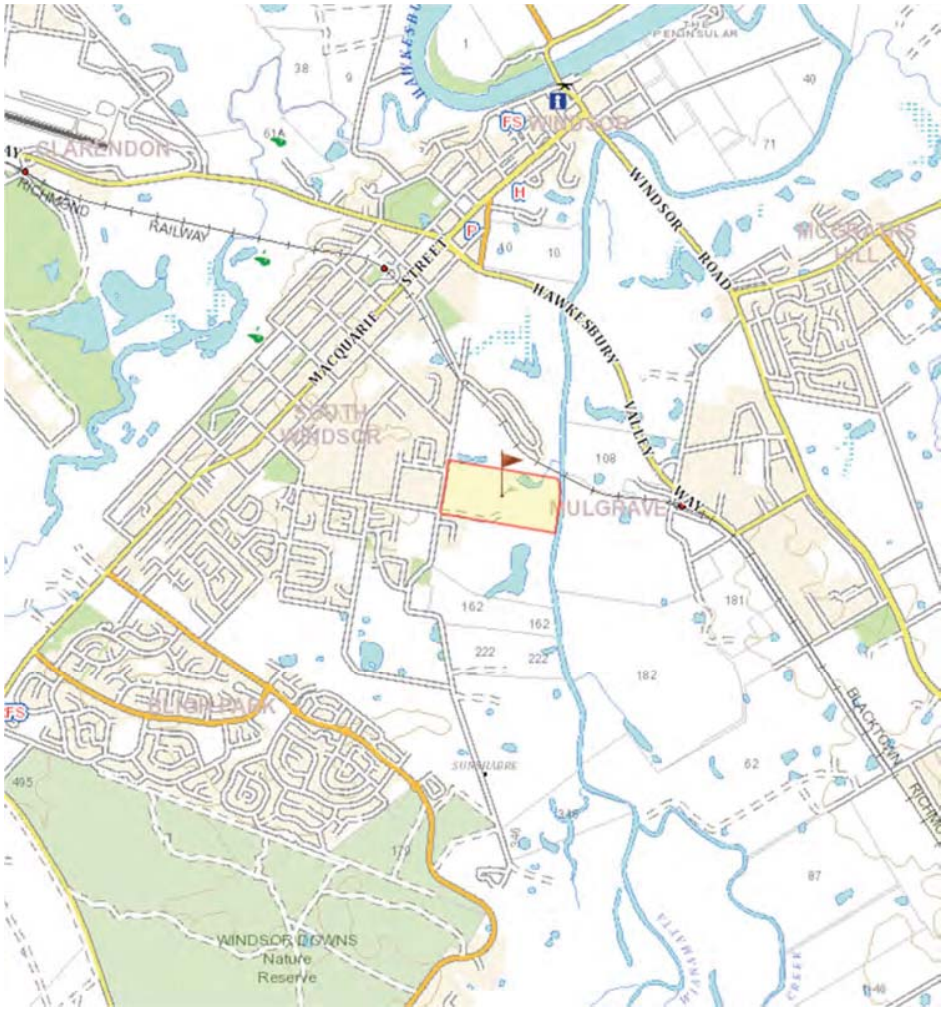
2.1 SITE LOCATION

The subject site is located at 100 Fairey Road, South Windsor NSW 2756, and is legally described as Lot 4 in DP 264159. The site is located approximately 1.2 km south of Windsor and approximately 45 km north-west of the Sydney CBD, within the Hawkesbury City Council Local Government Area. Figure 2-1 shows the site location and Figure 2-2 shows an aerial photograph of the site.

2.2 HOURS OF OPERATIONS

The facility is seeking approval to operate 7:00am to 6:00pm Monday to Friday and 7:00am to 1:00pm on Saturday.

Figure 2-1: Site Location



Source: SIX Maps 2018

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

Figure 2-2: Aerial of the Site

Source: SIX Maps 2018

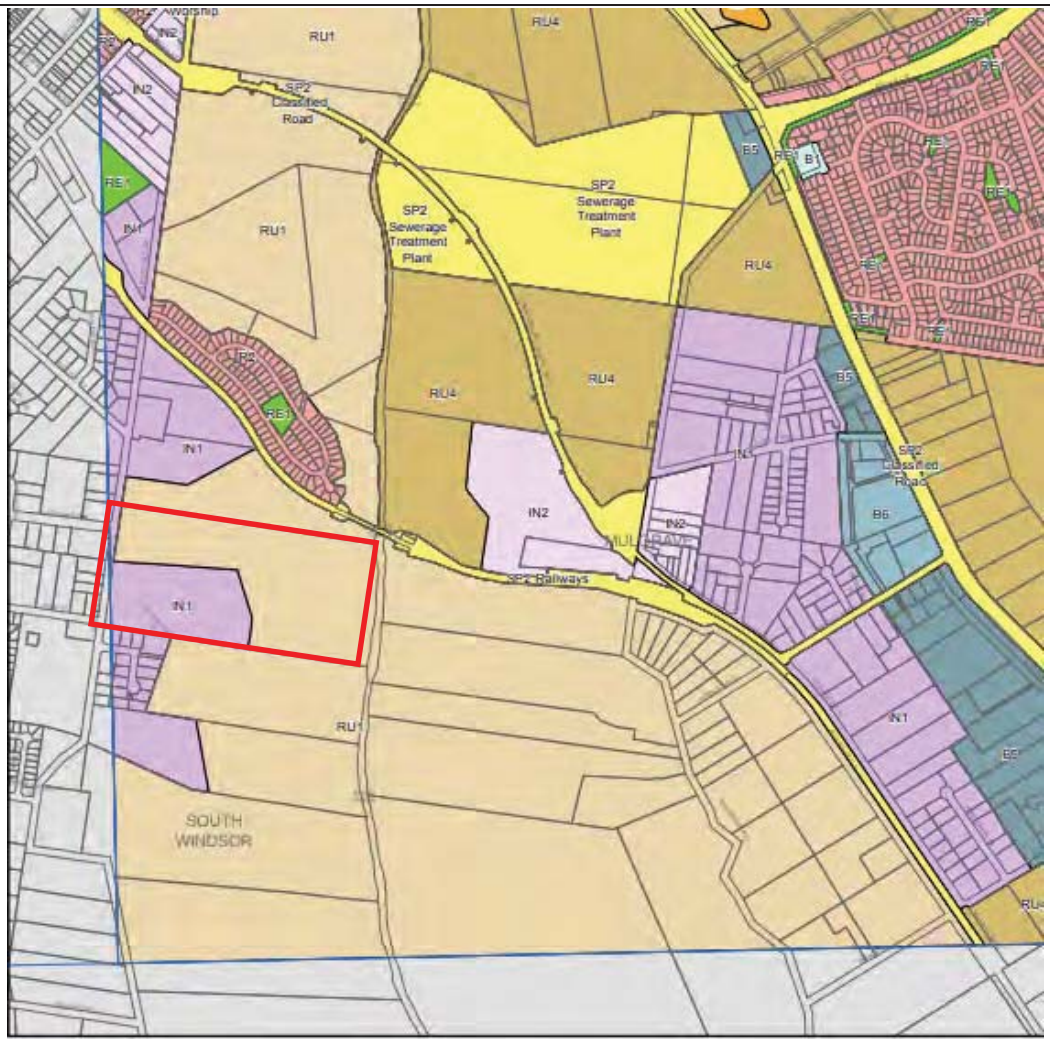
↑N Not to scale	LEGEND: Site Boundary	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

2.3 LAND USE OF SITE AND SURROUNDINGS

The site is zoned as 'RU1 Primary production / IN1 General Industrial' under the Hawkesbury Local Environmental Plan (LEP) 2012 as shown in Figure 2-3.

The surroundings are a mix of general industry and primary production, with the nearest residential area located 370 m to the south-west. The nearest school, Windsor High School, is located approximately 1.2 km to the north-east. Hawkesbury Valley Way is located approximately 500 m east of the site and Mulgrave train station is 700 m to the east. To the north is a cattle field, the east is South Creek and a concrete batching facility is south of the site.

Figure 2-3: Hawkesbury LEP 2012 – Land Zoning Map (extract)



Source: Hawkesbury LEP 2012

N

Not to scale

LEGEND

Site Boundaries

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		

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

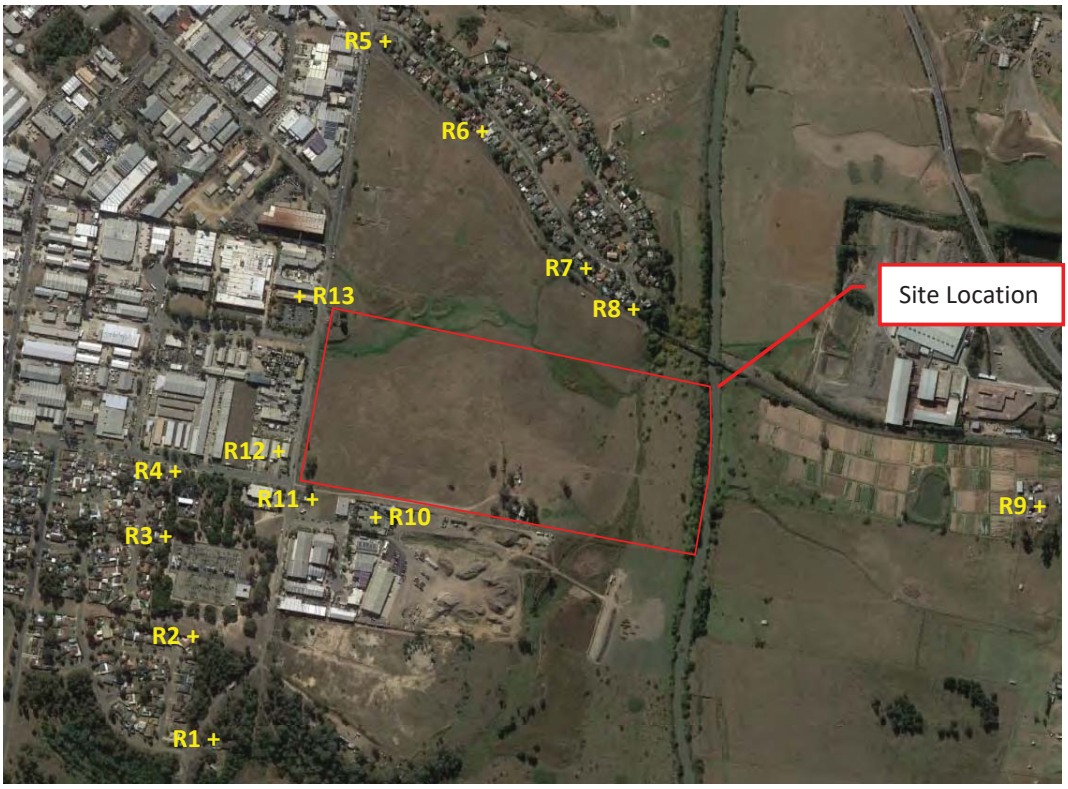
2.4 NEAREST SENSITIVE RECEPTORS

Table 2-1 lists the location of representative potentially affected receivers that are considered in this assessment. These are shown in Figure 2-4.

Table 2-1: Nearest Potentially Affected Receptors

Receptor ID	Address	Lot	DP	Separation distance	Type of receiver
R1	180 Fairey Road, South Windsor	28	861506	600 m	Residential
R2	18 Hale Crescent, South Windsor	85	263057	500 m	Residential
R3	10 Beasley Place, South Windsor	48	263057	430 m	Residential
R4	153 Ham Street, South Windsor	24	263057	370 m	Residential
R5	2 James Meehan Street, Windsor	76	238572	690 m	Residential
R6	30 James Meehan Street, Windsor	62	238572	550 m	Residential
R7	64 James Meehan Street, Windsor	23	246385	480 m	Residential
R8	6 Chisholm Place, South Windsor	17	246385	500 m	Residential
R9	124 Mulgrave Road, Mulgrave	13	736138	1100 m	Residential
R10	4 Speedwell Place, South Windsor	1	828534	Adjacent	Industrial Premises
R11	1 Speedwell Place, South Windsor	16	806993	Adjacent	Industrial Premises
R12	128 Ham Street, South Windsor	Null	SP33235	Adjacent	Industrial Premises
R13	97 Fairey Road, South Windsor	36	263025	300 m	Industrial Premises

Figure 2-4: Location of Nearest Potentially Affected Receptors



Source: Six Maps 2018

N

Not to scale

Legend:

Site Boundaries

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

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.

3. DESCRIPTION OF THE PROPOSAL

This section of the report discusses the proposed operation of the site. Figure 3-1 shows the layout of the proposed site, Figure 3-2 shows the site plan with traffic pathways and Figure 3-3 shows elevations of the proposed building and external stockpiles. A description of the process is provided below.

3.1 SITE AND PROCESS DESCRIPTION

The construction materials processing and recycling facility will be located in the south west corner of the site (located within the 'IN1 General Industrial' zone), within a purpose built building. Access to the site is via Fairey Road. The proposed facility will receive, handle and process up to 98,000 tonnes of construction and demolition (C&D) waste per year. This includes virgin excavated natural material (VENM) and excavated natural material (ENM).

Trucks driving onto the site will be weighed and inspected before being unloaded. Waste material is to be sorted, with timber, glass, metal, soil, general waste and sandstone taken out of the waste stream. Concrete waste, VENM and ENM will be crushed through the jaw crushers, and then screened through the screen within the building. Crushed materials are then processed through a screener to separate size fractions.

Separated waste streams will be stockpiled externally. A front end loader will be used to transfer materials to and from the stockpiles and the separated piles will then be taken off site by truck to sell to market or to landfill.

Dust impacts and potential controls are detailed in Section 6 Air Quality Impacts.

Figure 3-1: Site layout

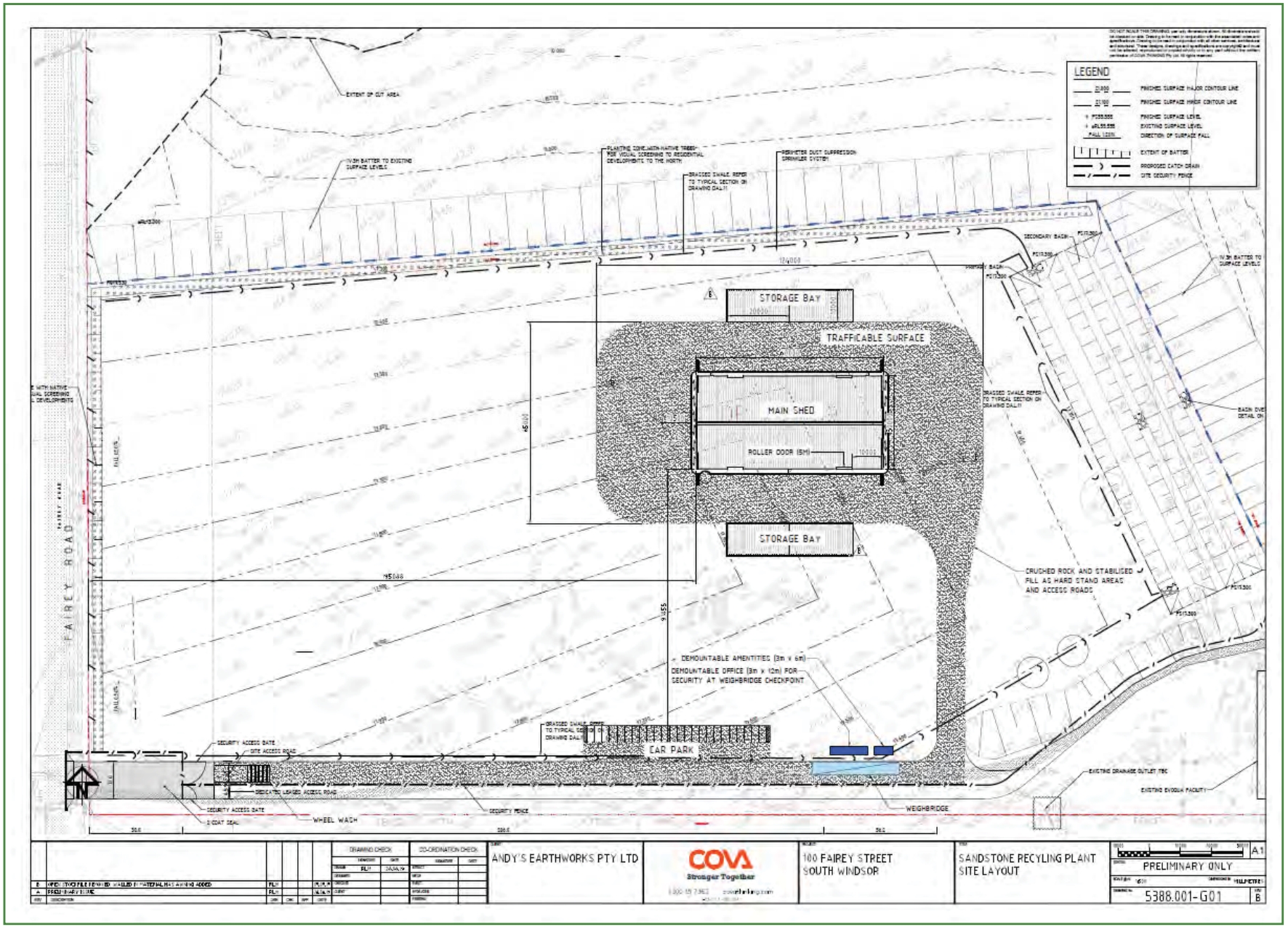


Figure 3-2: Site plan with traffic pathways

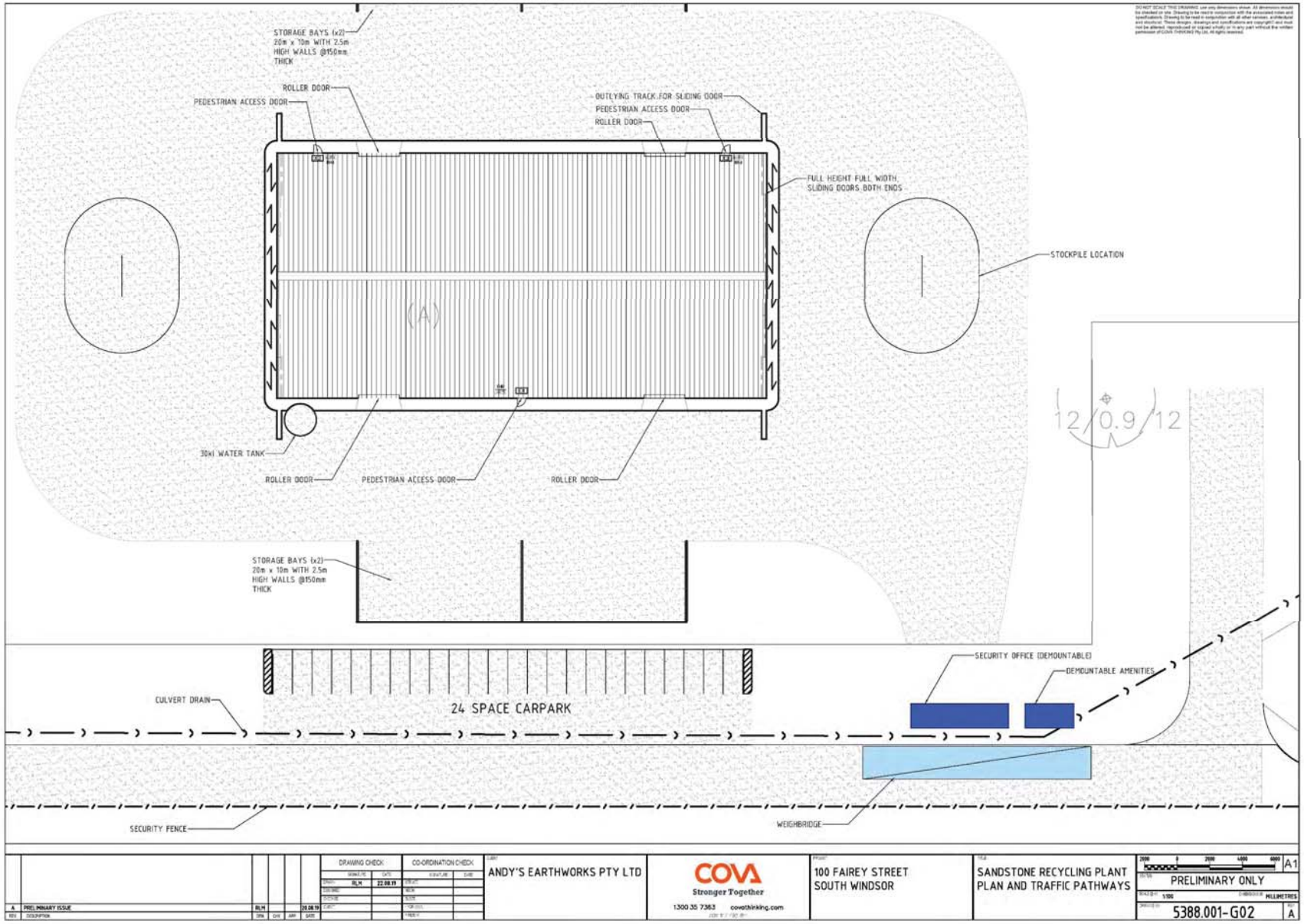


Figure 3-3: Purpose built building and external stockpile elevations

4. AIR QUALITY CRITERIA AND GUIDELINES

4.1 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.

4.2 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.

4.3 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 4-1. These criteria are applied at the nearest existing or likely future off-site sensitive receptor.

Table 4-1: 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

5. 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.

5.1.1 Representative Meteorological Year

The nearest automatic weather monitoring station within proximity to the subject site is the Richmond RAAF base Automatic Weather Station (AWS - ID 067105) operated by the Bureau of Meteorology. It is located approximately 4.5 kilometres to the north-west of the subject site. This weather station is considered suitable to determine the most representative year and summarise the local weather conditions presented in this section.

Meteorological data of 2014-2018 were compared to long term averages from Richmond RAAF base AWS for minimum and maximum temperature, and mean daily wind run. The representative meteorological year of 2015 was selected as was found to be consistent with long term trends (Attachment 2). Wind roses, representing the annual frequency of wind speed and direction, were also compared for four meteorological years and found to be reasonably consistent (Attachment 1). The 2015 meteorological year had a higher proportion of south westerly winds than the other four years compared against, but the patterns of predominant wind direction and frequencies were similar to all other years.

A 2015 prognostic meteorological data file was created by Lakes Environmental using the WRF model and AERMET pre-processor.

5.1.2 WRF and AERMET

The Weather Research and Forecasting (WRF) Model is a next-generation mesoscale numerical weather prediction system designed as a collaborative effort between the American National Center for Atmosphereic Research and other meteorological specialist organisations. It was created for both atmospheric research and operational forecasting applications and serves a wide range of meteorological applications across scales from tens of meters to thousands of kilometres.

AERMET is a meteorological pre-processor that organises data and estimates the necessary boundary layer parameters for dispersion calculations in AERMOD.

A meteorological data file was produced for inclusion in the air dispersion model using AERMET ver. 16216. The WRF prognostic data was entered into AERMET as onsite and upper air data. The surrounding land use was set to urban.

5.2 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 ie. 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.

5.2.1 Local Wind Trends

Seasonal wind rose plots for this site using Richmond RAAF base AWS data from 2015 have been included in Figure 5-1. Annual average wind speeds of 2.49 m/s and a calms frequency of 15.05% were estimated. Annual winds from the south-west were found to be dominant and were present at a frequency of approximately 15%.

The average summer wind speed was estimated to be 2.78 m/s, with a calms frequency of 10.47%. South-westerly, easterly, and north-easterly winds were found to be dominant at a frequency of around 17%, 16% and 15% respectively.

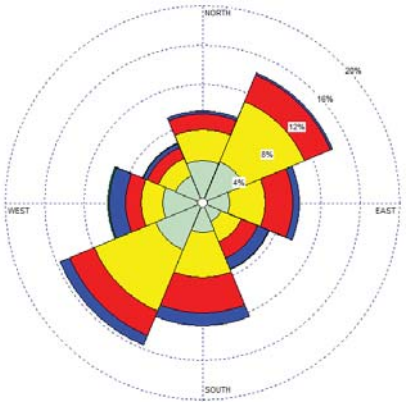
In autumn, dominant winds blew from the south-west (~19%). The average autumn wind speed was 2.54 m/s with a calms frequency of 14.12%.

The winter season data showed the prevalence of winds from the western and northern directions. The dominant winds blew from the west at a frequency of ~14%. Winds from the south-west, north and north-east were also common, at around 12% frequency each. The average winter wind speed was 1.97 m/s with a calms frequency of 21.92%.

In the spring time, average wind speeds of 2.69 m/s were recorded. Dominant winds were from the north-east (17%), south-west (15%) and south (14%). The spring calms frequency was 13.56%.

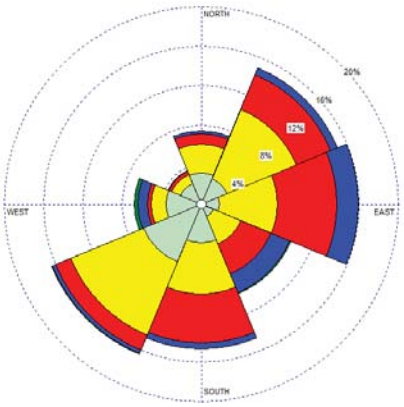
Figure 5-1: Wind Rose Plots for the Referenced Meteorological Station – Richmond RAAF base, Bureau of Meteorology (2015)

All Seasons



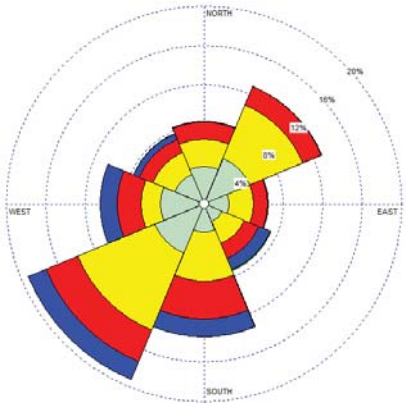
Average Wind Speed: 2.49 m/s
Calms Frequency: 15.05%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Summer Season (December – February)



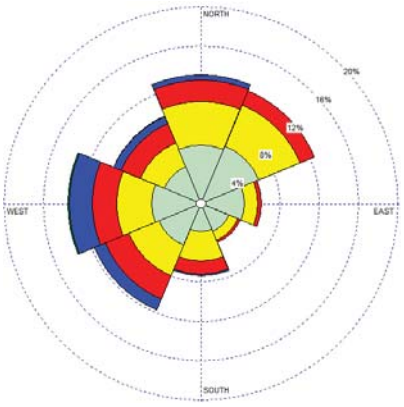
Average Wind Speed: 2.78 m/s
Calms Frequency: 10..47%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Autumn Season (March – May)



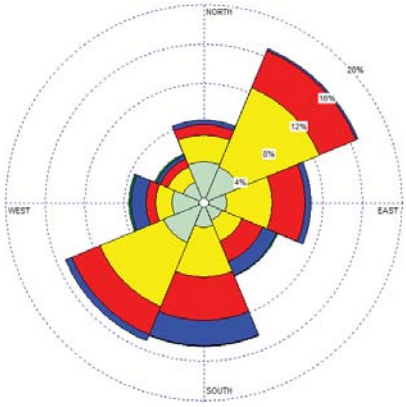
Average Wind Speed: 2.54 m/s
Calms Frequency: 14.12%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Winter Season (June – August)



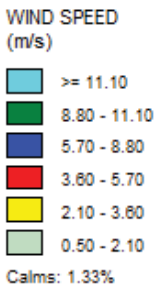
Average Wind Speed: 1.97 m/s
Calms Frequency: 21.92%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Spring Season (September – November)



Average Wind Speed: 2.69 m/s
Calms Frequency: 13.56%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

Legend

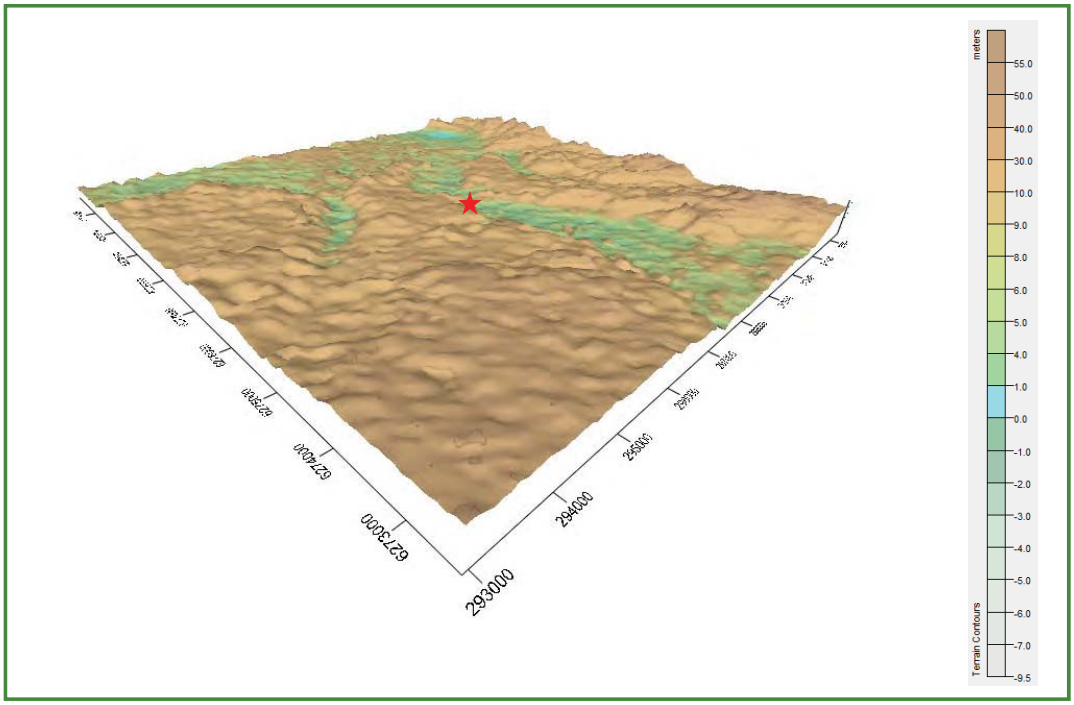


5.3 TERRAIN AND STRUCTURAL EFFECTS ON DISPERSION

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 subject site. Figure 5-2 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 that have been digitised from local contour terrain maps.

Figure 5-2: Local Topography of Site, Factor of 10 Vertical Exaggeration



5.4 LOCAL AIR QUALITY

No air quality measurements have been undertaken specifically for this project. Instead, the nearest available air quality monitoring data 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.

Ambient air quality data for $PM_{2.5}$ and PM_{10} was obtained from the NSW EPA Richmond air quality monitoring station located approximately 6.7 km west of the subject site, inside the

campus of the University of Western Sydney, Hawkesbury. This station is considered to be site-representative. The relevant data is summarised in Table 5-1.

Table 5-1: Summary of 2015 Data for PM_{10} and $PM_{2.5}$ from Richmond Air Quality Monitoring Station.

Pollutant	Averaging period	Concentration (µg/m^3)
PM_{10}	Maximum 24 hr average for 2015	49.32
	2nd highest 24 hr average for 2015	35.89
	3rd highest 24 hr average for 2015	35.83
	Annual average for 2015	17.6
$PM_{2.5}$	Maximum 24 hr average for 2015	**41.99**
	2nd highest 24 hr average for 2015	**25.58**
	3rd highest 24 hr average for 2015	24.4
	Annual average for 2015	**8.2**

Note: 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 34.5 µg/m^3 for an annual averaging period.

Background data from Richmond air quality monitoring station has missing values for some hourly measurements. As AERMOD models missing values as zero, where a 24-hour period was missing an hourly measurement, a daily average was calculated from available data and then substituted for the missing hourly data. This was done to ensure no under estimation of predicted levels of PM_{10} and $PM_{2.5}$ was made.

A summary of the background air quality levels from Richmond air quality monitoring station adopted for this assessment is provided in Table 5-2. Elevated concentrations are marked in bold and concentrations exceeding the *Approved Methods* criteria are marked in red.

Table 5-2: Adopted Particulate Matter Background Levels for Assessment

Pollutant	Averaging Period	Concentration (µg/m^3)
Total Suspended Particulates (TSP)	Annual	34.5
PM_{10}	24 hours	**49.32**
	Annual	17.6
$PM_{2.5}$	24 Hours	**41.99**
	Annual	**8.2**

The data collected from Richmond air quality monitoring station shows elevated background levels of $PM_{2.5}$ that exceed the *Approved Methods* for both the annual and 24 hour averaging periods criterion of 8 µg/m^3 and 25 µg/m^3 respectively.

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 Sections 7.5.2 and 8.

6. AIR QUALITY IMPACTS

6.1 CONSTRUCTION

Construction activities will include:

- Levelling of the land by cut and fill;
- Stabilising the area using road base material;
- Establishment of sediment basins, drainage channels and stormwater management controls;
- Planting of vegetation;
- Construction of outdoor stockpile bays;
- Construction of a purpose built building for operations to take place;
- Installation of small demountable buildings for use as office and amenities; and
- Installation of mains water storage tanks, weighbridge, wheel wash facilities and mobile water sprays for dust suppression.

The construction activities have the potential to generate dust.

A Construction Environmental Management Plan (CEMP) is recommended to be prepared that documents the environmental aspects of the construction phase and establishes procedures to manage any potential impacts. It is recommended an Air Quality Control Procedure be presented in the CEMP 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.

Controls 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 stockpile 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 vehicle 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.

6.2 OPERATIONS

The proposed development will include the following dust generating activities:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of C&D waste including VENM, ENM, recycled crushed concrete, brick and excavated rock products within the building; and
- Material storage in stockpiles.

Control Measures

The following control measures will be implemented to reduce dust impacts:

- Dust emitting activities limited to inside the building;*
- Wind breaks/dividing barriers on stockpiles;*
- Water dust suppression sprays;*
- Vegetative buffers; and
- Confine stockpiles to covered storage bays.

*** These control measures have been implemented in the dispersion model**

7. AIR IMPACT ASSESSMENT & MODELLING

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, as follows.

7.1 EMISSION SOURCES

The main air emissions typical of a construction and demolition recycling facility include dust and particulates (Total suspended particulates (TSP), PM_{10} and $PM_{2.5}$). There will be no odour emissions associated with the proposed development as none of the materials stored on-site and none of the processes undertaken are odour-generating. Therefore, odour does not warrant any further assessment.

The air emission sources associated with the proposed development are listed below.

- Front end loader handling of materials;
- Material crushing and screening;
- Unloading materials and loading materials; and
- Wind erosion of stockpiles.

Wheel generated dust has not been considered as a significant source of emissions. The entire site will be hardstand of compacted road base which releases minimal dust. Trucks wheels will also be promptly cleaned in a wheel wash as they leave the site to remove any dust or sediments, and will only achieve minimal speeds on the site. Hence, wheel generated dust emissions are adequately controlled.

7.1.1 Assumptions

The following assumptions were used in the model:

- The total of 98,000 tonnes per annum of raw material processed was used to estimate emissions from the subject site for the annual emissions of the Truck Loading and Unloading, Front end Loader, Crusher and Screener sources;
- The maximum peak daily processed (crushed & screened) material usage of 500 tonnes of materials was used to estimate emissions from the subject site for the 24 hour daily emissions of the Loading, Unloading, Front end Loader, Crusher and Screener sources;
- Stockpiles were assumed to occupy 400 m^2 for 24 hours per day and 365 days per year. The same emission rate and area size were used to estimate both annual and 24 hours emissions; and
- All other sources were modelled for the business hours of Monday to Friday 7am to 6pm and Saturday 7am to 1pm.

7.1.2 Mitigation measures

The air quality mitigation measures (for dust control) that are included in the proposed development are summarised below.

- All truck unloading, crushing, screening and sorting of materials are conducted within a building; and
- All dust generating sources will be sprayed with dust suppression sprays.

7.2 ADOPTED EMISSION FACTORS

The following emission factors from the 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 $PM_{2.5}$.

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 wind erosion from external stockpiles.

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 crushing and screening activities.

Table 7-1: Emission Factors

Reference (NPI EETM)	Source	$PM_{2.5}$ Emission Factor (kg/tonne)	PM_{10} Emission Factor (kg/tonne)	TSP Emission Factor (kg/tonne)
Mining (overburden)	Front End Loader/ Excavator	0.0018	0.012	0.025
Mining and Processing of Non-Metallic Minerals	Screening	0.00151	0.0043	0.0125
Mining and Processing of Non-Metallic Minerals	Crushing	0.00042	0.0012	0.0027
Mining and Processing of Non-Metallic Minerals	Loading	0.00001	0.00005	[1]0.00010
Mining and Processing of Non-Metallic Minerals	Unloading	0.000001	0.000008	[1]0.00002
Mining	Wind Erosion from Stockpiles	[2]0.03 kg/ha/hr	0.2 kg/ha/hr	0.4 kg/ha/hr

[1] No TSP data available in NPI. As materials are made up of a variety of products (bricks, concrete, timber, metal, glass) a generic PM_{10} to TSP ratio of 0.51 has been assumed to estimate TSP emission factors.

[2] No $PM_{2.5}$ data available in NPI. A ratio of 0.15 $PM_{2.5}/PM_{10}$ has been adopted as per the *Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emissions Factors* (2006) 'Aggregate Handling and Storage Piles'

7.2.1 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 7-2.

Table 7-2: 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 7-1 depending on the emission reduction controls in place for each process, as outlined in Table 7-3.

Table 7-3: Emission Reduction Factors Applied to NPI EETM Emission Factors

Processes at Proposed Site	Control in Place	Reduction Factor(s) Applied
Front-end Loader (inside)	Enclosed by 2-3 walls, water sprays	0.1, 0.5
Screening	Enclosed by 2-3 walls, water sprays	0.1, 0.5
Crushing	Enclosed by 2-3 walls, water sprays	0.1, 0.5
Truck Loading	Enclosed by 2-3 walls, water sprays	0.1, 0.5
Truck Unloading	Enclosed by 2-3 walls, water sprays	0.1, 0.5
Front-end Loader (outside)	Water sprays	0.5
Wind erosion from Stockpiles	Water sprays	0.5

7.3 SOURCE CONFIGURATIONS AND PARAMETERS

7.3.1 Emission Rate Derivation

The emission rates for each source were estimated using the following equation by multiplying the emission factors previously discussed in Section 7.2 by the quantity of materials handled at the relevant activities for the corresponding activity period of time as outlined in the assumptions n Section 7.1.1 . Appropriate reduction factors outlined in Table 7-3 were then applied.

$$ER = \frac{1000 \times EF \times Q \times RF}{OpHrs}$$

Where:
ER = Emission Rate (g/s)
EF = Emission Factor (kg/tonne)
OpHrs = Annual operational time (s/year) or (s/day)
Q = Materials processed (tonnes/year) or (tonnes/day)
RF = Reduction Factor (if applicable)

7.3.2 Emission Sources Modelled

Each potential dust emitting process at the proposed recycling facility was allocated a separate source in the dispersion model, as outlined in Table 7-4 and Figure 7-1.

The annual processing capacity is 98,000 tonnes of materials to be crushed and screened. The maximum quantity of materials to be processed in one 24 hour period is not expected to exceed 500 tonnes.

As dust producing equipment (Crusher, Screener, Front end loader inside, Loading and Unloading from trucks) are enclosed within a building, they were modelled as a volume source with a height of 5 m which disperse emissions from the top height of the roller doors. All of these sources were modelled in the south-west corner of the site, to conservatively predict for greatest impacts at nearest receptors.

The outside activity of the FEL was modelled as a line area source of approximately 220 m in length, to simulate the dust generating activity of the vehicle when sorting and traveling outside of the building. The stockpiled materials were modelled as two separate area sources, with a total approximate area of 400 m^2. Emissions from the stockpiles have been modelled with a release height of 0 m above the ground. The stockpiles would in practice vary in height; however a lower release height has been conservatively adopted as it results in higher concentrations at receptors. Note that as the stockpile source is based on surface area, the emission rate remains the same for both annual averaging and peak 24 hour averaging.

Table 7-4: Summary of Emission Sources – Inventory

Source Name		Source Type	Source Area (m^2)	Source Height (m)	Daily Emission Rate (g/s)		Annual Emission Rate (g/s)		
					$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	TSP
Modelled as a total building source	Truck Loading	-	-	-	4.73E-06	3.16E-05	1.92E-06	1.28E-05	2.51E-05
	Truck Unloading	-	-	-	7.58E-07	5.05E-06	3.07E-07	2.05E-06	4.01E-06
	Front end loader (inside)	-	-	-	5.68E-04	3.79E-03	2.30E-04	1.53E-03	3.20E-03
	Crusher	-	-	-	2.65E-04	7.58E-04	1.07E-04	3.07E-04	6.91E-04
	Screener	-	-	-	9.50E-04	2.71E-03	3.85E-04	1.10E-03	3.20E-03
	Total Building	**Volume**	**1800**	**5**	1.79E-03	7.30E-03	7.25E-04	2.96E-03	7.11E-03
	Front end loader (outside)	Area Line Source	400	1	1.14E-02	7.58E-02	4.60E-03	3.07E-02	6.39E-02
	Stockpile 1	Area	200	0	1.67E-04	1.11E-03	1.67E-04	1.11E-03	2.22E-03
	Stockpile 2	Area	200	0	1.67E-04	1.11E-03	1.67E-04	1.11E-03	2.22E-03

Figure 7-1: Arrangement of Modelled Sources

7.4 DISPERSION MODEL

The new generation air dispersion model, AERMOD ver. 16216r, 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.

7.4.1 Meteorological Data

Prognostic meteorological data for the year 2015 was obtained from Lakes Environmental Services and pre-processed using AERMET, as described in Sections 5.1.1 and 5.1.2. The resultant upper air and surface data files were input to AERMOD.

7.5 AIR IMPACT MODELLING RESULTS

This section details the results of air impact modelling at the nearest sensitive receptors.

7.5.1 Maximum Impacts at Sensitive Receptors

Table 7-5 to Table 7-7 provide the results of the maximum modelled impacts for each identified receptor. Isopleths for each averaging period are provided in Figure 7-2 to Figure 7-6. Background concentrations that exceed the relevant *Approved Methods* criterion are marked with red text.

7.5.1.1 Annual

Table 7-5: TSP Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.014	34.5 µg/m³	34.51	90 µg/m³
R2	0.012		34.51	
R3	0.012		34.51	
R4	0.013		34.51	
R5	0.02		34.52	
R6	0.018		34.52	
R7	0.046		34.55	
R8	0.045		34.55	
R9	0.009		34.51	
R10	0.13		34.63	N/A[1]
R11	0.044		34.54	
R12	0.03		34.53	
R13	0.025		34.53	

✓Complies × Non-compliance

NOTE: [1]See section 8.2

Figure 7-2: TSP Annual Averaging Period Modelling Results

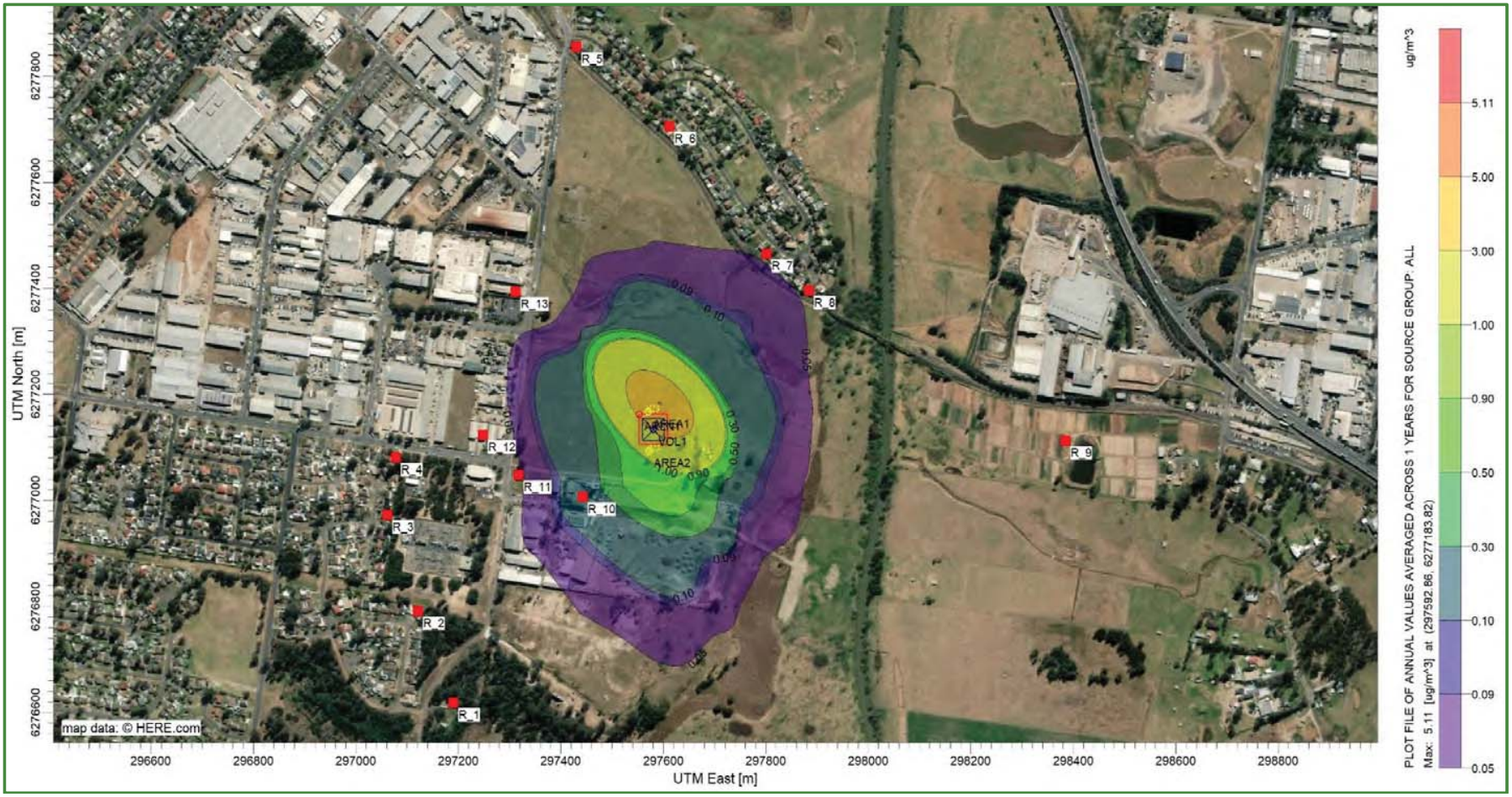


Table 7-6: PM_{10} Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.007	17.6 µg/m³	17.61	25 µg/m³
R2	0.006		17.61	
R3	0.006		17.61	
R4	0.006		17.61	
R5	0.01		17.61	
R6	0.01		17.61	
R7	0.02		17.62	
R8	0.02		17.62	
R9	0.00		17.60	
R10	0.06		17.66	N/A[1]
R11	0.02		17.62	
R12	0.01		17.61	
R13	0.01		17.61	

✓Complies × Non-compliance

NOTE: [1]See section 8.2

Figure 7-3: PM_{10} Annual Averaging Period Modelling Results

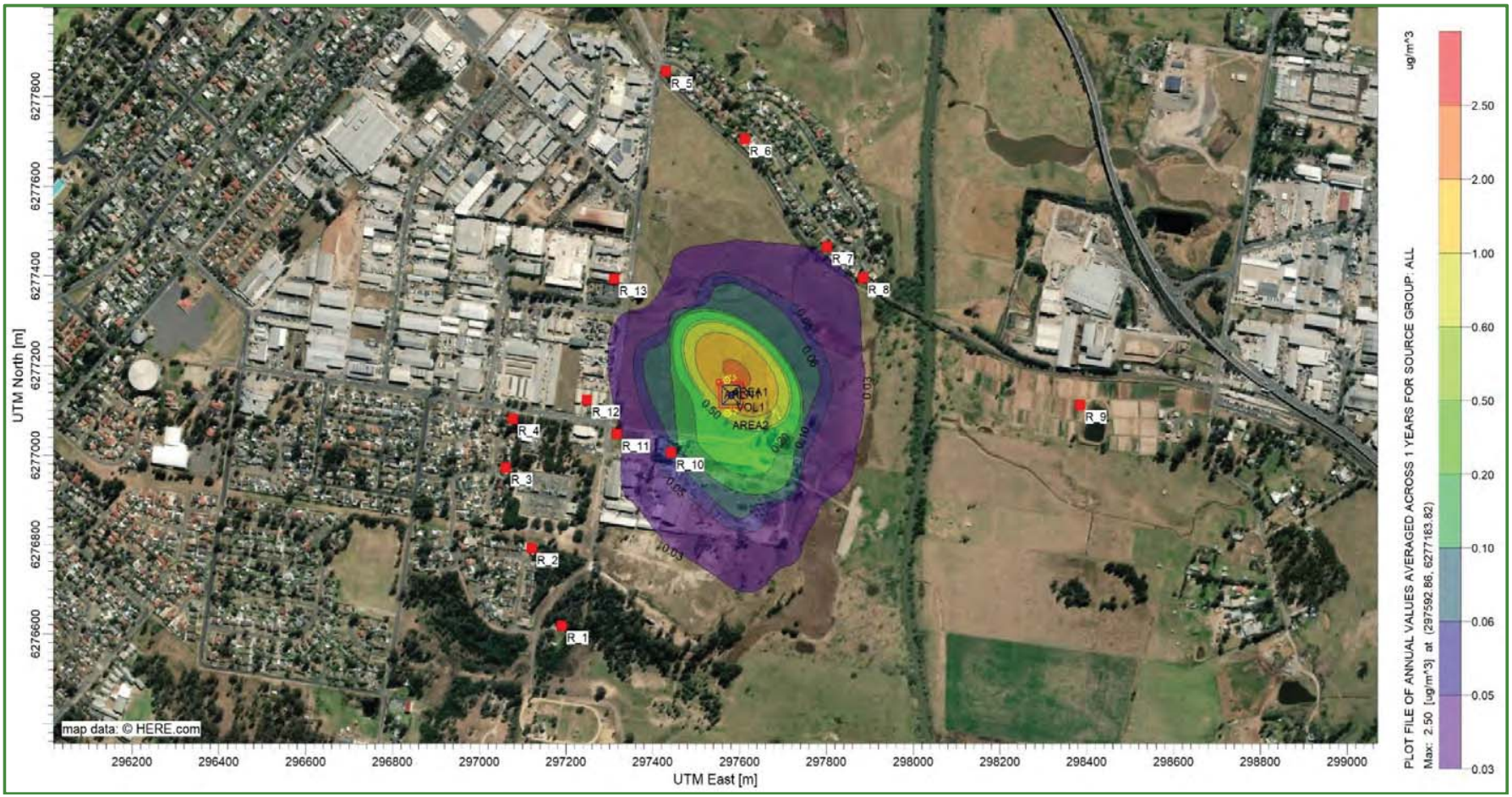


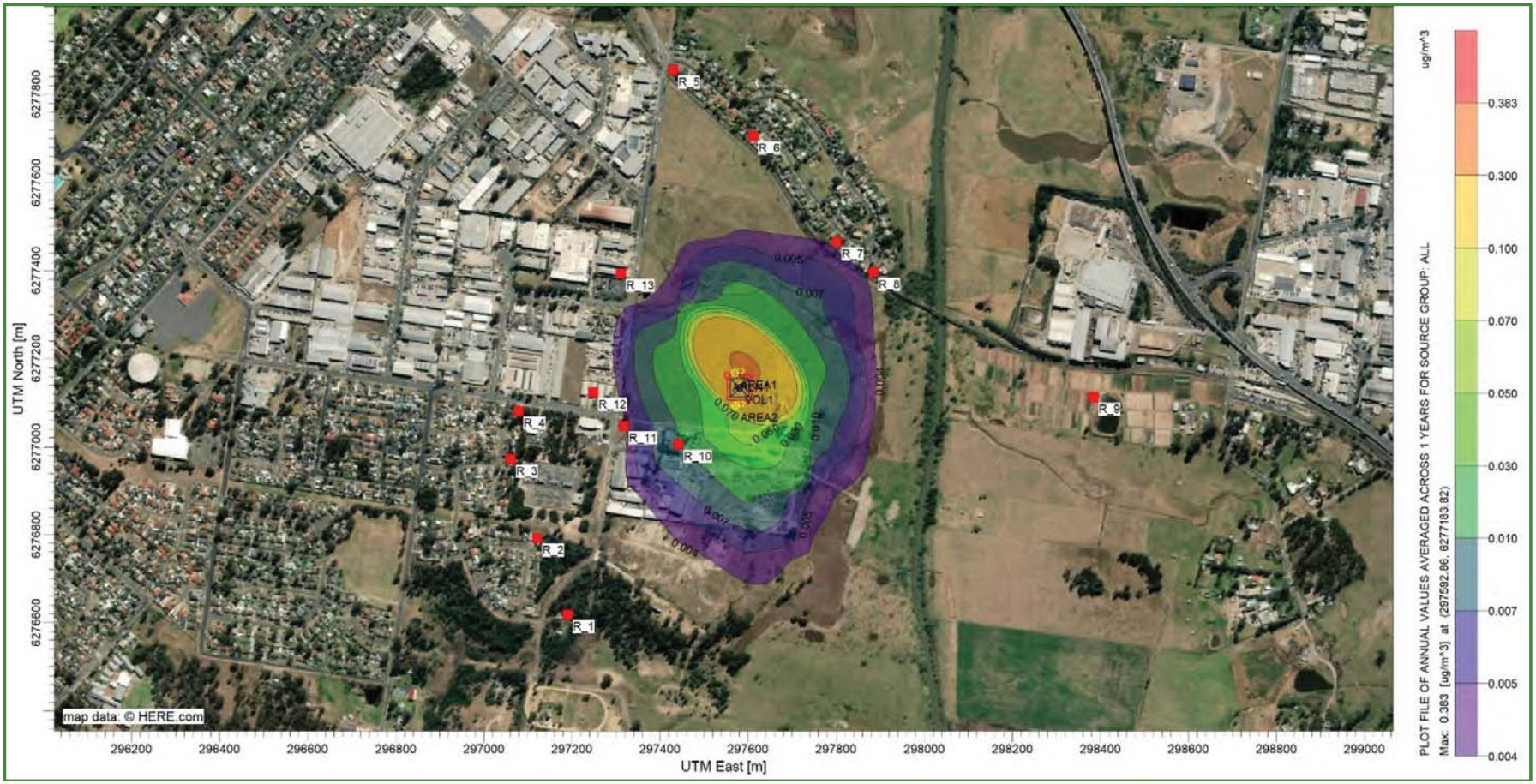
Table 7-7: $PM_{2.5}$ Annual Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.001	8.2 µg/m³	8.20	8 µg/m³
R2	0.001		8.20	
R3	0.001		8.20	
R4	0.001		8.20	
R5	0.001		8.20	
R6	0.001		8.20	
R7	0.004		8.20	
R8	0.003		8.20	
R9	0.001		8.20	
R10	0.01		8.21	N/A[1]
R11	0.003		8.20	
R12	0.002		8.20	
R13	0.002		8.20	

✓Complies × Non-compliance

NOTE: [1]See section 8.2

Figure 7-4: $PM_{2.5}$ Annual Averaging Period Modelling Results



7.5.1.2 24 hour

Table 7-8: 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	0.76	49.32 µg/m³	50.07	50 µg/m³
R2	0.48		49.79	
R3	0.09		49.40	
R4	0.40		49.71	
R5	4.29		53.60	
R6	0.53		49.84	
R7	0.37		49.68	
R8	1.41		50.72	
R9	0.52		49.83	
R10	1.69		51.00	N/A[1]
R11	0.33		49.64	
R12	0.79		50.10	
R13	0.38		49.69	

✓Complies × Non-compliance

NOTE: [1]See section 8.2

Figure 7-5: PM_{10} 24 Hour Averaging Period Modelling Results

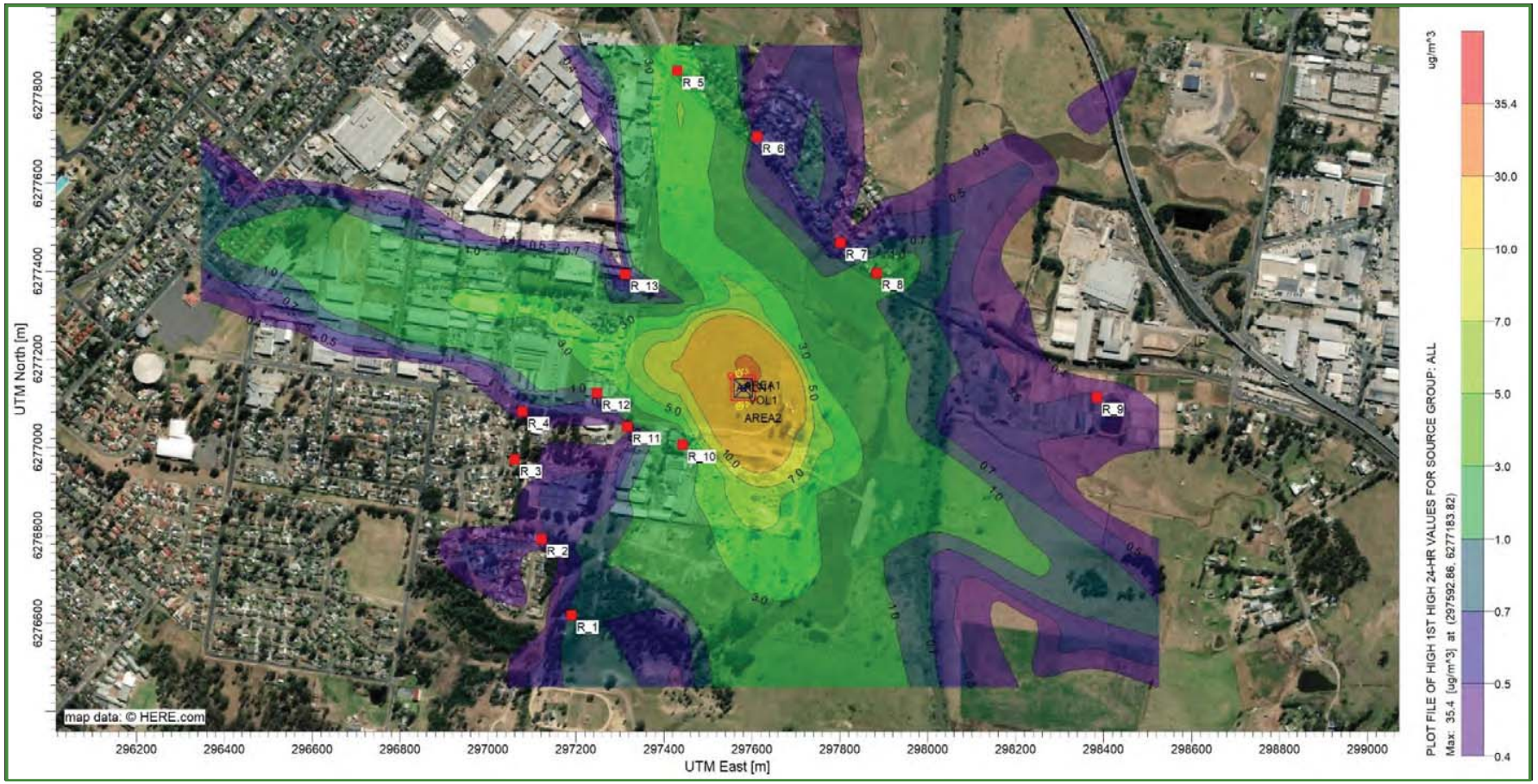


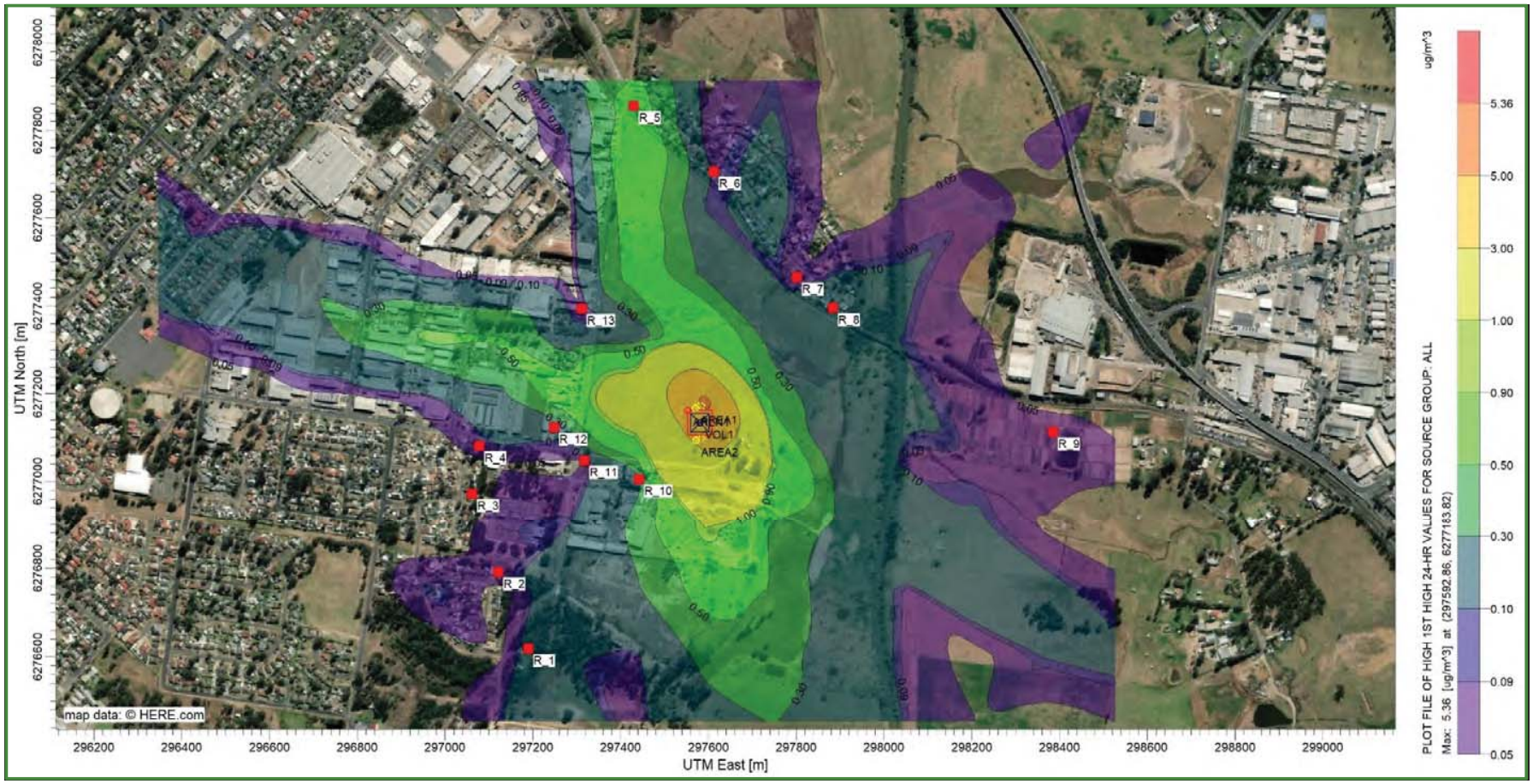
Table 7-9: $PM_{2.5}$ 24 Hour Averaging Period Modelling Results

Receptor ID	Incremental Impact (µg/m³)	Background (µg/m³)	Cumulative Impact (µg/m³)	Criteria (µg/m³)
R1	0.12	41.99 µg/m³	42.11	25 µg/m³
R2	0.08		42.07	
R3	0.01		42.00	
R4	0.07		42.06	
R5	0.65		42.64	
R6	0.09		42.08	
R7	0.06		42.05	
R8	0.21		42.20	
R9	0.08		42.07	
R10	0.27		42.26	N/A[1]
R11	0.05		42.04	
R12	0.13		42.12	
R13	0.06		42.05	

✓Complies × Non-compliance

NOTE: [1]See section 8.2

Figure 7-6: $PM_{2.5}$ 24 Hour Averaging Period Modelling Results



7.5.2 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 7-10 and Table 7-11 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 residential receptor (R5).

Table 7-10: Summary of Top Eight Days of Contemporaneous PM_{10} Impact and Background at Residential Receptor R5 (*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	49.32	0.004	49.32	30/06/2015	19.13	4.29	23.42
26/11/2015	35.83	0.06	35.89	15/06/2015	20.23	0.18	20.41
27/11/2015	35.59	0.24	35.83	8/07/2015	12.98	0.13	13.11
12/12/2015	31.67	1.15	32.82	28/07/2015	13.47	0.09	13.55
21/08/2015	30.27	0.001	30.27	9/03/2015	25.61	0.08	25.69
19/08/2015	27.49	0.02	27.51	16/05/2015	12.34	0.08	12.41
22/08/2015	27.35	0.0001	27.35	1/07/2015	9.56	0.08	9.64
10/03/2015	27.15	0.004	27.15	18/05/2015	15.77	0.07	15.84

✓Complies × Non-compliance

Table 7-11: Summary of Top Eight Days of Contemporaneous $PM_{2.5}$ Impact and Background at Residential Receptor R5 (*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
04/02/2015	41.99	0.002	41.99	30/06/2015	16.95	0.65	17.60
06/07/2015	25.58	0.0003	25.58	15/06/2015	15.43	0.03	15.46
21/08/2015	24.40	0.0002	24.40	8/07/2015	14.53	0.02	14.54
07/06/2015	23.82	0.00001	23.82	28/07/2015	11.58	0.01	11.60
05/07/2015	23.21	0.00000	23.21	9/03/2015	11.20	0.01	11.22
28/06/2015	21.21	0.00000	21.21	1/07/2015	16.91	0.01	16.92
22/08/2015	19.52	0.00002	19.52	16/05/2015	5.83	0.01	5.84
14/06/2015	18.27	0.00003	18.27	18/05/2015	9.08	0.01	9.09

✓Complies × Non-compliance

8. DISCUSSION OF MODELLING RESULTS

8.1 RESIDENTIAL RECEPTORS

TSP emissions at all sensitive receptors are predicted to comply with the *Approved Methods* criterion for an annual averaging period. PM_{10} annual average emissions are also predicted to comply at all residential receptors.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria. The background concentrations for $PM_{2.5}$ for both averaging periods at 8.2 µg/m^3 for annual and 41.99 µg/m^3 for 24 hour exceeded the *Approved Methods* criteria of 8 µg/m^3 and 25 µg/m^3 even before the incremental impacts were added. The background concentrations for 24 hour PM_{10} do not exceed the criteria of 50 µg/m^3 but are considered elevated at 49.32 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 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 human health or the environment.

8.2 INDUSTRIAL RECEPTORS

Industrial receptors are not considered "sensitive receptors" in this assessment. The justification is provided below.

Many air quality impact assessments conducted by Benbow Environmental and other respected environmental consultancies have been submitted to and approved by the EPA where neighbouring industrial facilities were not required to be considered as sensitive receptors.

It is our understanding that the *Approved Methods* criteria is designed to protect residents who may live at their home 24/7 and vulnerable people such as children and the elderly. It is highly unreasonable and unfeasible that this development must assess the same approved methods criteria at a residence, school or hospital to that of an industrial facility like that of warehouses, wholesalers, manufacturers operating in close proximity to the site. As employees typically only work an 8 hour shift at such facilities, a more suitable criterion is for these places of business would be the occupational health and safety levels, which the site has demonstrated would readily comply with.

As it is not common practice in NSW to assess industrial or commercial facilities against the *Approved Methods* criteria, and based on the nature of works undertaken, we believe it is unwarranted to assess the neighbouring industrial facilities as sensitive receivers.

9. STATEMENT OF POTENTIAL AIR QUALITY IMPACTS

TSP emissions at all sensitive receptors were predicted to comply with the *Approved Methods* criterion for an annual averaging period. PM_{10} annual average emissions are also predicted to comply at all residential receptors. Odour is not considered as a potential emission that would be generated from the proposed development and therefore was not assessed.

The maximum predicted impacts for 24 hour averaging periods for PM_{10} and $PM_{2.5}$, and the annual averaging period for $PM_{2.5}$ all exceeded the relevant criteria due to elevated background concentrations.

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

Therefore, the *Approved Methods* criteria are satisfied at all residential receptors for all particulate air pollutants modelled.

Matthew Taylor	Emma Hansma	R T Benbow
Graduate Environmental Scientist	Senior Engineer	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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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.

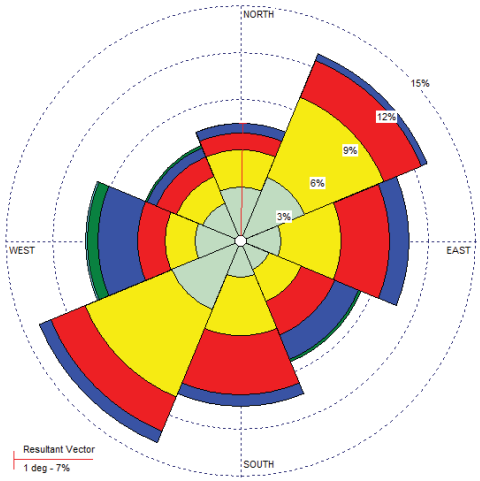
Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided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

ATTACHMENTS

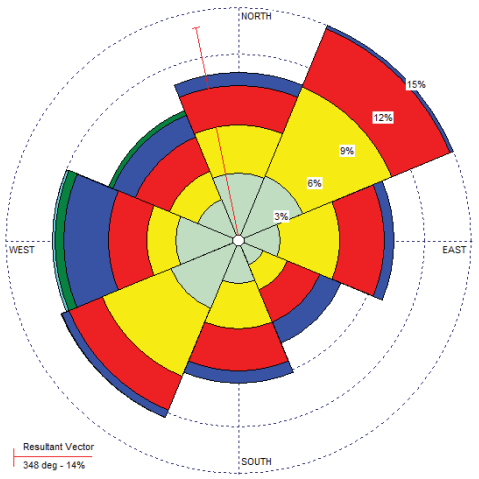
Attachment 1: Wind Rose Plots for the Referenced Meteorological Station – Richmond RAAF, Bureau of Meteorology 2014 – 2017.

2017



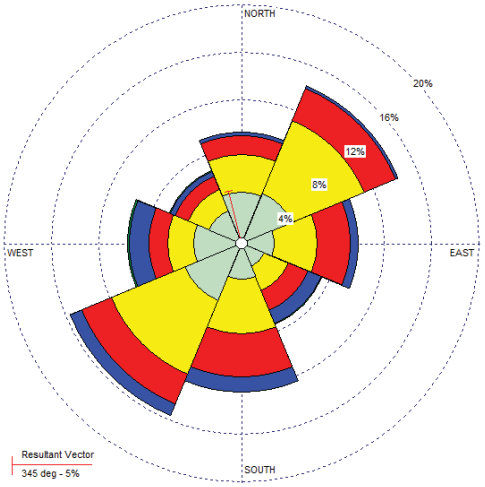
Average Wind Speed: 2.57 m/s
Calms Frequency: 19.67%
Axis Frequencies: 3%, 6%, 9%, 12%, 15%

2016



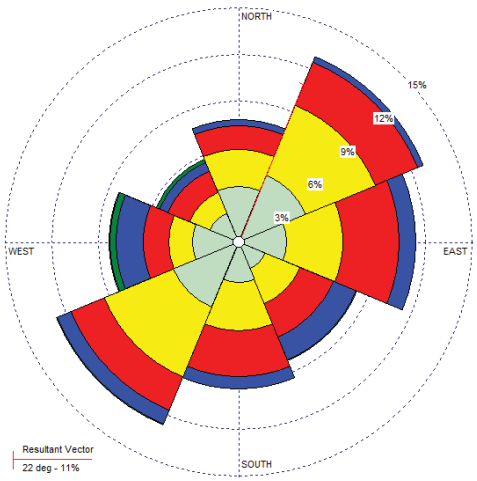
Average Wind Speed: 2 m/s
Calms Frequency: 14.42%
Axis Frequencies: 3%, 6%, 9%, 12%, 15%

2015



Average Wind Speed: 2.49 m/s
Calms Frequency: 15.05%
Axis Frequencies: 4%, 8%, 12%, 16%, 20%

2014



Average Wind Speed: 2.42 m/s
Calms Frequency: 22.63%
Axis Frequencies: : 3%, 6%, 9%, 12%, 15%

WIND SPEED
(m/s)

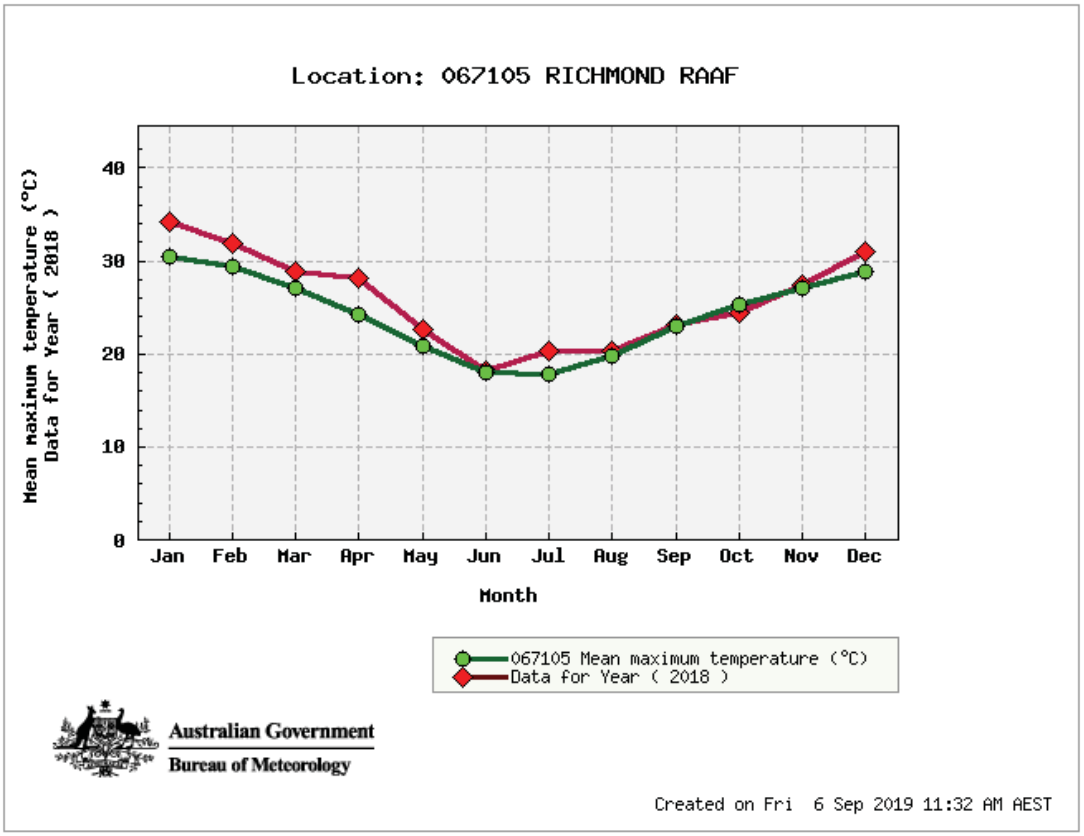
- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

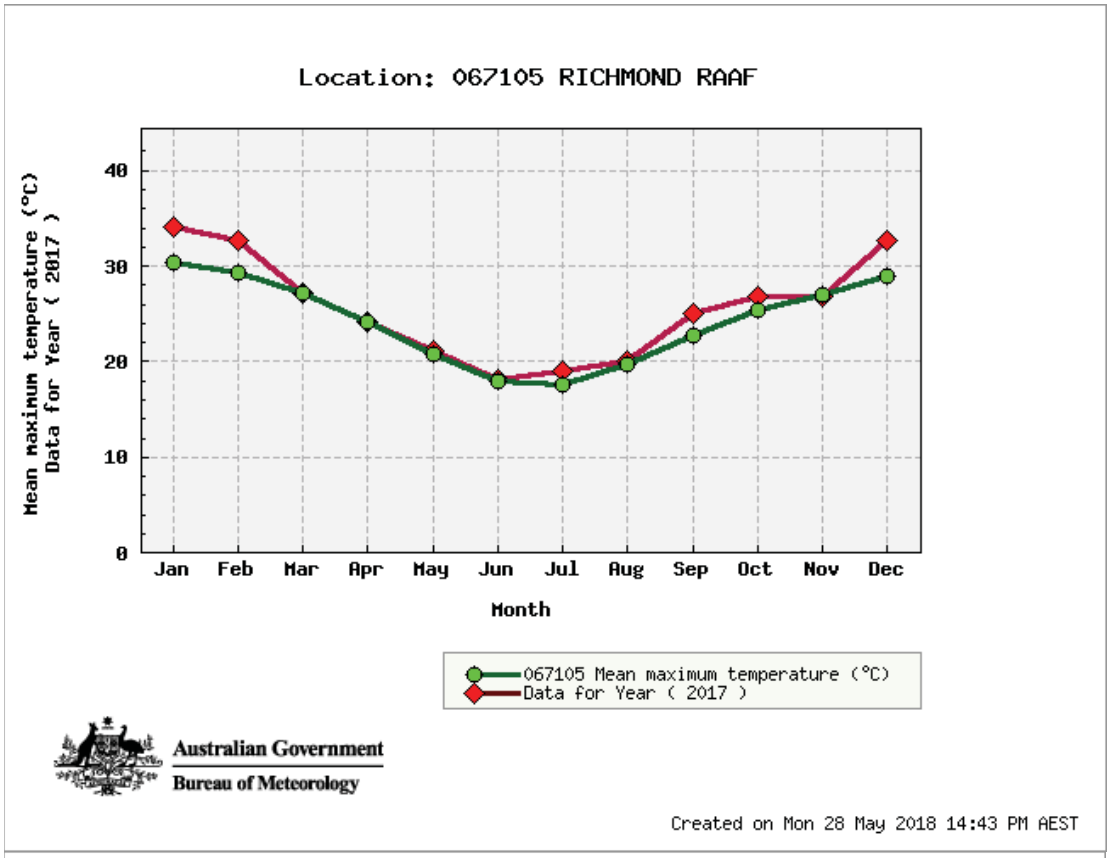
Attachment 2: Long-term Climate Statistics for the Referenced Meteorological Station – Bankstown Airport, Bureau of Meteorology

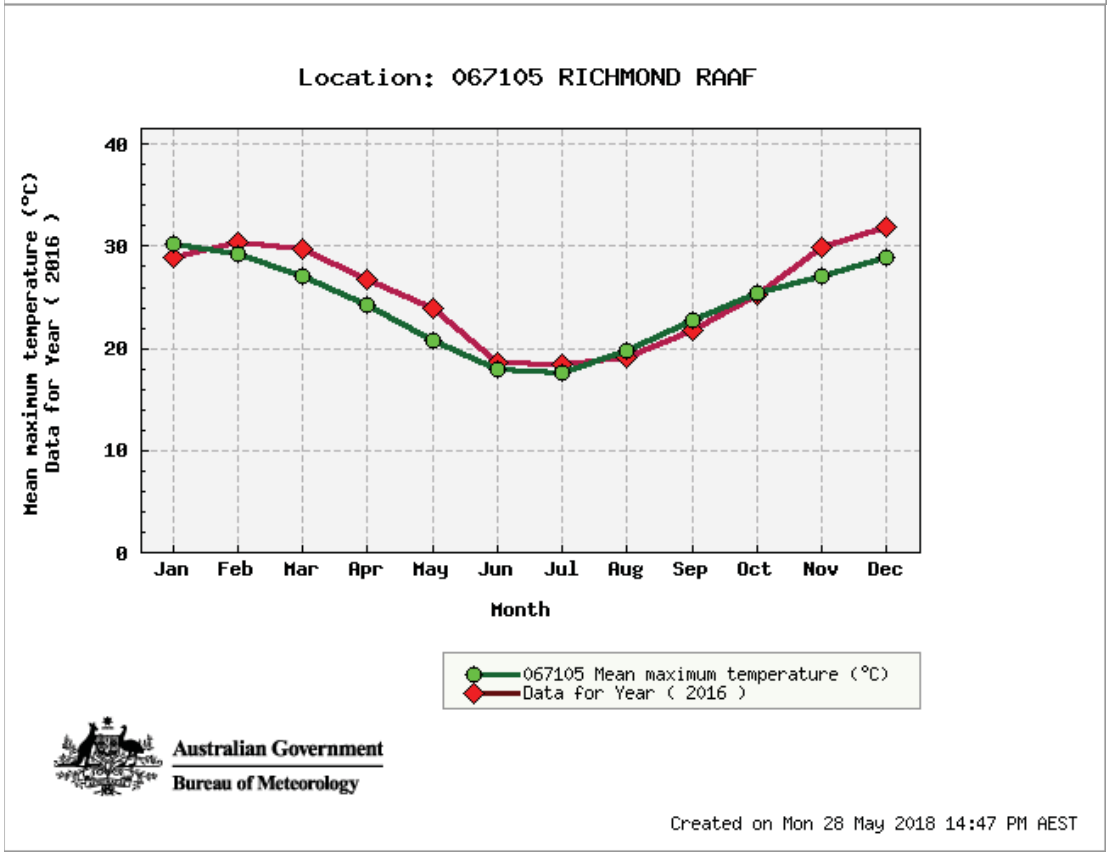
Representative Year

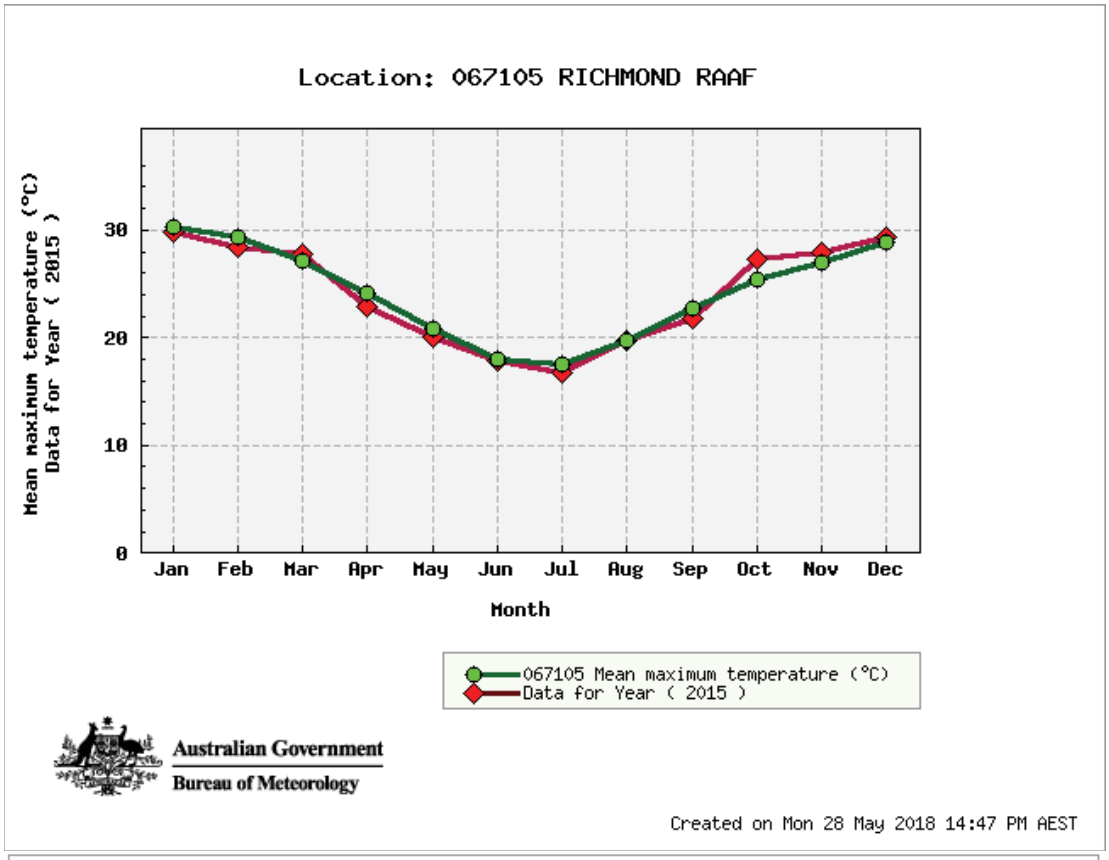
We have selected 2015 as the most representative year for weather. The maximum and minimum mean temperature follow the overall trend very closely in comparison to the years preceding 2019. Minimum mean temperatures for 2018, 2017 and 2016 show less of a smooth trend with anomaly spikes. For maximum temperatures in 2018, 2017 and 2016, the temperature tends to be quite a bit above the overall trend for several of the months in the year.

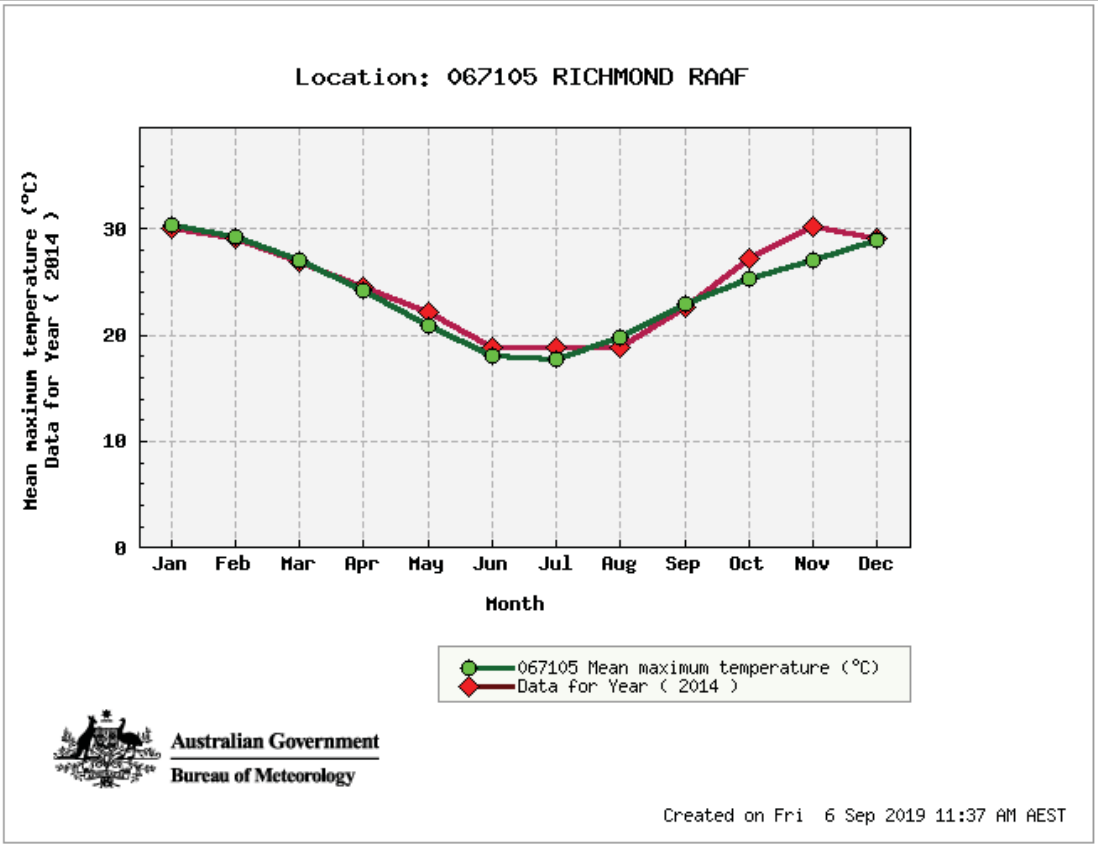
For mean daily wind run in 2015, the trend is followed more so than other years and it is the first year preceding 2019 to have complete data for the year. In 2018 there were 4 months of data missing, 2017 had 3 months missing and 2016 had 4 months missing. The wind run data for 2014 may follow the trend slightly more closely but data for December is missing.

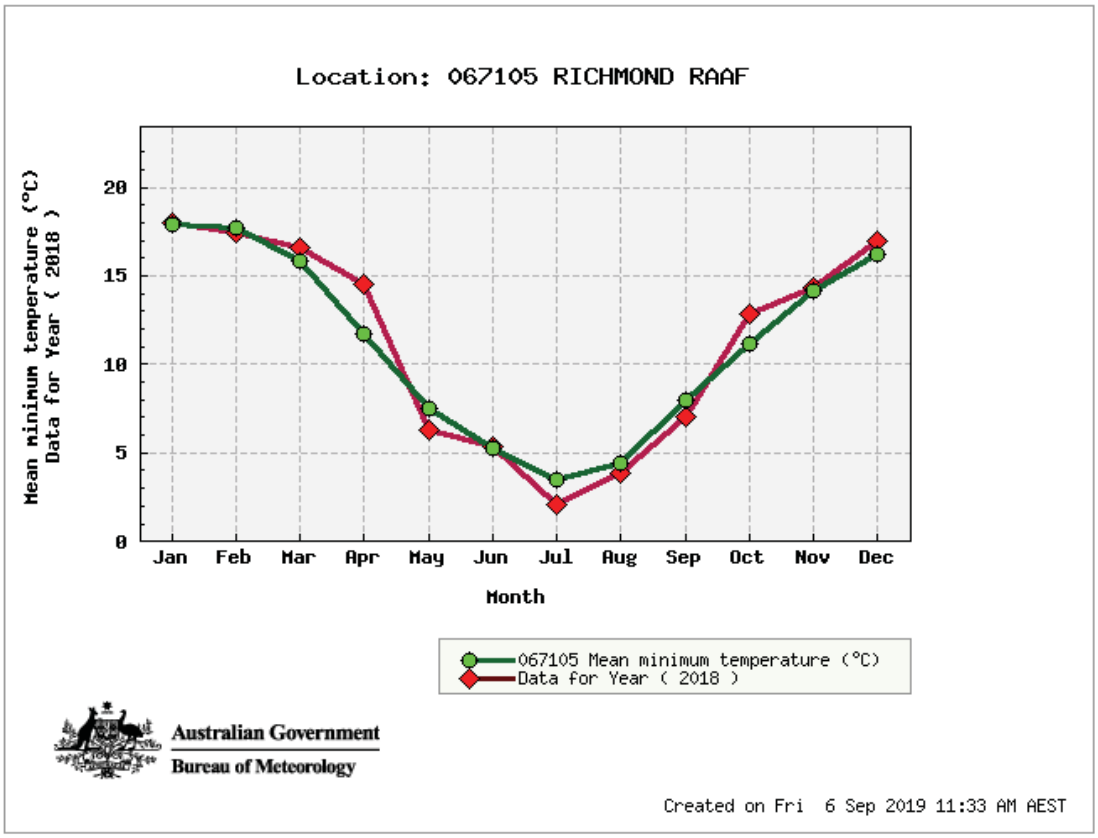


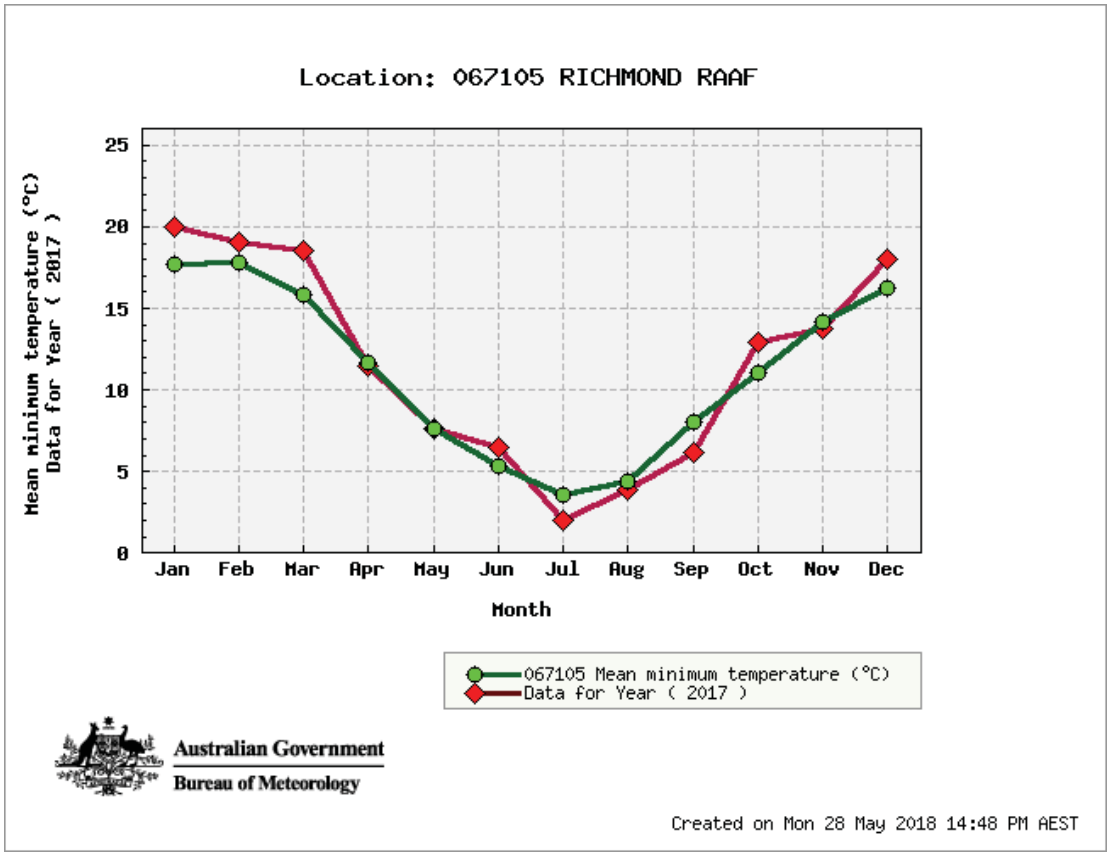


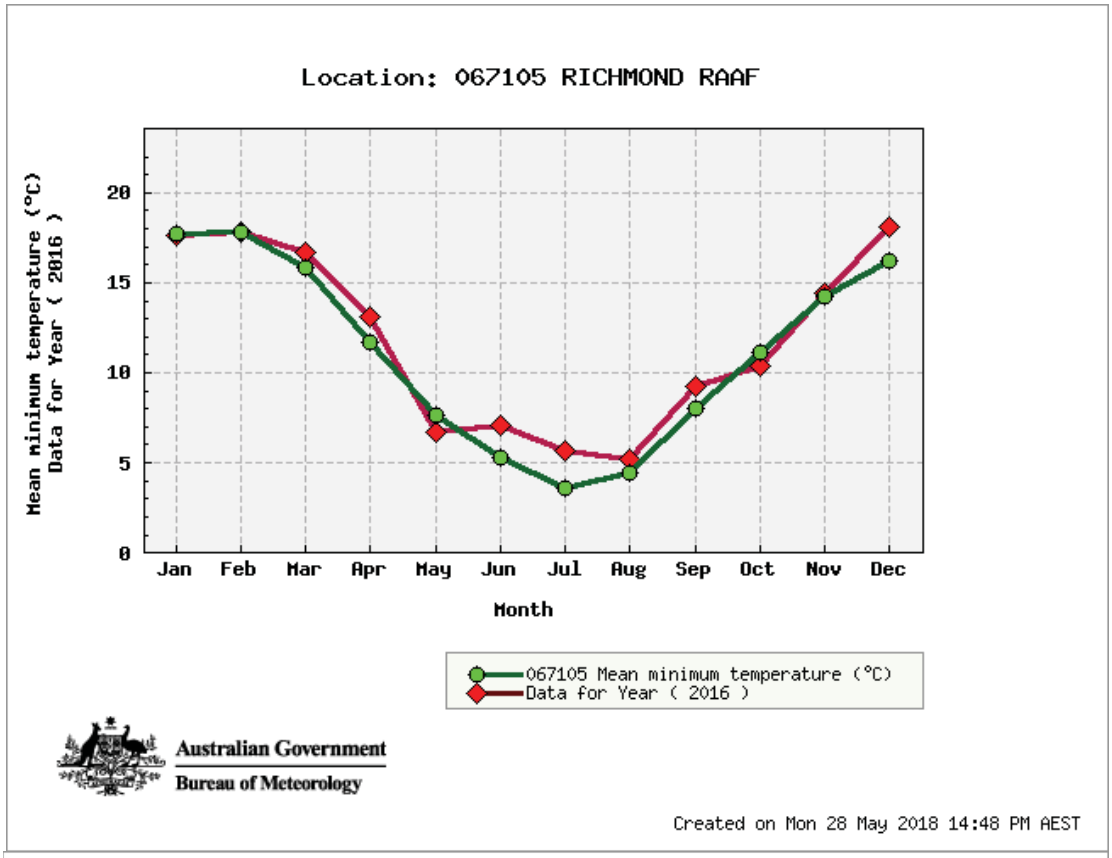


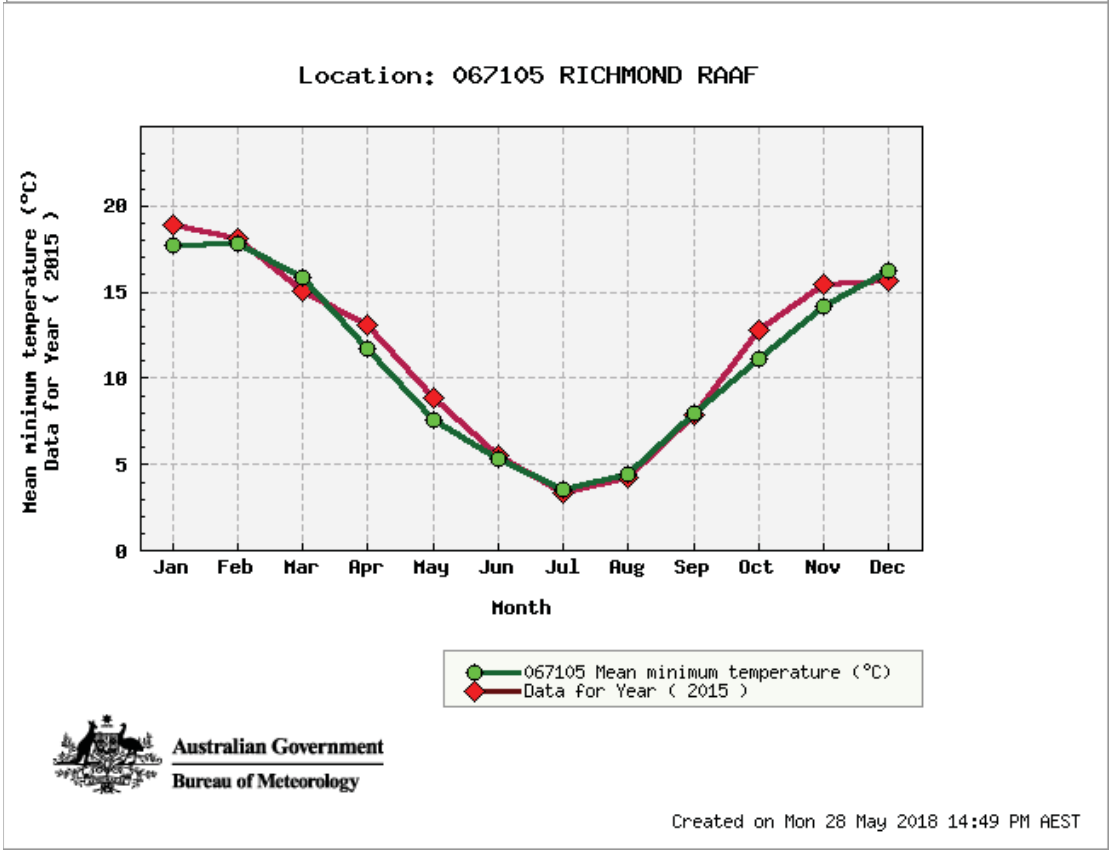


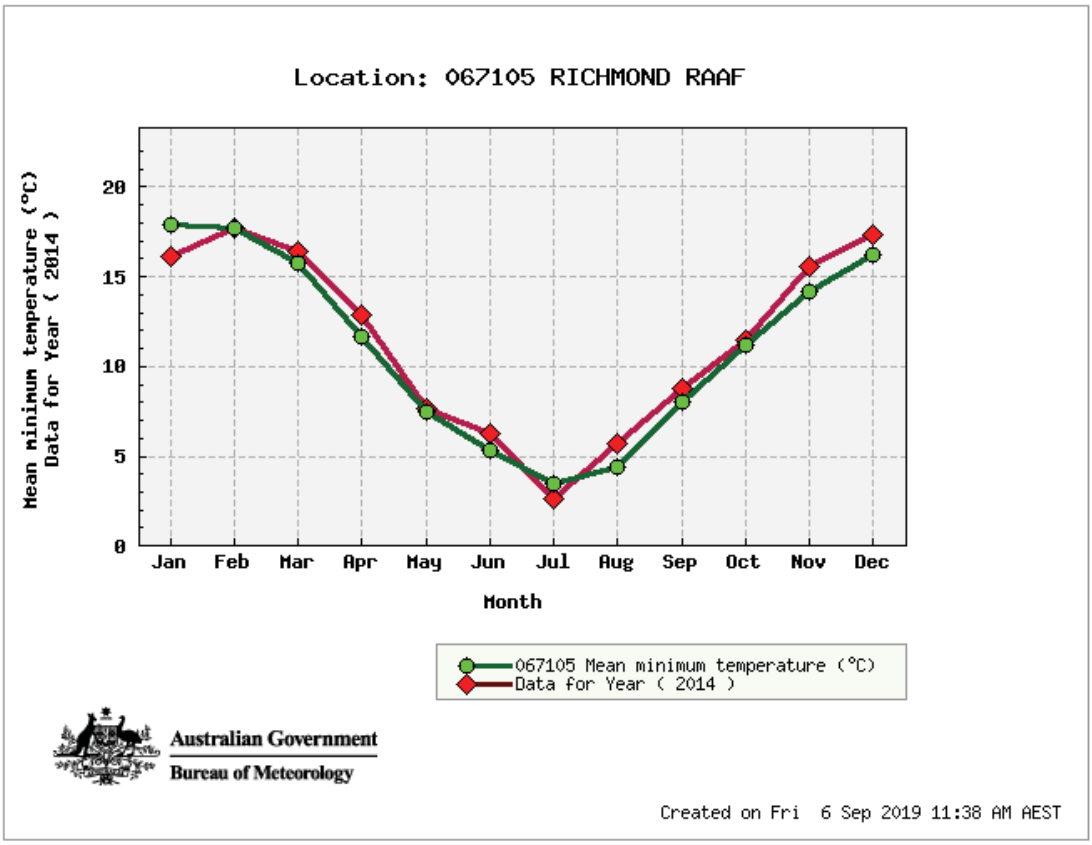


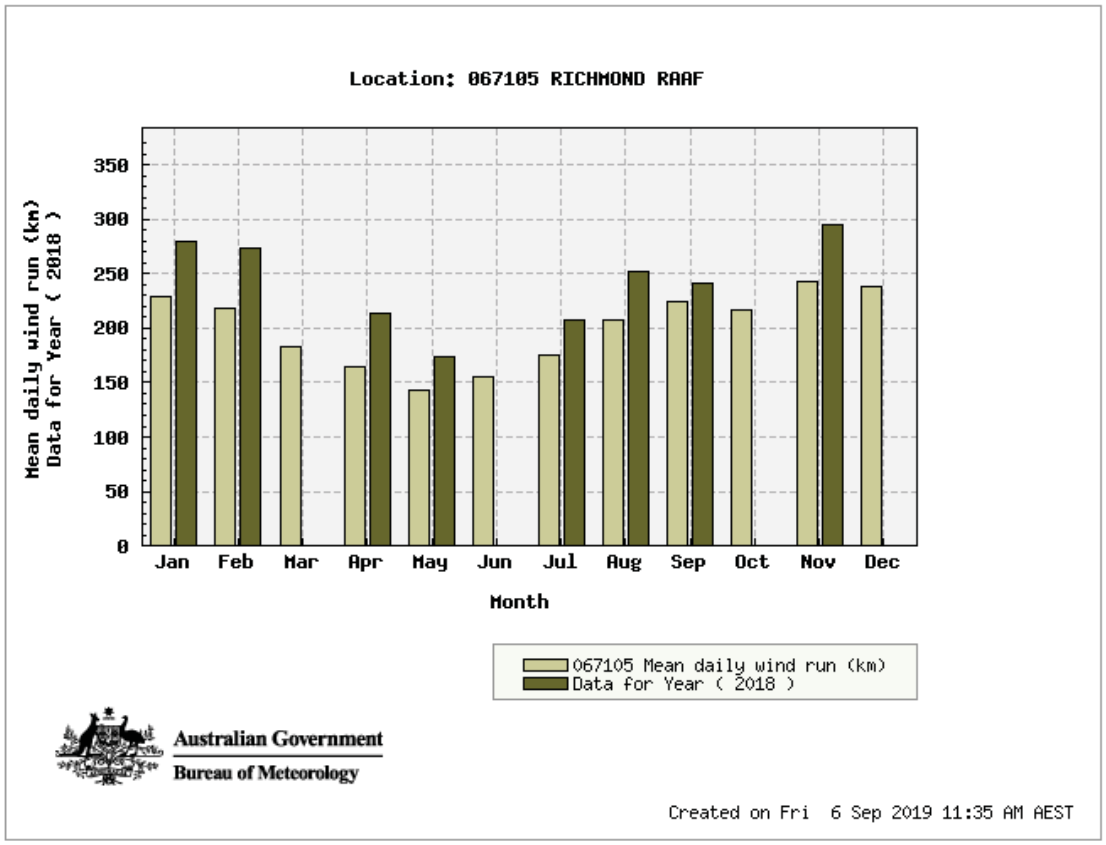


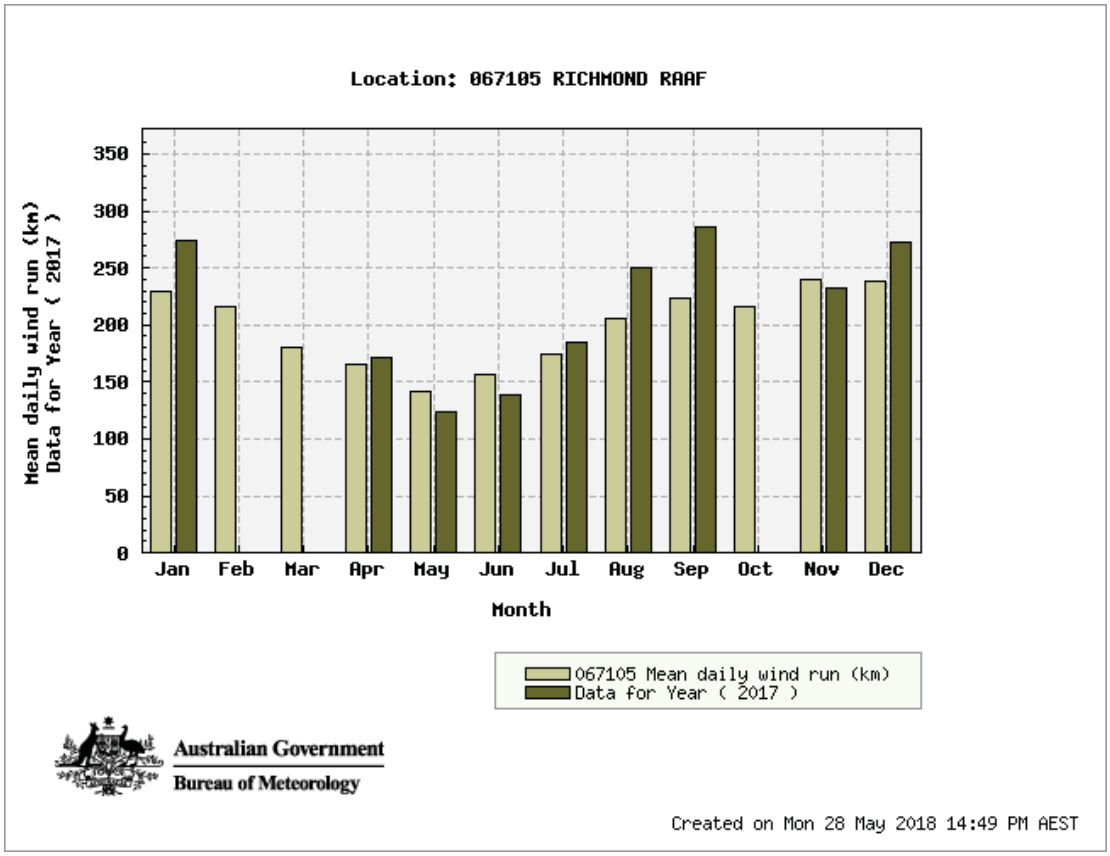


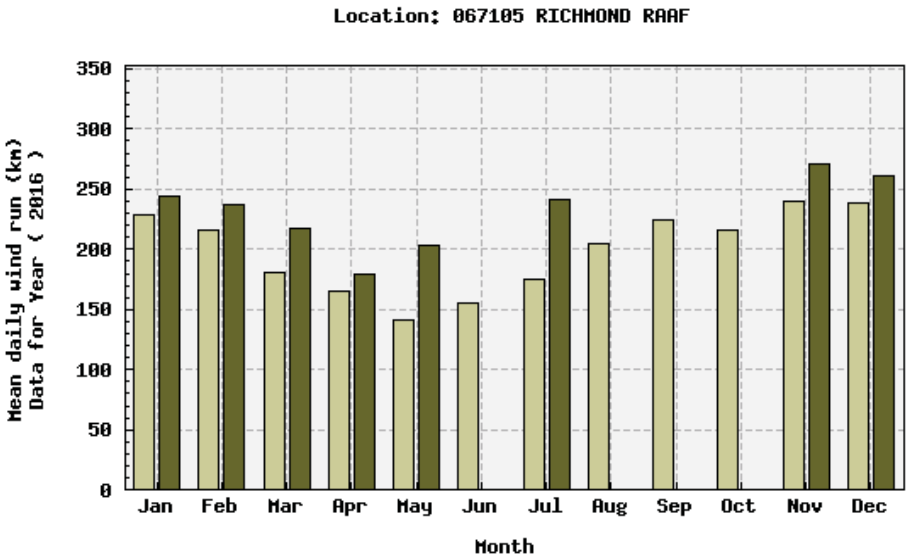












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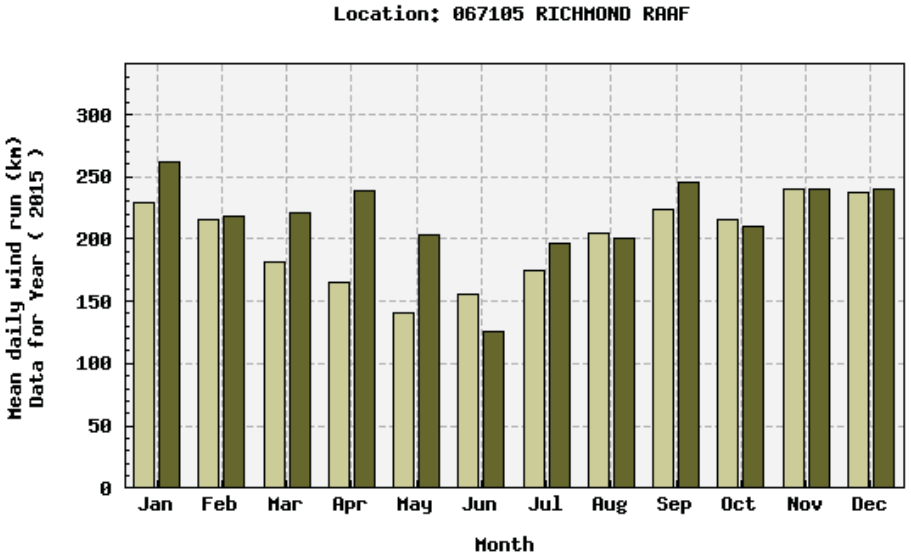

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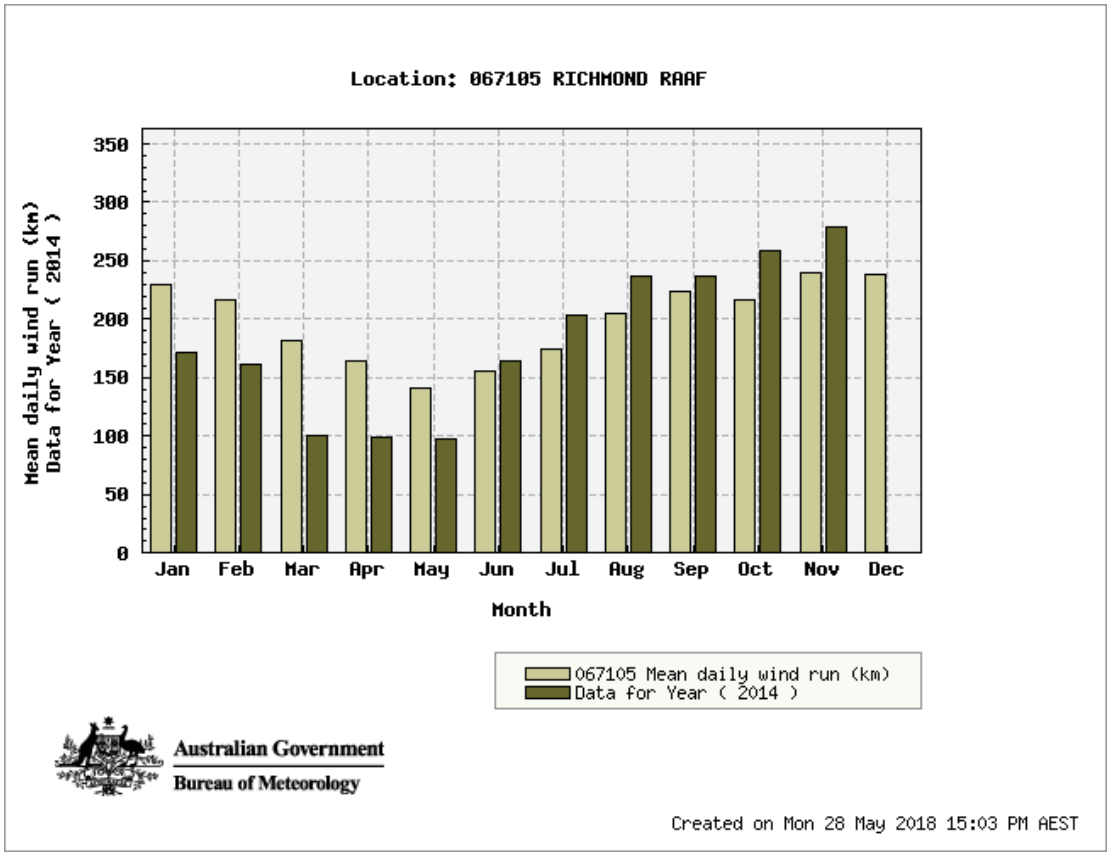

EIS Appendix 5: Noise Impact Assessment, Benbow Environmental

NOISE IMPACT ASSESSMENT
FOR ANDY'S EARTHWORKS
100 FAIREY ROAD, SOUTH WINDSOR

Prepared for: Andrew Irwin, Andy's Earthworks Pty Ltd
Martin Abell, MacroPlan Dimasi

Prepared by: Emma Hansma, Senior Engineer
R T Benbow, Principal Consultant

Report No: 181025_NIA_Rev5
September 2019
(Released: 11 September 2019)

Benbow
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1. INTRODUCTION

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd c/o MacroPlan Dimasi to prepare a noise impact assessment for a proposed facility at 100 Fairey Road, South Windsor.

The principal noise sources associated with the site include truck movements to and from the site, and on-site equipment including the crusher, screen, excavator and front end loader.

The potential noise impacts of operational, construction 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);
- NSW Road Noise Policy (RNP) (DECCW, 2011); and
- NSW Interim Construction Noise Guideline (DECC, 2009).

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) Establish project specific noise levels;
d) Determine all potential noise sources associated with the existing and 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 subject site is located at 100 Fairey Road South Windsor, Lot 4 in DP 264159. The site is located approximately 45 kilometres north-west of the Sydney central business district, in the South Windsor Industrial Area within the local government area of Hawkesbury City Council. Figure 2-1 shows the location of the subject site.

2.2 HOURS OF OPERATIONS

The facility is seeking approval to operate 7am to 6:00pm Monday to Friday and 7am to 1pm on Saturday.

2.3 PROPOSAL DESCRIPTION

The site is proposed to crush and screen up to 98,000 tonnes of construction and demolition waste including virgin excavated natural material (VENM) and excavated natural material (ENM).

As seen from the site plan in Figure 2-2, trucks will come onto site from Fairey Road via a driveway along the southern boundary of the property. The trucks will each carry up to 30 tonnes of material at a time. 10 truck movements are expected on average per day, with up to 20 trucks in the maximum scenario.

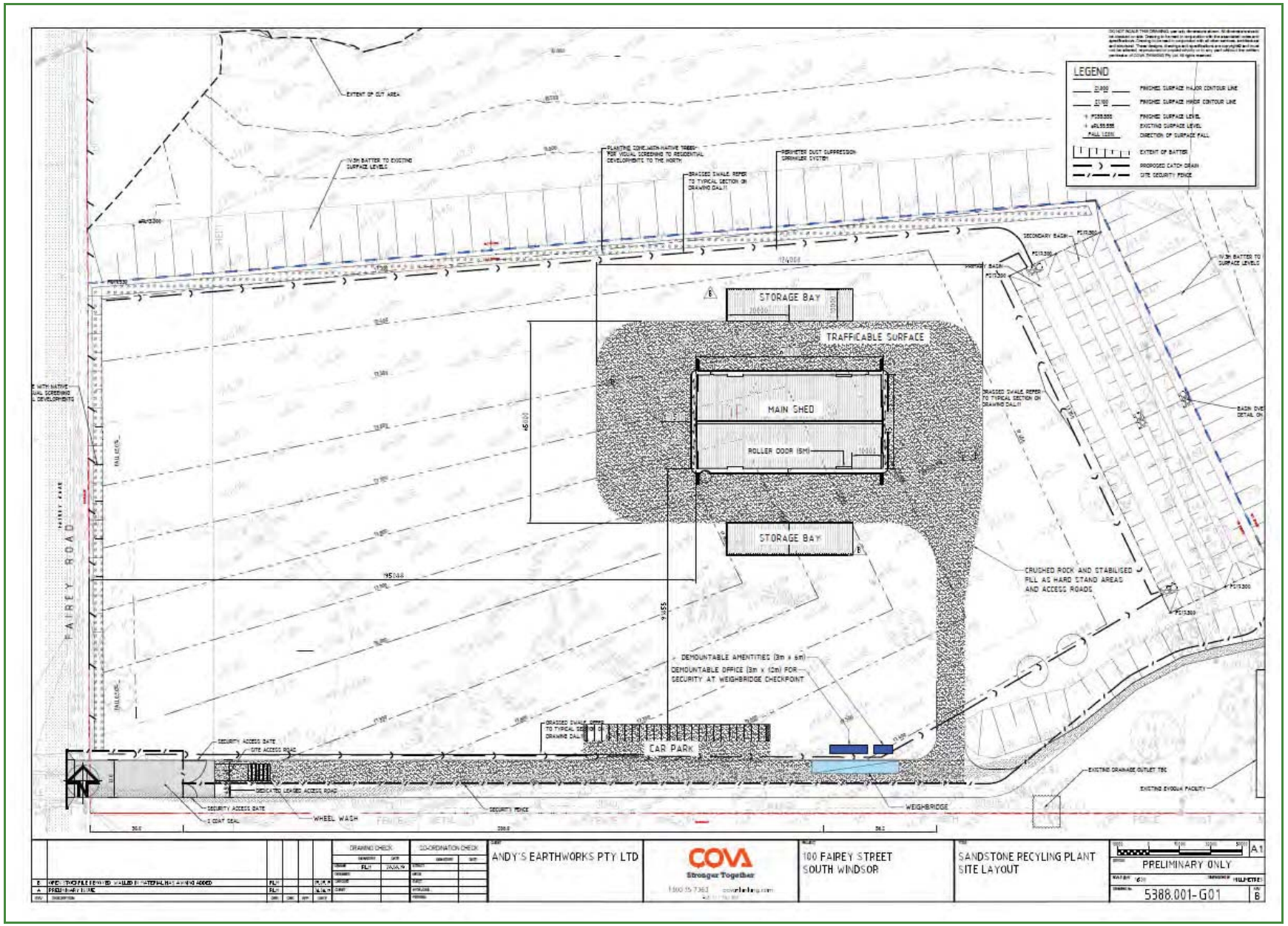
Trucks driving onto the site will be weighed and inspected before being unloaded. Waste material is to be sorted, with timber, glass, metal, soil, general waste and sandstone taken out of the waste stream. Concrete waste, VENM and ENM will be crushed through the jaw crushers, and then screened through the screen within the building. The separated waste streams will be stockpiled. The separated piles will be taken off site by truck to sell to market or to landfill.

Figure 2-1: Site Location

Source: Six Maps 2018

↑N Not to scale	**Legend**: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Site Plan



2.4 DESCRIPTION OF THE SURROUNDING AREA

The 100 Fairey Road property has two zonings. The south west corner of the site is covered by the IN1 General Industrial zoning under the Hawkesbury Local Environmental Plan 2012. The remainder of the property on the north and east of the lot is covered by the RU1 Primary Production zoning. All works associated with the proposed development are to be contained within the project area inside the area zoned IN1. The site can be accessed from Fairey Road.

To the south and west of the site are industrial properties, which are also covered by the IN1 General Industrial zoning. To the immediate north and east of the site are rural lands covered by the RU1 Primary production zoning. The eastern edge of the site falls away into South Creek.

The nearest residential receivers to the site are located to the south west off Beasley Place in South Windsor, and to the north east off James Meehan Street in Windsor.

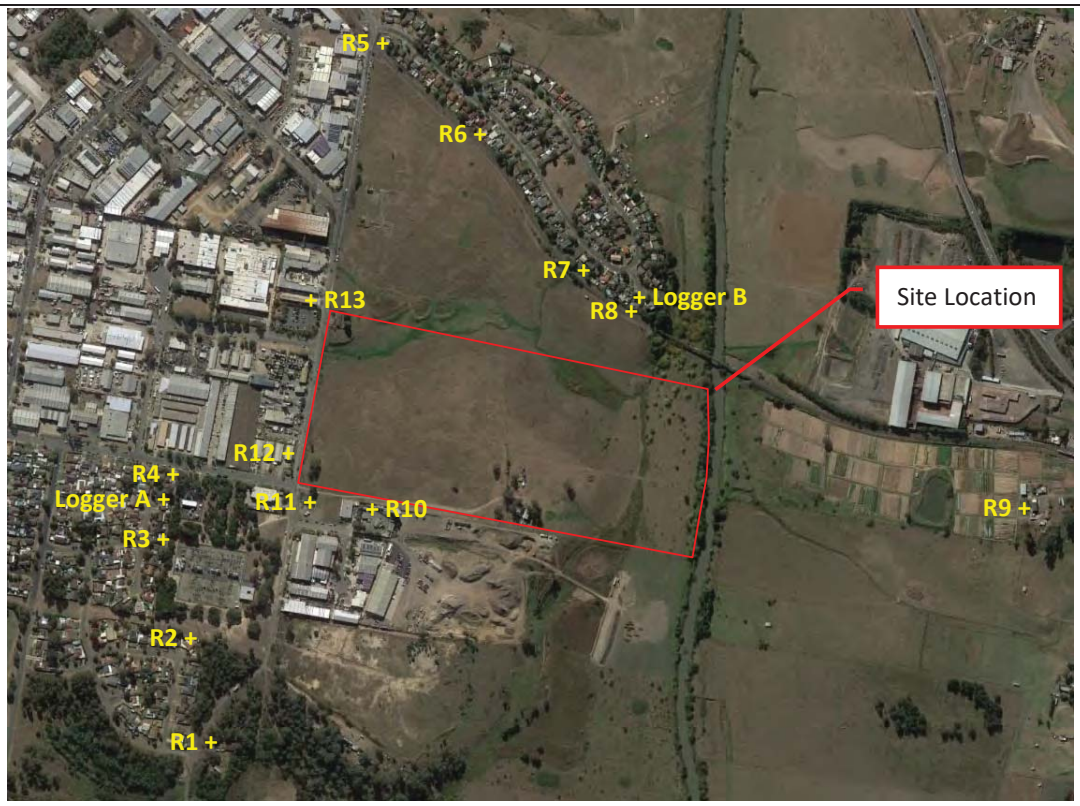
2.5 NEAREST SENSITIVE RECEPTORS

Table 2-1 lists the location of representative potentially affected receivers that are considered in this assessment. These are shown in Figure 2-3.

Table 2-1: Nearest Potentially Affected Receptors

Receptor ID	Address	Lot	DP	Separation distance	Type of receiver
R1	180 Fairey Road, South Windsor	28	861506	600 m	Residential
R2	18 Hale Crescent, South Windsor	85	263057	500 m	Residential
R3	10 Beasley Place, South Windsor	48	263057	430 m	Residential
R4	153 Ham Street, South Windsor	24	263057	370 m	Residential
R5	2 James Meehan Street	76	238572	690 m	Residential
R6	30 James Meehan Street	62	238572	550 m	Residential
R7	64 James Meehan Street	23	246385	480 m	Residential
R8	6 Chisholm Place, South Windsor	17	246385	500 m	Residential
R9	124 Mulgrave Road, Mulgrave	13	736138	1100 m	Residential
R10	4 Speedwell Place, South Windsor	1	828534	Adjacent	Industrial Premises
R11	1 Speedwell Place, South Windsor	16	806993	Adjacent	Industrial Premises
R12	128 Ham Street, South Windsor	Null	SP33235	Adjacent	Industrial Premises
R13	97 Fairey Road, South Windsor	36	263025	300 m	Industrial Premises

Figure 2-3: Location of Nearest Potentially Affected Receptors



Source: Six Maps 2018

N
Not to scale

Legend:

Site Boundaries

Benbow Environmental
25-27 Sherwood Street,
Northmead NSW 2152

3. 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.

3.1 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 two (2) 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.

In assessing the background noise levels, any data affected by adverse weather conditions has been discarded according to the requirements of the NSW EPA Noise Policy for Industry (NPI). The weather data was sourced from the Bureau of Meteorology from the Automatic Weather Station (AWS) located at Richmond RAAF base (ID 067105).

3.2 MEASUREMENT LOCATION

Unattended long-term noise monitoring was undertaken from 4th September 2018 to 19th September 2018 at representative residential receivers at 7 Beasley Place, South Windsor and 6 Chisholm Place, Windsor. Attended noise monitoring was undertaken on 5th September at 7 Beasley Place, South Windsor and 6 Chisholm Place, Windsor. The attended and noise logging locations are shown in Figure 2-3. Noise Logger Charts are presented in Attachment 3.

3.3 MEASURED NOISE LEVELS

3.3.1 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 3-1. Daily noise logger graphs have been included in Attachment 3.

Table 3-1: Unattended Noise Monitoring Results at Logger Location A Beasley Place, 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
4/09/2018	53	48	41	48	41	36	40	33	31	45	40	34
5/09/2018	-	51	44	-	43	38	-	36	32	-	42	39
6/09/2018	57	54	47	50	45	40	38	36	32	48	44	40
7/09/2018	57	48	-	51	41	-	42	34	-	50	39	-
8/09/2018	54	47	43	47	39	38	35	33	32	46	38	38
9/09/2018	-	52	46	-	42	40	-	34	32	-	42	39
10/09/2018	54	50	46	47	43	42	36	35	33	47	42	45
11/09/2018	-	53	45	-	45	40	-	37	33	-	44	41
12/09/2018	-	51	48	-	44	43	-	39	34	-	43	44
13/09/2018	-	50	45	-	43	40	-	34	32	-	41	41
14/09/2018	-	53	45	-	45	39	-	35	32	-	43	39
15/09/2018	-	-	-	-	-	-	-	-	-	-	-	-
16/09/2018	-	48	48	-	41	41	-	31	31	-	38	40
17/09/2018	56	51	46	49	45	42	37	37	34	61	43	42
18/09/2018	-	52	47	-	45	42	-	38	35	-	45	42
19/09/2018	-	-	48	-	-	44	-	-	37	-	-	44
Average	**55**	**50**	**46**	**48**	**43**	**40**	*	*	*	*	*	*
Median (RBL)	*	*	*	*	*	*	**37**	**35**	**32**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**54**	**42**	**42**

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.

Table 3-2: Unattended Noise Monitoring Results at Logger Location B Chisholm Place, 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
4/09/2018	61	61	58	45	40	37	36	32	31	48	52	47
5/09/2018	-	64	53	-	45	38	-	34	30	-	55	47
6/09/2018	62	62	50	52	44	36	36	33	29	50	48	44
7/09/2018	62	63	-	52	43	-	37	32	-	50	56	-
8/09/2018	63	63	55	53	40	38	35	32	30	51	52	47
9/09/2018	-	60	55	-	40	38	-	31	31	-	47	47
10/09/2018	62	60	54	49	41	42	35	32	31	50	52	48
11/09/2018	-	61	56	-	43	41	-	33	31	-	49	49
12/09/2018	-	58	51	-	42	41	-	33	31	-	47	47
13/09/2018	-	59	55	-	40	40	-	32	30	-	47	47
14/09/2018	-	62	54	-	44	39	-	34	30	-	51	46
15/09/2018	-	-	-	-	-	-	-	-	-	-	-	-
16/09/2018	-	64	58	-	44	43	-	32	31	-	53	49
17/09/2018	62	63	51	49	43	40	35	32	31	49	56	45
18/09/2018	-	61	55	-	42	40	-	35	31	-	48	46
19/09/2018	-	-	53	-	-	41	-	-	31	-	-	49
Average	**62**	**62**	**54**	**50**	**42**	**40**	*	*	*	*	*	*
Median (RBL)	*	*	*	*	*	*	**35**	**32**	**31**	*	*	*
Logarithmic Average	*	*	*	*	*	*	*	*	*	**50**	**52**	**47**

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.

3.3.2 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 3-3.

Table 3-3: Attended Noise Monitoring Results, dB(A)

Location / Time Period	Noise Descriptor				Comments
	L_{Aeq}	L_{A90}	L_{A10}	L_{A1}	
7 Beasley Place 5/9/2018 14:20	44	39	44	55	*Distant Road Traffic Hawkesbury Valley Way <38 dB(A)* *Occasional Industrial bang, Ham Street <72 dB(A)* *Dog <45 dB(A)* *Birds <66 dB(A)* *Train horn <43 dB(A)* *Cars, Fairey Road and Ham Street <51 dB(A)*
6 Chisholm Place 5/9/2018 14:20	56	37	52	68	*Distant Road Traffic Hawkesbury Valley Way <39 dB(A)* *Train horn <42 dB(A)* *Train passing <55 dB(A)* *Distant grinder <56 dB(A)* *Birds <57 dB(A)* *Aeroplane <47 dB(A)* *Dog <41 dB(A)* *Passing vehicle <68 dB(A)*

4. CURRENT LEGISLATION AND GUIDELINES

4.1 NSW EPA NOISE POLICY FOR INDUSTRY

4.1.1 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.

4.1.2 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.

4.1.3 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 are reproduced in Table 4-1. The suburban category has been selected for the residential noise amenity criteria, as per Table 2.3 of the Noise Policy for Industry, the day RBL <45 dB(A), the evening RBL < 40 dB(A), the night RBL is < 35 dB(A) and the area features local traffic flows with commercial and industry uses nearby.

Table 4-1: Amenity noise levels.

Receiver	Noise Amenity Area	Time of Day	L_{Aeq} dB(A)
			Recommended amenity noise level
Residential	Suburban	Day	55
		Evening	45
		Night	40
Industrial premises	All	When in use	70

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.

4.1.4 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.

4.1.5 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 4-2.

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 4-2: 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-R4	Residential – Suburban	Day	37	**42**	55	53	**42**	-
		Evening	35	**40**	45	43	**40**	-
		Night	32	**37**	40	38	**37**	**52**
R5-R9	Residential – Suburban	Day	35	**40**	55	53	**40**	-
		Evening	32	**37**	45	43	**37**	-
		Night	31	**36**	40	38	**36**	**52**
R10-R13	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).

4.2 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:

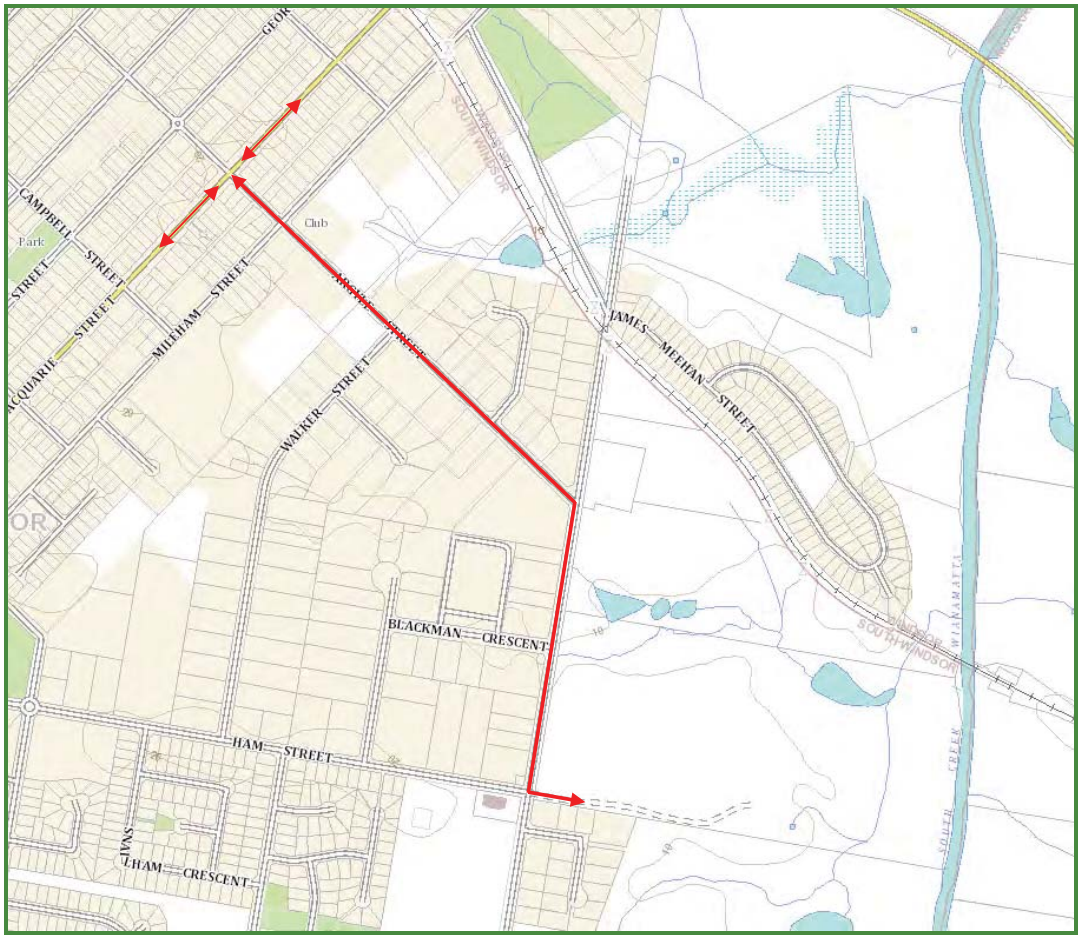
- Existing roads;
- New road projects;
- Road redevelopment projects; and
- New traffic-generating developments.

4.2.1 Road Category

The subject site is located on Fairey Road. The most likely route to and from the site is along Macquarie Street, Argyle Street and Fairey Road as shown in Figure 4-1. As no residential receivers not associated with the site are located along Fairey Road, road traffic noise impacts will be analysed at residential receivers along Argyle Street.

Based on the RNP road classification description, Argyle Street would be classified as a 'local road'.

Figure 4-1: Recommended truck route to site



4.2.2 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 4-3.

Table 4-3: 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.

4.2.3 Assessment Locations for Existing Land Uses

Table 4-4: 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.

4.3 Construction Noise and Vibration 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.

4.3.1 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 4-5 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 4-5: 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.

Table 4-5: Management Levels at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq(15\ minute)}$	How to Apply
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 4-6 sets out management levels for construction noise at other land uses applicable to the surrounding area.

Table 4-6: 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)

There are no other sensitive land uses in the area surrounding the site. The noise criterion for construction noise is presented in Table 4-7.

Table 4-7: Construction Noise Criterion dB(A)

Receiver	Land Use	Period	RBL L_{A90}	Management Level $L_{Aeq(15\ minute)}$
R1-R4	Residential	Standard Hours	37	47
R5-R9	Residential	Standard Hours	35	45
R10-R13	Industrial	Standard Hours	-	75

4.3.2 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.

4.3.3 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 4-8: 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

4.3.4 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 4-9: 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

Table 4-9: 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	
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

4.3.5 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 4-10: 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

4.4 METEOROLOGICAL FACTORS

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 2017 weather data has been conducted to establish whether significant winds are characteristic of the area.

4.4.1 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.

4.4.2 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.

4.4.3 Local Wind Trends

Seasonal wind rose plots for this site utilising Richmond RAAF AWS data have been included in Figure 4-2, Figure 4-3 and Figure 4-4 for day, evening and night periods respectively.

Figure 4-2: Wind Rose Plots – BOM Richmond RAAF AWS ID 067105 2017 – Day time

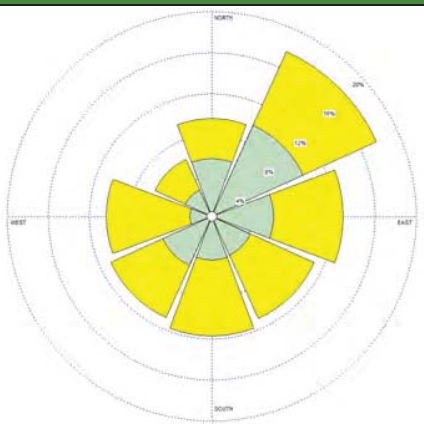
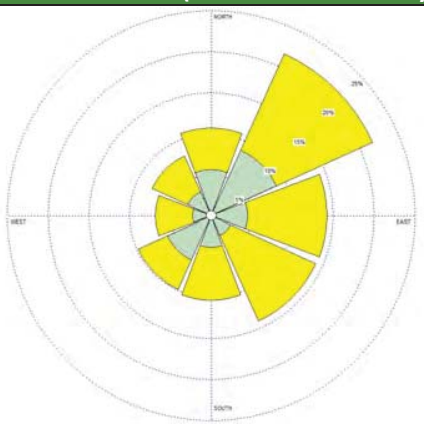
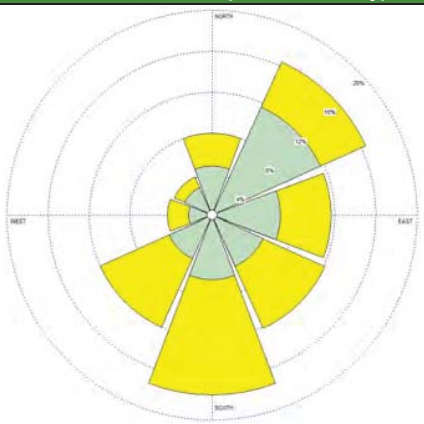
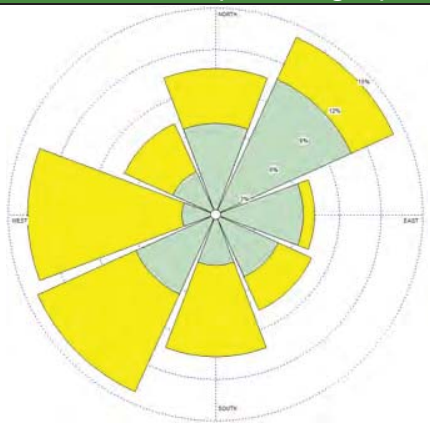
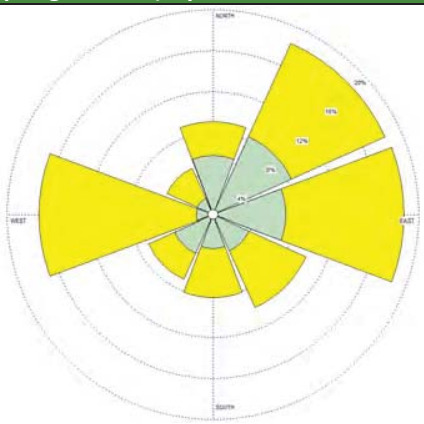
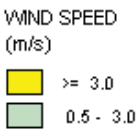
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 3.27 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 3.64 m/s Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.68 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 2.89 m/s Axis Frequencies: 3%, 6%, 9%, 12%, 15%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 3.80 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	

Figure 4-3: Wind Rose Plots – BOM Richmond RAAF AWS ID 067105 2017 – Evening time

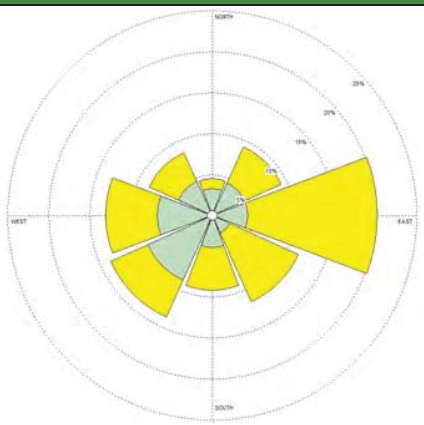
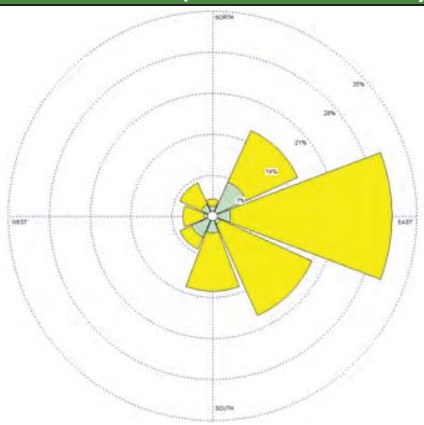
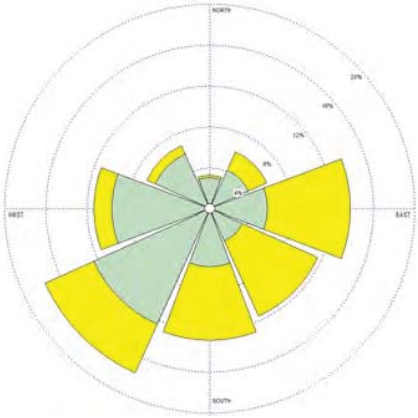
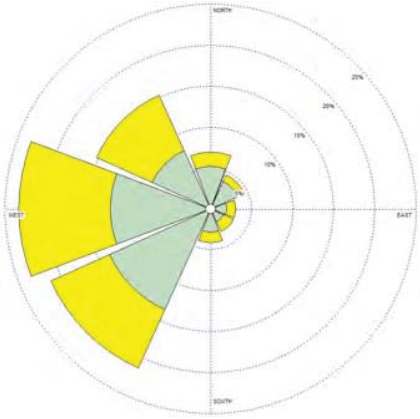
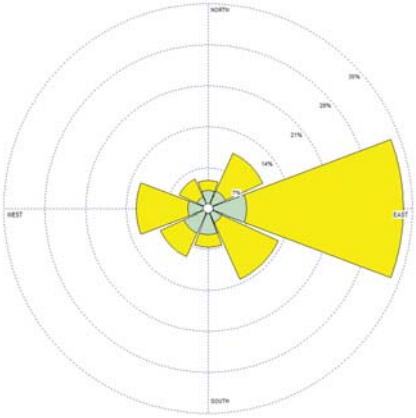
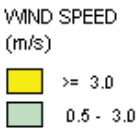
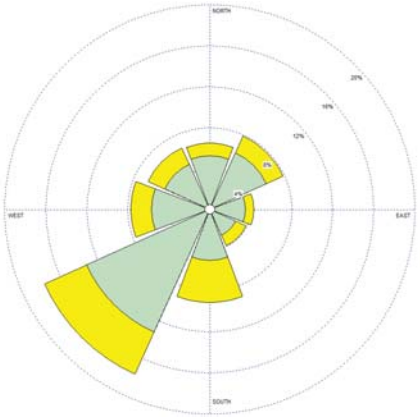
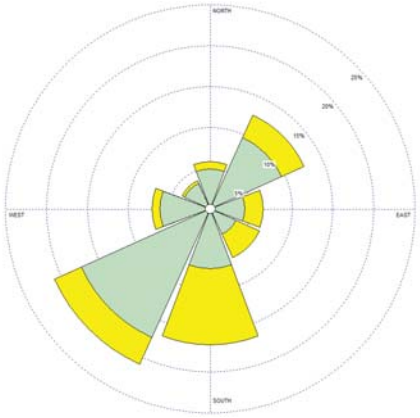
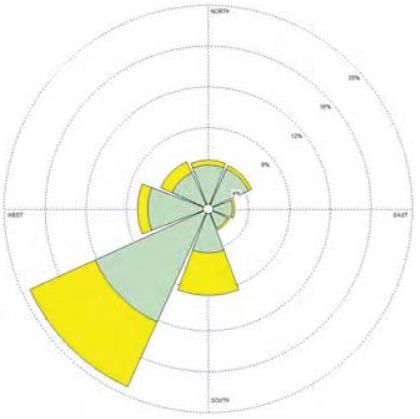
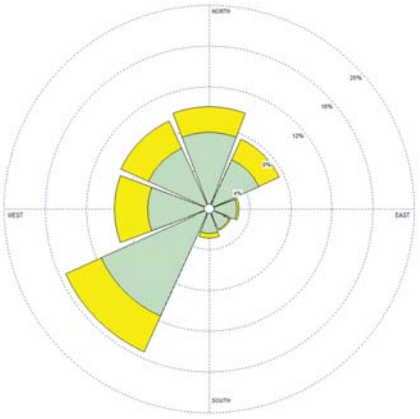
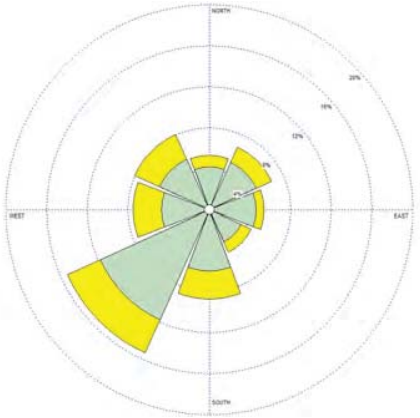
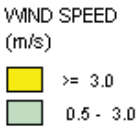
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 3.08 m/s Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 4.24 m/s Axis Frequencies: 7%, 14%, 21%, 28%, 35%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.26 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 2.15 m/s Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 4.82 m/s Axis Frequencies: 7%, 14%, 21%, 28%, 35%	

Figure 4-4: Wind Rose Plots – BOM Richmond RAAF AWS ID 067105 2017 – Night time

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 1.48 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 1.97 m/s Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 1.21 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	Average Wind Speed: 1.33 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 1.41 m/s Axis Frequencies: 4%, 8%, 12%, 16%, 20%	

Based on the information presented from the weather data, source-to receiver wind speeds of 3 m/s or below are not present for more than 30% of the time during any season or time period. Therefore wind effects have not been included in the assessment.

4.5 TEMPERATURE INVERSIONS

Temperature inversion is considered a feature where this occurs more than 30% of the nights in winter.

As stated in section 2.2, the site is seeking approval to operate 7am to 6:00pm Monday to Friday and 7am to 1pm on Saturday. As the site will not operate during the night period, temperature inversions have not been considered in the noise impact assessment.

4.5.1 Weather Conditions Considered in the Assessment

The following conditions will be considered in this noise impact assessment considered:

- Neutral Weather Conditions

Details of the considered meteorological conditions have been displayed in Table 4-11.

Table 4-11: Meteorological Conditions Assessed in Noise Propagation Modelling

Classification	Ambient Temp.	Ambient Humidity	Wind Speed	Wind Direction (blowing from)	Temperature Inversion	Affected Receiver	Applicability
Neutral	10°C	70%	0 m/s	–	No	All	All periods

5. 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.

5.1 MODELLING METHODOLOGY

Predictive Noise 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 numerous sites and is recognised by regulatory authorities throughout Australia.

Inputs into the noise model include topographical features of the area, ground absorption, on site structures, surrounding buildings, residential fences and predicted noise sources. Receivers were included to predict the noise emissions of the proposed development at the nearest potentially affected residences.

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).

5.2 NOISE SOURCES

The sound power levels for the identified noise sources associated with the operational activities have been taken from on-site measurements of the proposed equipment at the proponents East Kurrajong facility.

A-weighted third octave band centre frequency sound power levels have been used and are presented in Table 5-1 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 5-1: A-weighted Sound Power Levels Associated with Operational Activities, dB(A)

Noise Source	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
Concrete Jaw Crusher Komatsu BR380JG-1 (running loaded)	108	41	46	59	61	64	74	72	76	79	88
		96	96	94	99	101	100	97	98	97	94
		93	91	86	87	82	75	68	62	60	51
Screen	104	46	45	64	66	68	73	73	77	80	82
		82	86	87	88	91	91	93	94	95	95
		95	97	93	89	87	84	78	74	68	61
25T Excavator	102	-	-	-	-	82	-	-	85	-	-
		91	-	-	97	-	-	96	-	-	95
		-	-	92	-	-	85	-	-	-	-
Front End Loader (<111 kW at 2000 rpm)	102	44	51	59	85	84	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
Truck Engine	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	-	-	-
Truck Exhaust	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	-	-	-

5.2.1 Modelling Scenario

Two scenarios were modelled for operational noise emissions. The first scenario considers the external mobile equipment to the south of the building as per Figure 5-1. The second scenario considers the external mobile equipment to the north of the building as per Figure 5-2.

The details regarding the scenarios are presented in the following table.

Table 5-2: Modelled Noise Sources

Scenario	Description
Scenario 1 and 2	The scenario includes the following equipment: • Concrete jaw crusher (inside building); • Screen (inside building); • 25T excavator; • Front end loader; and • Truck manoeuvring.

Figure 5-1 and Figure 5-2 show the locations of the noise sources for the operational scenarios.

Figure 5-1: Scenario 1 – Mobile equipment to the south

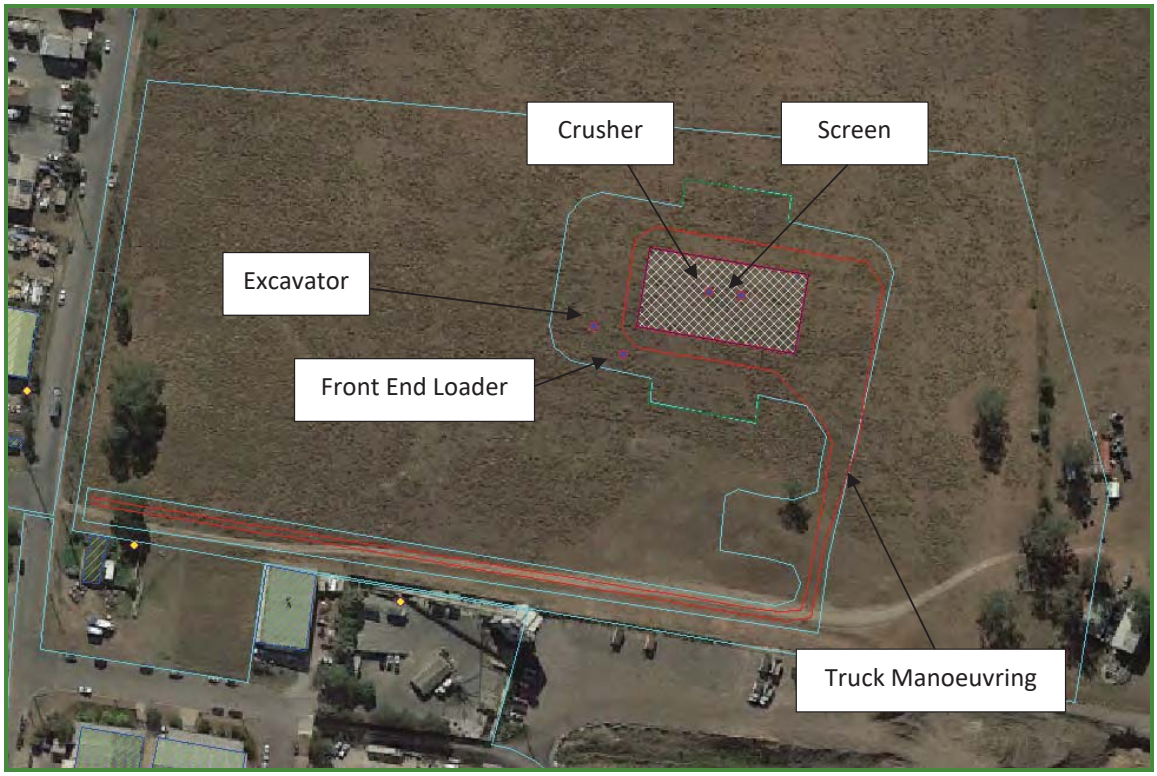
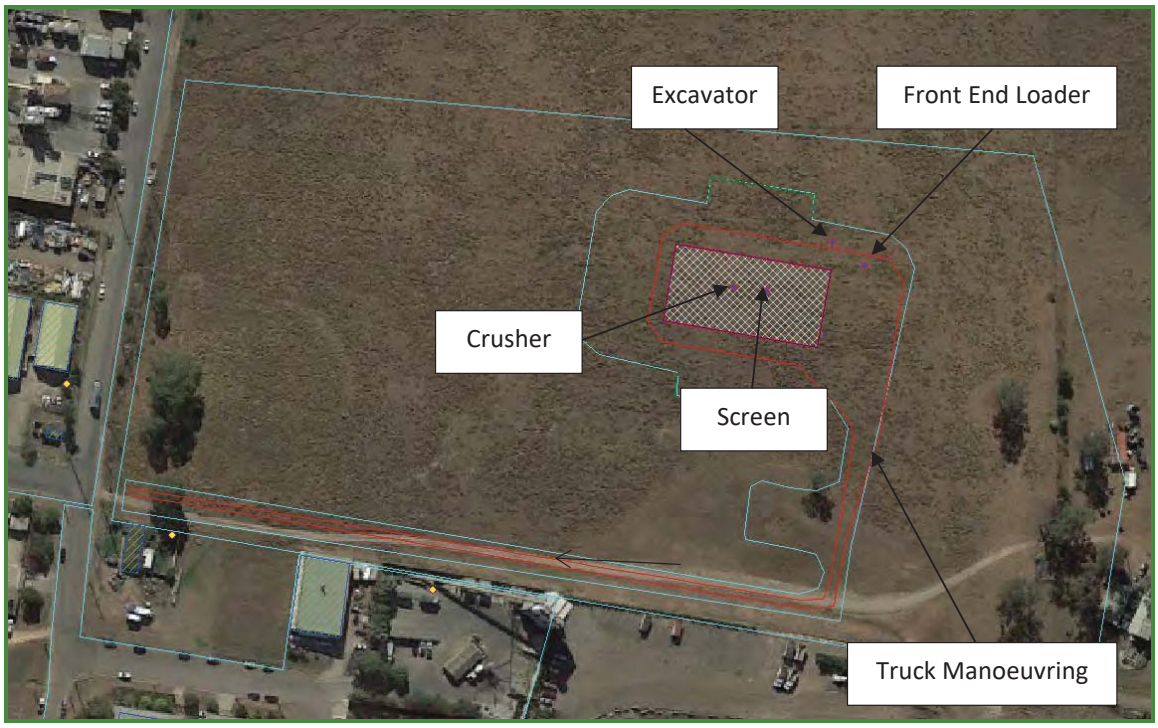


Figure 5-2: Scenario 2 – Mobile equipment to the north



5.2.2 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:

- Off-site topographical information has been obtained from Google Earth and implemented in SoundPLAN. On site topographical information has been entered from the site survey.

- 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 has been modelled with a ground absorption factor of 0.5 and the driveway and concrete building pad with an absorption factor of 0. The industrial precincts in South Windsor and surrounding Speedwell Place have been modelled with a ground absorption factor of 0 (hard). The residential areas of South Windsor and Windsor near the site have been modelled with a ground absorption factor of 0.5. Grasslands and bushland areas have been modelled with an absorption factor of 0.8.

- Heavy vehicles enter and exit the site once per 15 minute period in the worst case scenario. Trucks travel on the site at 10 km/h. Truck engines are modelled at a height of 1.5 m, and truck exhausts are modelled at a height of 3.0 m.

- The concrete jaw crusher, screen, 25 T excavator and front end loader are all modelled as point sources and are assumed to operate for 100% of the 15 minute period.

- Residential fences have been included in the model. Backyard fences are included for houses located on Beasley Place, Hale Crescent, James Meehan Street and Chisholm place.

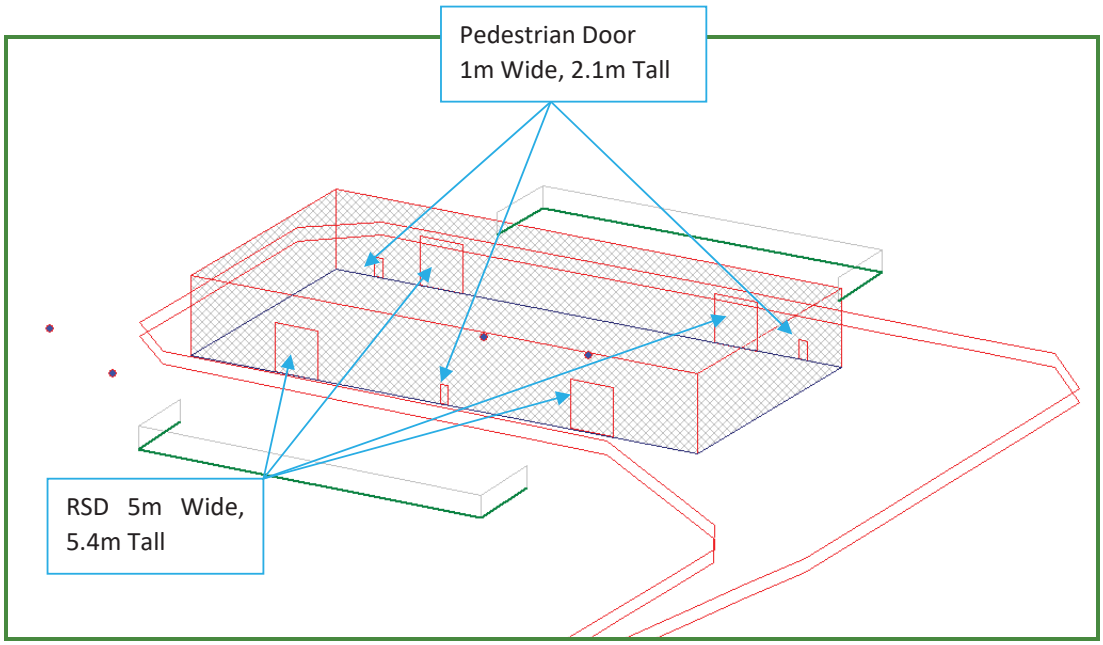
- Buildings on industrial sites around Speedwell Place and on Ham Street have been included in the model.

- All residential receivers were modelled at 1.5 m above ground level at the most noise-affected point within the property boundary.

- 2.5 m stockpile walls have been included in the model.

- The industrial building has been modelled with the following properties:
  - Roller shutter doors (RSD) modelled open 100% of the time (Rw 0 dB);
  - Pedestrian doors modelled open 30 sec/15 min (Rw 0 dB);
  - Façades including the roof modelled with 1 mm corrugated steel (colorbond building) (Rw 25 dB);
  - Locations and dimensions of openings are shown in Figure 5-3.

Figure 5-3: Industrial Building



5.3 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 5-3.

Table 5-3: Predicted Noise Levels – Operational Activities dB(A)

Receptor	Project Criteria $L_{eq(15\ minute)}$	Predicted $L_{Aeq(15\ minute)}$ Scenario 1	Predicted $L_{Aeq(15\ minute)}$ Scenario 2
	Day	Day	Day
R1	42	35✓	31✓
R2	42	35✓	32✓
R3	42	36✓	33✓
R4	42	40✓	37✓
R5	40	33✓	34✓
R6	40	36✓	36✓
R7	40	35✓	39✓
R8	40	35✓	39✓
R9	40	31✓	32✓
R10	68	56✓	54✓
R11	68	56✓	55✓
R12	68	51✓	47✓
R13	68	46✓	42✓

Note: ✓ indicates compliance with the relevant noise criteria

From Table 5-3, following the implementation of the assumptions and noise control measures outlined in this report, noise levels are predicted to comply with the criteria at all surrounding receivers.

6. RECOMMENDED MITIGATION MEASURES

The noise assessment in Section 5 predicted that noise levels would be met at all surrounding receivers during the proposed daytime operations.

The following noise mitigation measures are recommended in order to further reduce noise levels from truck movements at surrounding receivers:

- Maintain vehicles paths onsite so all trucks may enter and leave the site in the forward direction, preventing the use of truck reverse beepers;
- All onsite mobile equipment is to be fitted with reversing lights and/or broadband/white noise (also known as squawkers) reversing alarms;
- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site; and
- Enforcement of low on-site speed limits.

7. ROAD TRAFFIC NOISE ASSESSMENT

A description of the calculation methodology and the noise predictions associated with road traffic has been provided below.

Vehicles driving to site are recommended to travel along the route in Figure 4-1. The closest residential receptor to the route is 28 Argyle Street, South Windsor. Road traffic noise impacts are therefore analysed at this worst case receiver.

Calculation of the road traffic noise contribution has been undertaken using the Calculation of Road Traffic Noise (CoRTN) algorithm within SoundPLAN. The CoRTN algorithm was utilised to predict the contribution from site road traffic at the nearest residential receivers during the day period.

Vehicles are assumed to travel at the posted speed of 50 km/h. It is understood that 10 truck movements are expected on average per day, with up to 20 trucks in the maximum scenario. In this analysis, 3 truck movements to and from site are considered in the worst case 1 hour period.

The predicted noise levels at the most impacted receiver are displayed in Table 7-1. The highest contribution from the route to/from the site is predicted at this location, therefore it is the only results displayed.

Table 7-1: Predicted Levels for Road Traffic Noise

Receptor	Noise Criteria	Site Contribution
	$L_{Aeq,\ 1\ hour}$	$L_{Aeq,\ 15\ hour}$
46 Whitsunday Circuit, Green Valley	55	51 ✓

For residential dwellings that front onto Argyle Road, the predicted noise levels associated with the vehicle movements from the site would be below the daytime criteria of $L_{Aeq\ (1\ hour)}$ 55 dBA for local roads.

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

8. CONSTRUCTION NOISE ASSESSMENT

Construction activities will involve civil works to re-profile the site and building the new industrial building. The civil works is considered the worst case construction operations that will take place on the site. The equipment list for the civil works is detailed in Table 8-1. Equipment location diagrams are presented in Figure 8-1 and Table 8-2.

All works are proposed to be undertaken during standard construction hours, that is:

- Monday to Friday, 7am to 6pm;
- Saturday 8am to 1pm; and
- No work on Sundays or public holidays.

Table 8-1: Modelled Noise Scenarios for Proposed Construction Works

Scenario	Time of the day	Noise Sources for Worst 15-minute Period
1. Civil works (Western Location)	Standard hours	• 20 T excavator • Backhoe • Roller • Hand tools • Truck
2. Civil works (Northern Location)	Standard hours	• 20 T excavator • Backhoe • Roller • Hand tools • Truck

Figure 8-1: Construction Scenario 1 – Civil Works (Western Location)

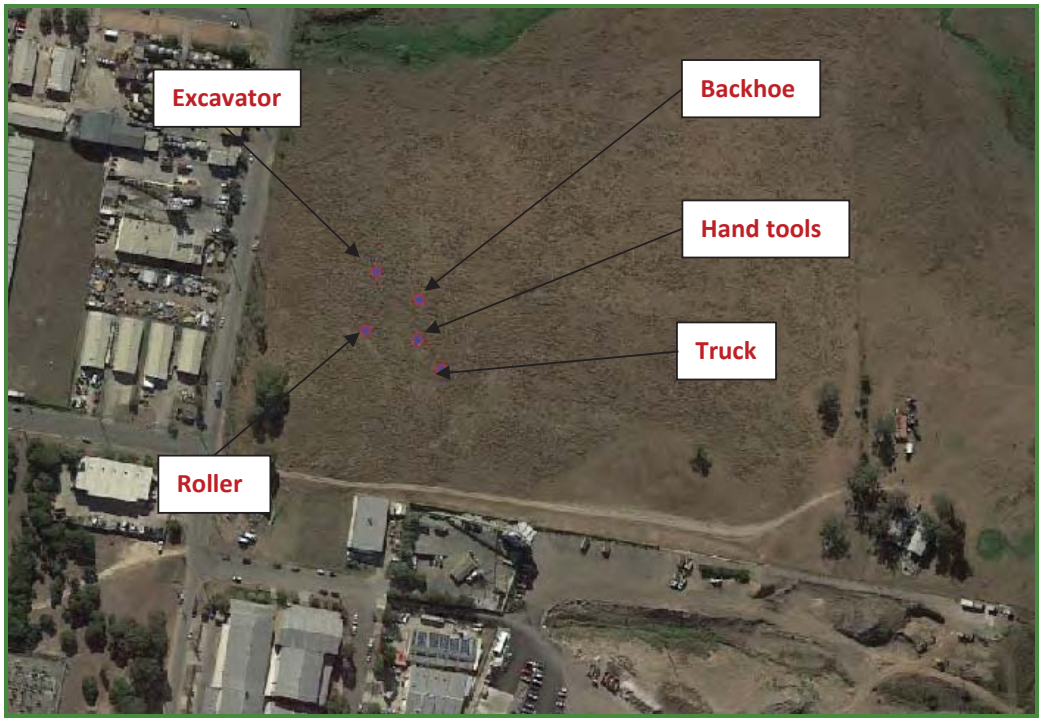


Figure 8-2: Construction Scenario 2 – Civil Works (Northern Location)

8.1 MODELLING METHODOLOGY

8.1.1 Noise Model

Noise propagation modelling for the construction activities was carried out using the ISO9613 algorithm within SoundPLAN. The construction scenarios were modelled using the $L_{Aeq,\ 15\ minutes}$ descriptor.

Assumptions made in the noise modelling of the construction noise scenarios are as follows:

- The relevant assessment period for operational noise emissions has been considered to be 15 minutes. Construction scenarios assume equipment is running for 100% of the 15 minute assessment period;

- Off-site topographical information has been obtained from Google Earth and implemented in SoundPLAN. On site topographical information has been entered from the site survey.

- 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 has been modelled with a ground absorption factor of 0.5. The industrial precincts in South Windsor and surrounding Speedwell Place have been modelled with a ground absorption factor of 0 (hard). The residential areas of South Windsor and Windsor near the site have been modelled with a ground absorption factor of 0.5. Grasslands and bushland areas have been modelled with an absorption factor of 0.8.

- Residential fences have been included in the model. Backyard fences are included for houses located on Beasley Place, Hale Crescent, James Meehan Street and Chisholm place.

- Buildings on industrial sites around Speedwell Place and on Ham Street have been included in the model.

- All residential receivers were modelled at 1.5 m above ground level at the most noise-affected point within the property boundary.

- All noise sources associated with the construction works have been modelled as point sources.

8.1.2 Noise Sources

A-weighted octave band centre frequency sound power levels are presented shown in Table 8-2 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 8-2: 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
Excavator 20T	**102**	82	85	91	97	96	95	92	85
Backhoe	**96**	76	78	83	89	91	89	88	77
Roller	**101**	81	86	96	96	94	91	82	72
Hand tools	**100**	71	81	91	96	94	90	87	81
Truck	**105**	76	84	89	104	95	93	88	88

8.2 CONSTRUCTION PREDICTED NOISE LEVELS

Results of the predictive noise modelling of the construction activities are shown in Table 8-3. Noise levels during the construction period are predicted to comply with the criteria at all receptors.

Table 8-3: Noise Modelling Results Associated with Construction Activities for L_{eq}, dB(A)

Receiver	PSNL ($L_{eq,15\ minute}$ dB(A))	Scenario (Standard Hours) (L_{eq}, dB(A))	
	Standard Hours	1	2
R1	47	36 ✓	35 ✓
R2	47	39 ✓	36 ✓
R3	47	37 ✓	36 ✓
R4	47	42 ✓	39 ✓
R5	45	34 ✓	34 ✓
R6	45	36 ✓	37 ✓
R7	45	38 ✓	41 ✓
R8	45	37 ✓	40 ✓
R9	45	29 ✓	33 ✓
R10	75	53 ✓	48 ✓
R11	75	55 ✓	47 ✓
R12	75	56 ✓	48 ✓
R13	75	49 ✓	44 ✓

✓Complies × Non-compliance

8.3 CONSTRUCTION NOISE CONTROLS

It is proposed that construction works take place during standard hours only. The proposed hours of operations for all **construction** works are as follows:

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

9. VIBRATION IMPACT ASSESSMENT

In the NSW TfNSW Construction Noise Strategy document and Assessing Vibration – a Technical Guideline, equipment that may cause vibration impacts includes hydraulic hammers, vibratory pile drivers, pile boring, jackhammers, wacker packers, concrete vibrators and pavement breakers, amongst other equipment. The proposed construction activities are not proposed to include vibratory equipment, while the operational activities are proposed to include vibrating screens.

9.1 OPERATIONAL EQUIPMENT

The operational activities do not include equipment that generates vibration apart from the vibrating screen. An inspection of the existing vibratory screen in East Kurrajong was carried out, with no perceptible ground vibration 3 m from the source. The equipment is well isolated and is therefore not predicted to cause vibration that will be perceptible at any neighbouring structures or receivers.

10. CONCLUSION

Benbow Environmental (BE) has conducted a detailed noise impact assessment for the proposed facility at 100 Fairey Road, South Windsor, NSW. The principal noise sources associated with the site include truck movements to and from the site, and on-site equipment including the crusher, screen, excavator and front end loader.

This noise impact assessment has been prepared in accordance with the *NSW Noise Policy for Industry*, *NSW Road Noise Policy* and *NSW Interim Construction Noise Guideline*.

Background noise levels of the area have been obtained in accordance with the methodologies outlined in the NSW EPA Noise Policy for Industry and relevant Australian Standards. The potential noise impacts of operational, construction and road traffic activities on the nearby receivers have been predicted utilising noise modelling software, SoundPlan.

Two operational scenarios are recommended in this report. Noise emissions generated by the proposed facility are predicted to comply with the relevant acoustic criteria at all considered residential and industrial receiver locations. All operational activities are recommended to take place during the day period.

Road traffic noise levels associated with the development have been considered against the Road Noise Policy, with compliance predicted at all considered receptors.

Compliance with the guidelines set out in the Interim Construction Noise Guideline was predicted at all surrounding receivers.

This concludes the report.

Emma Hansma
Senior Engineer

Richard 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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

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 20815 & FILT 4015**

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-957	**Serial No:**	15335
Microphone Type:	7052E	**Serial No:**	40814
Filter Type:	1/3 Octave	**Serial No:**	15335
Comments:	All tests passed for class 1. (See over for details)		
Owner:	Benbow Environmental 13 Daking Street North Parramatta NSW 2151		
Ambient Pressure:	1014 hPa ±1.5 hPa		
Temperature:	23 °C ±2° C	**Relative Humidity:**	53% ±5%
Date of Calibration:	14/06/2017	**Issue Date:**	16/06/2017

Acu-Vib Test Procedure: AVP10 (SLM) & AVP06 (Filters)

CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....

Jack Rudd

Accredited for compliance with ISO/IEC 17025
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.

NATA
ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

HEAD OFFICE
Unit 14, 22 Hudson Ave Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 23100

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer: Rion
Type No: NC-73 **Serial No:** 10186522
Owner: Benbow Environmental
13 Daking Street
North Parramatta NSW 2151

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	94.16	990.12	3.98
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: 1010 hPa ±1.5 hPa **Relative Humidity:** 31% ±5%
Temperature: 24 °C ±2° C
Date of Calibration: 11/07/2018 **Issue Date:** 11/07/2018
Acu-Vib Test Procedure: AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2004
CHECKED BY: ..... **AUTHORISED SIGNATURE:** .....
Jack Kiely

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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Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C18128

Client Details Benbow Environmental
13 Daking Street
North Paramatta NSW 2151

Equipment Tested/ Model Number : ARL EL-215
Instrument Serial Number : 194441
Microphone Serial Number : N/A
Pre-amplifier Serial Number : N/A

Atmospheric Conditions
Ambient Temperature : 23.4°C
Relative Humidity : 52.3%
Barometric Pressure : 100.4kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 9 Mar 2018
Secondary Check: Riley Cooper
Report Issue Date : 12 Mar 2018

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
- *31.5 Hz to 8kHz* ±0.15dB
- *12.5kHz* ±0.21dB
- *16kHz* ±0.29dB

Electrical Tests
- *31.5 Hz to 20 kHz* ±0.12dB

Environmental Conditions
- *Temperature* ±0.07°C
- *Relative Humidity* ±0.58%
- *Barometric Pressure* ±0.017Pa

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.

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.

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Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C18129

Client Details Benbow Environmental
13 Daking Street
North Paramatta NSW 2151

Equipment Tested/ Model Number : ARL EL-215
Instrument Serial Number : 194593
Microphone Serial Number : N/A
Pre-amplifier Serial Number : N/A

Atmospheric Conditions
Ambient Temperature : 23°C
Relative Humidity : 51.2%
Barometric Pressure : 100.57kPa

Calibration Technician : Lucky Jaiswal
Calibration Date : 9 Mar 2018
Secondary Check: Riley Cooper
Report Issue Date : 12 Mar 2018

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
31.5 Hz to 8kHz *±0.15dB*
12.5kHz *±0.21dB*
16kHz *±0.29dB*

Electrical Tests
31.5 Hz to 20 kHz *±0.12dB*

Environmental Conditions
Temperature *±0.07°C*
Relative Humidity *±0.58%*
Barometric Pressure *±0.017Pa*

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.

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.

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

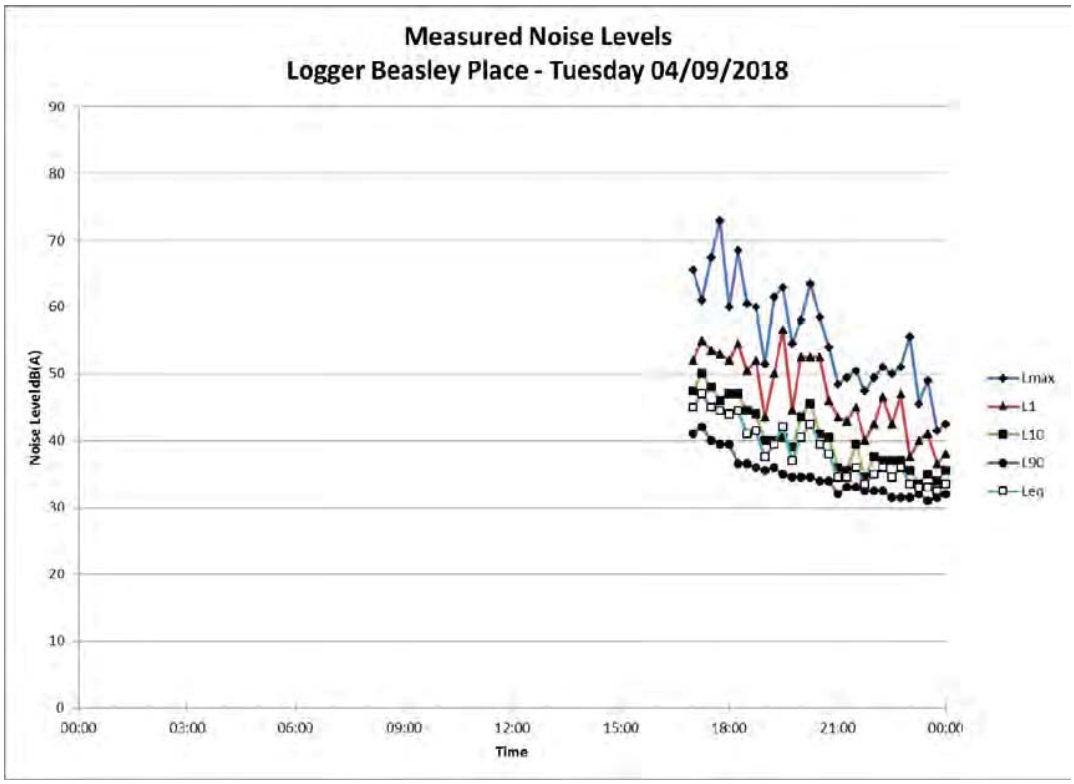
The attended short-term noise monitoring was carried out using a SVANTEK SVAN957 Class 1 Precision Sound Level Meter. The instrument was calibrated by a NATA accredited laboratory within two years of the measurement period. The instrument sets comply with AS 1259 and was set on A-weighted, fast response.

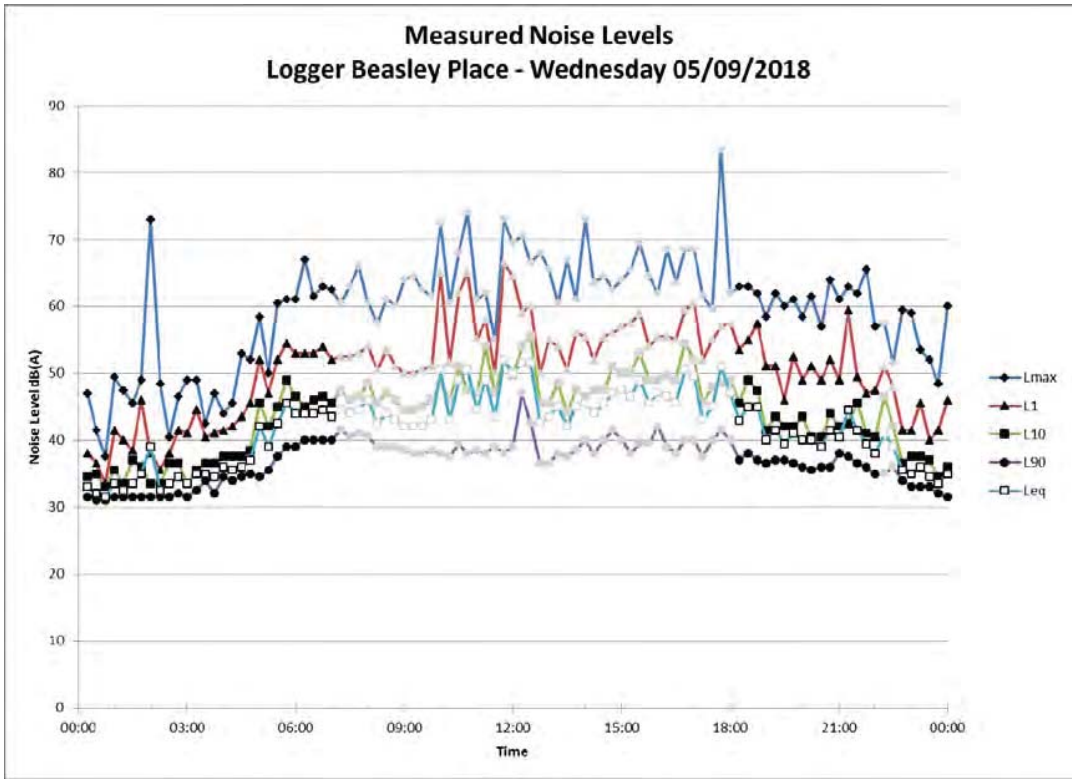
The microphone was positioned at 1.5 metres above ground level and was fitted with a windsock. The instrument was calibrated using a Rion NC-73 sound level calibrator prior and subsequent to the measurement period to ensure the reliability and accuracy of the instrument sets. There were no significant variances observed in the reference signal between the pre-measurement and post-measurement calibrations. Instrument calibration certificates have also been included in Attachment 1.

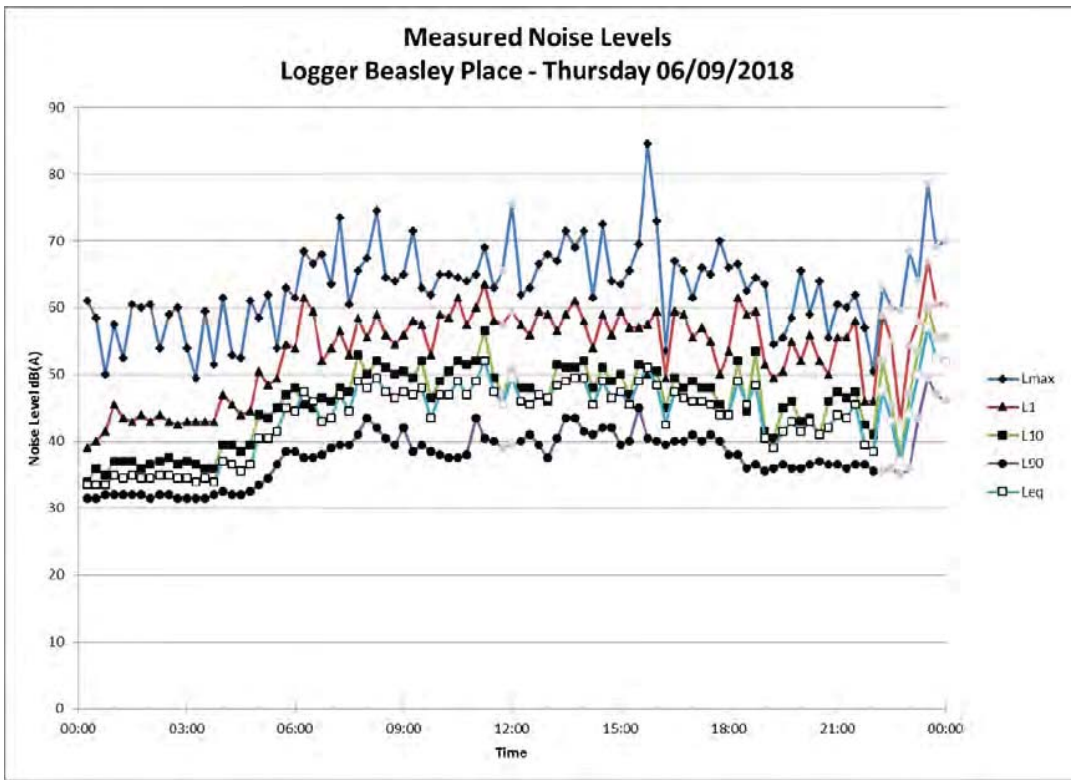
WEATHER CONDITIONS
It was partially cloudy, fine without significant breeze.

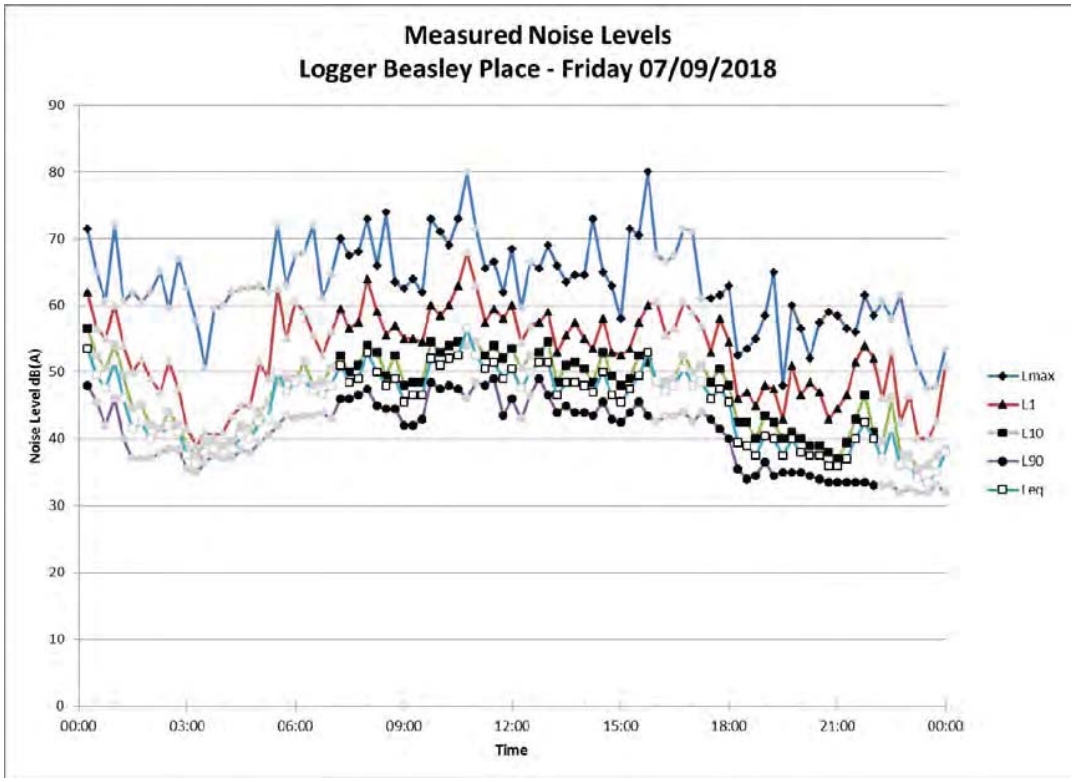
METHODOLOGY
The attended noise measurements were carried out generally in accordance with Australian Standard AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise".

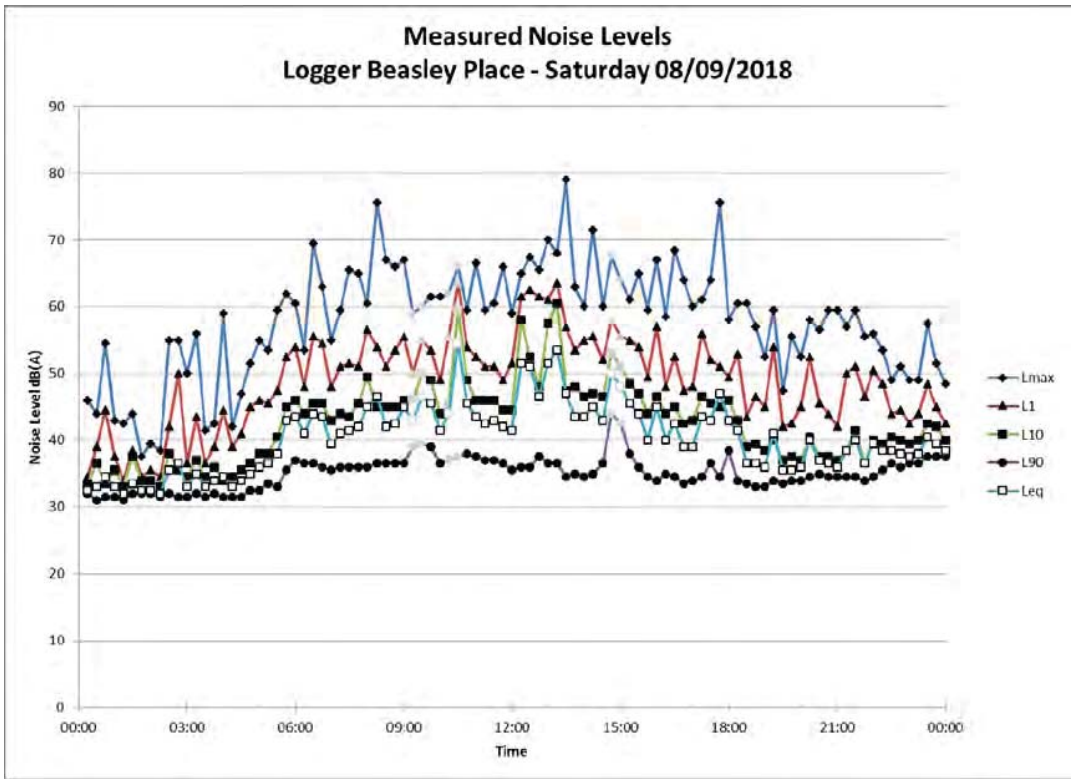
Attachment 4: Daily Noise Logger Charts

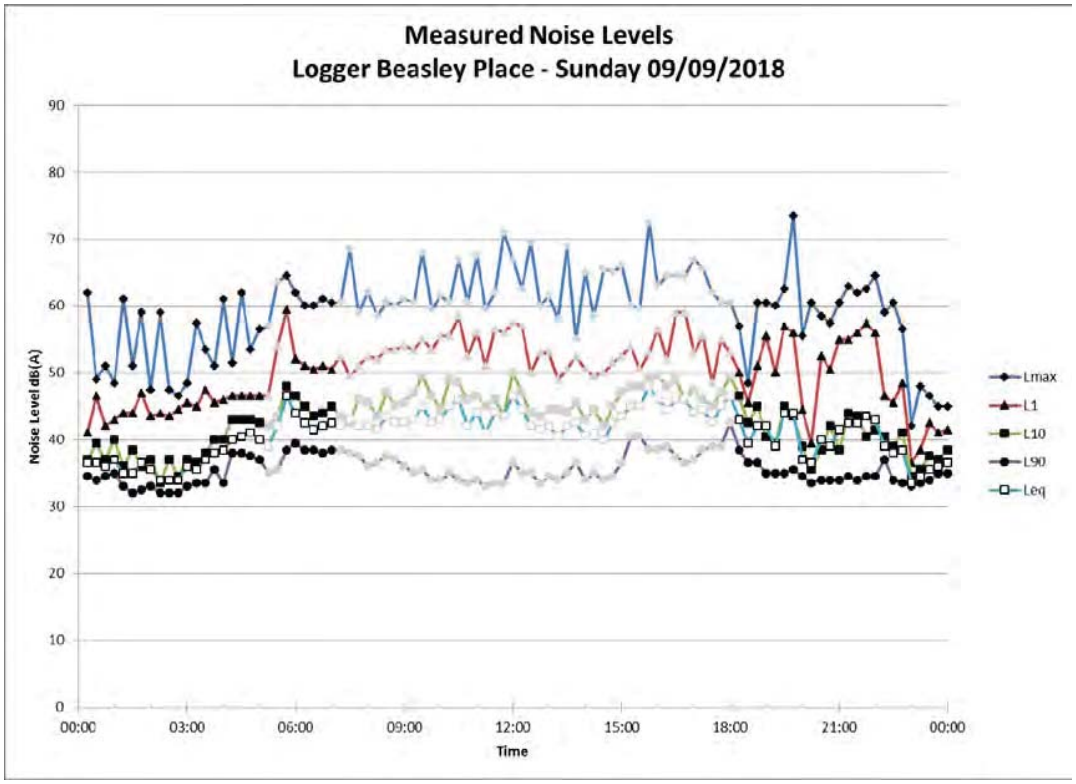


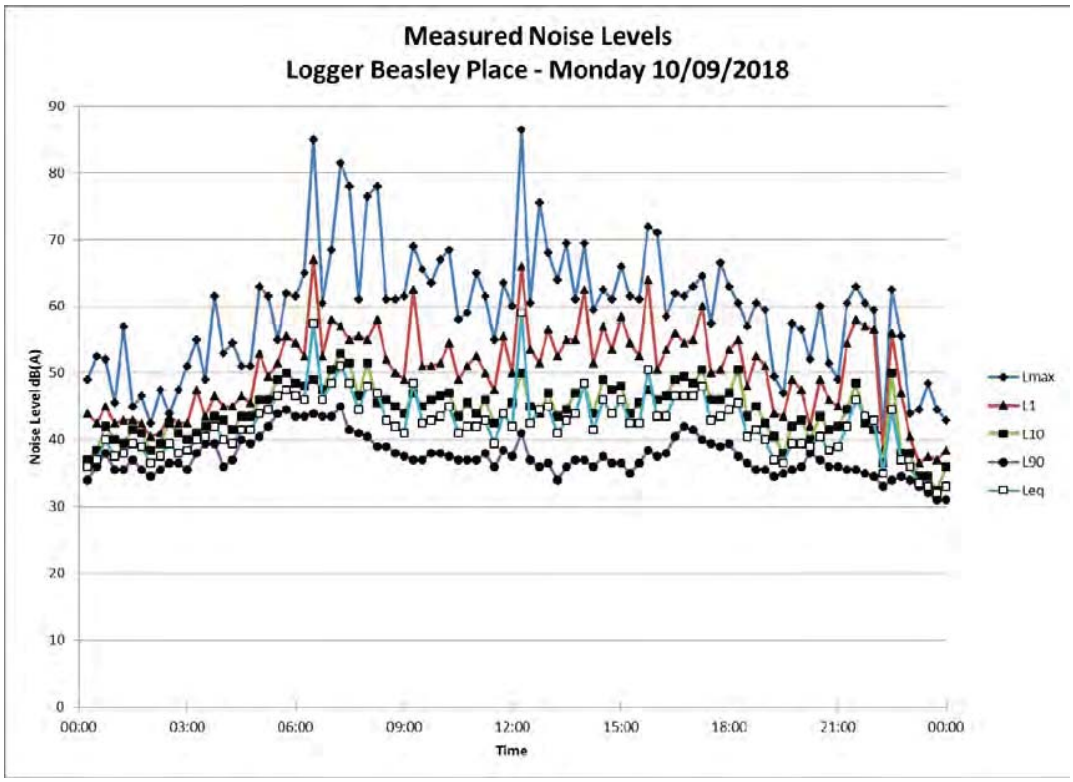


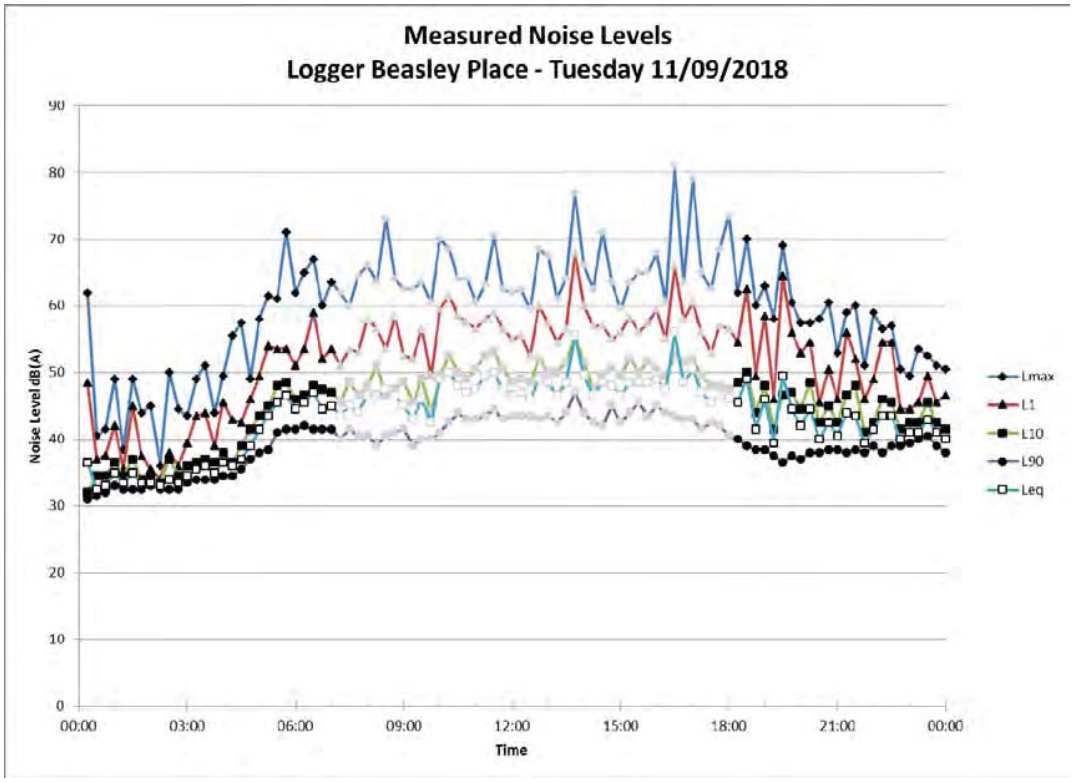


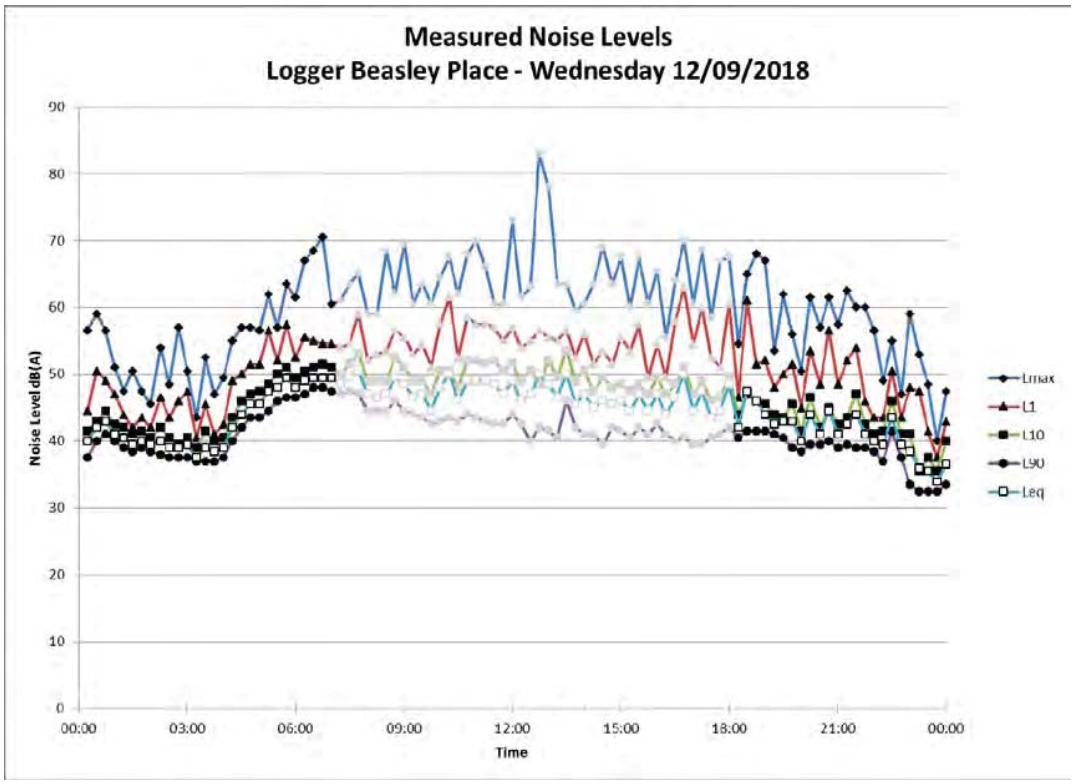


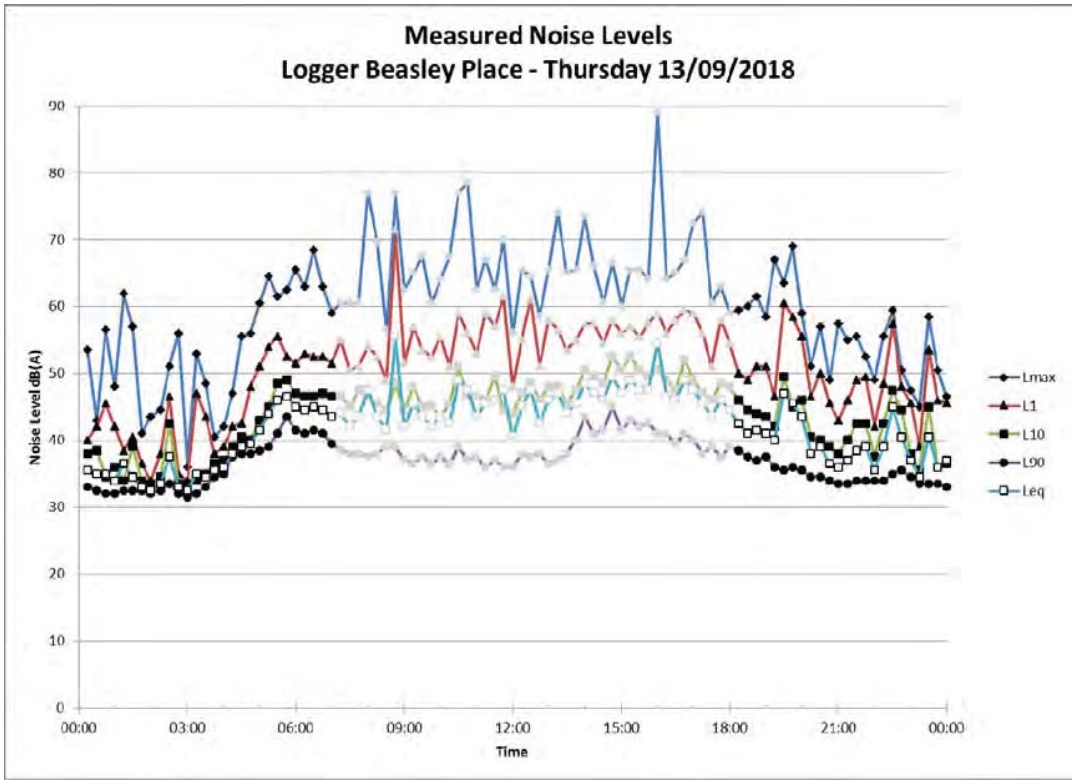


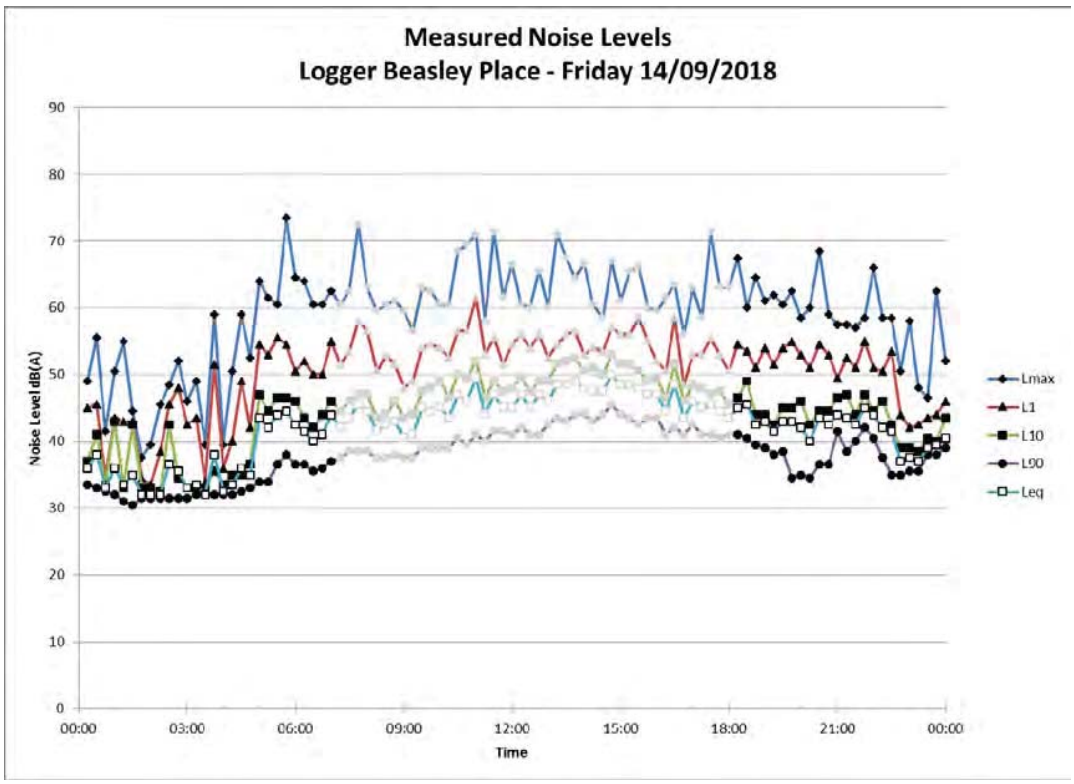


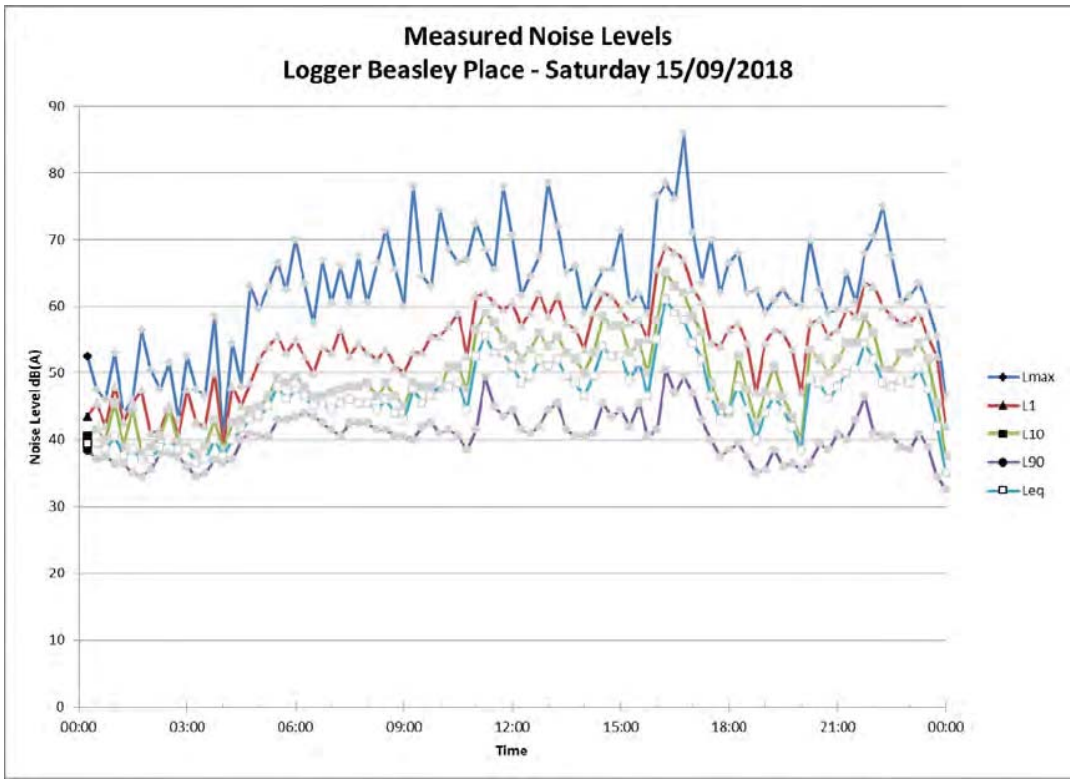


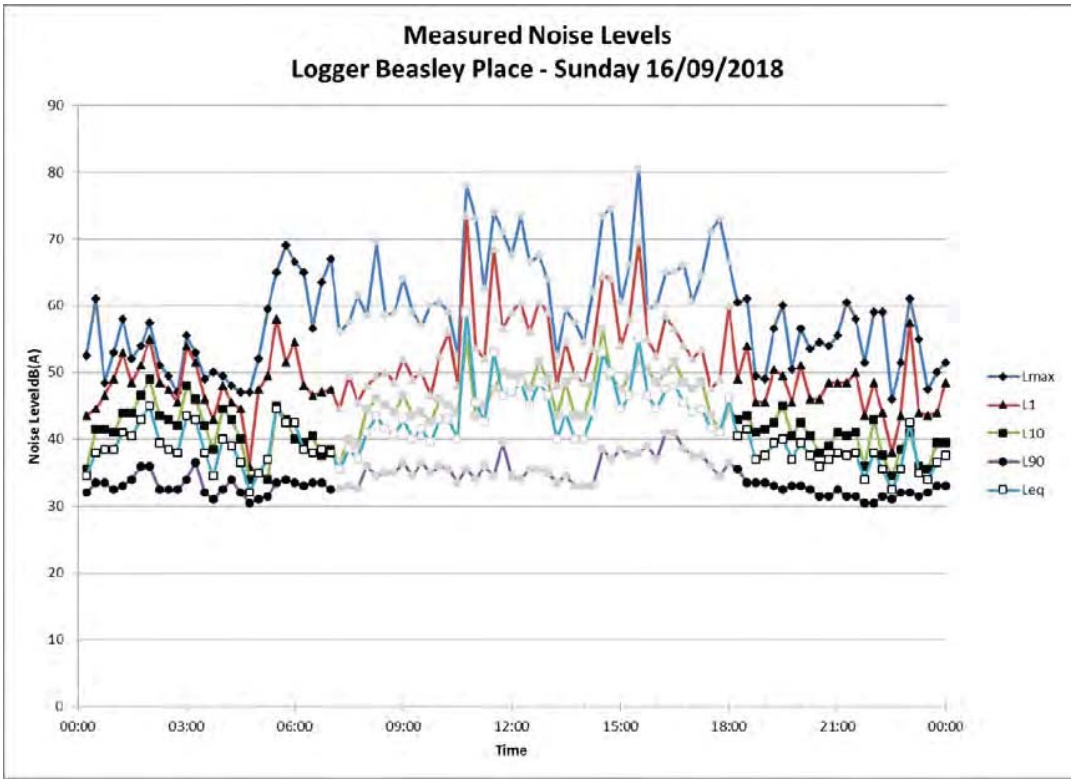


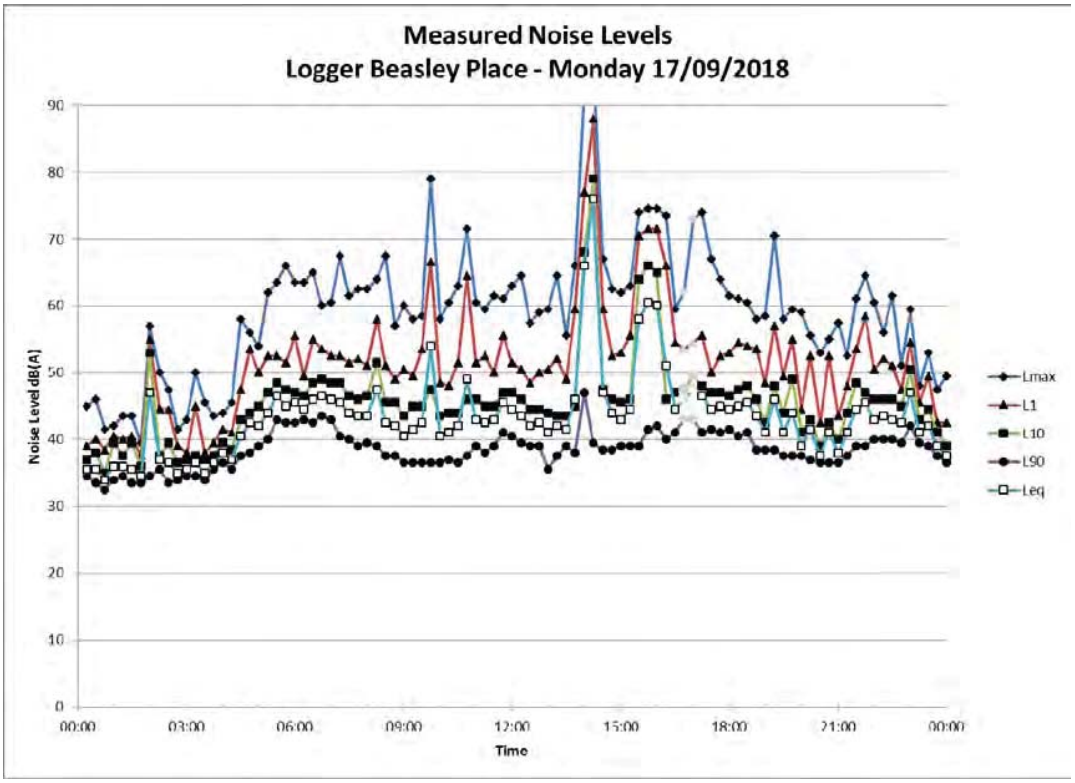


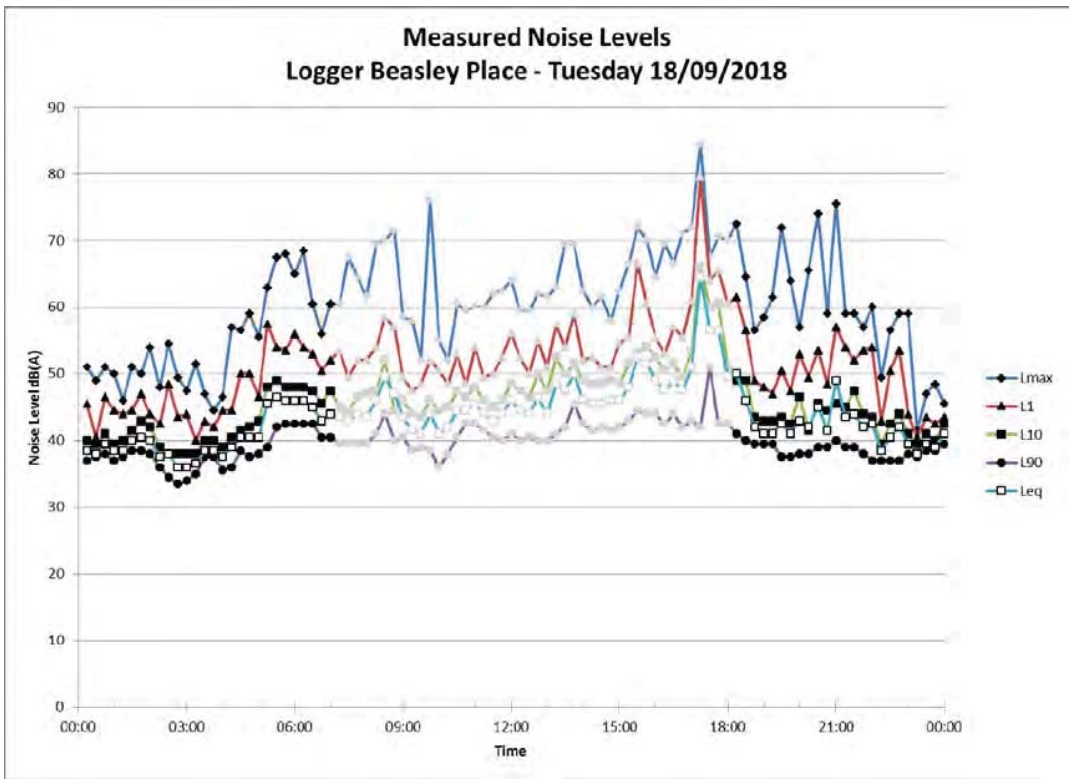


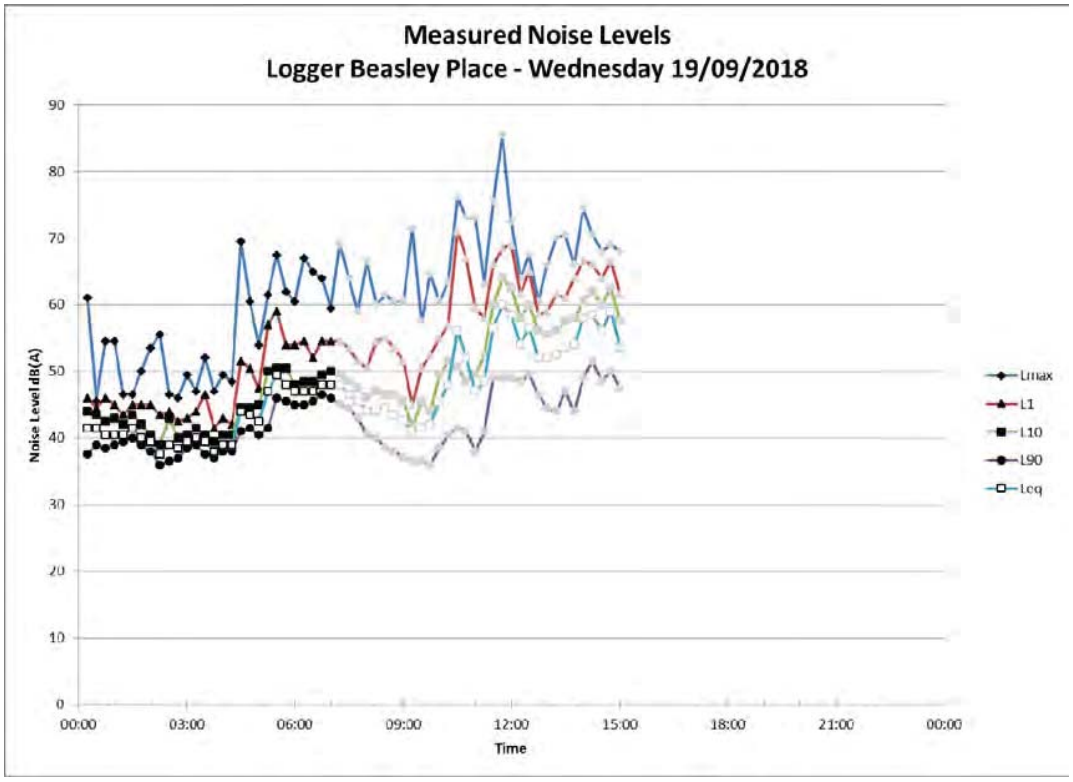


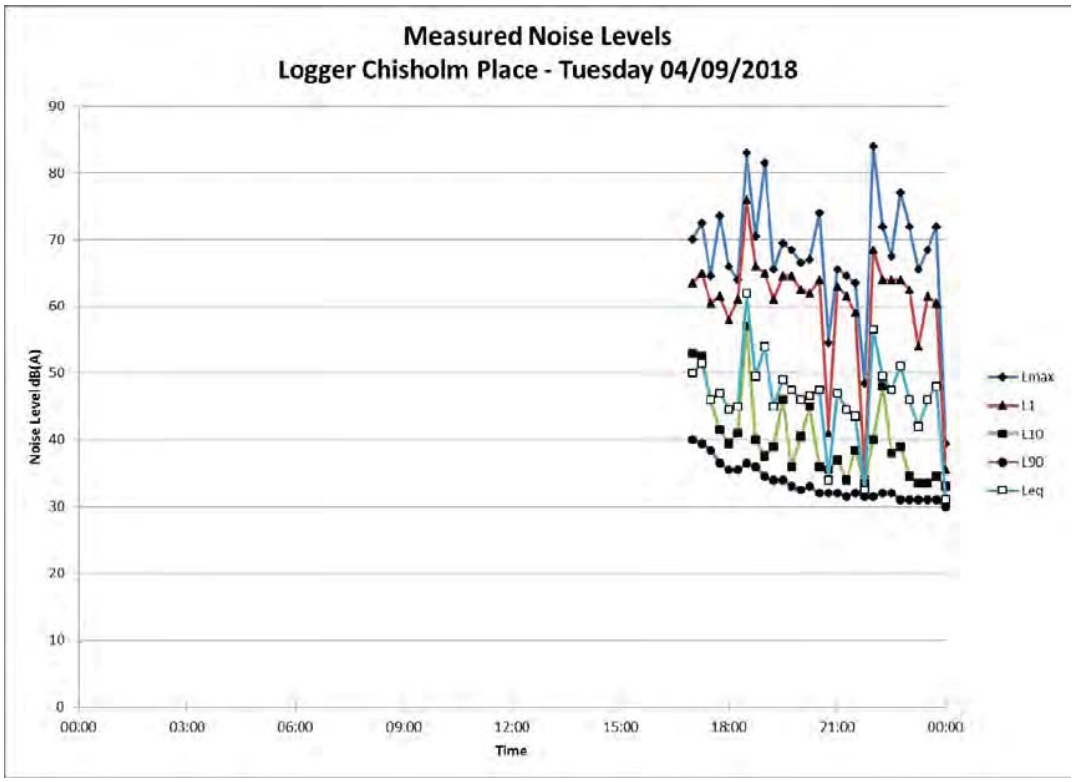


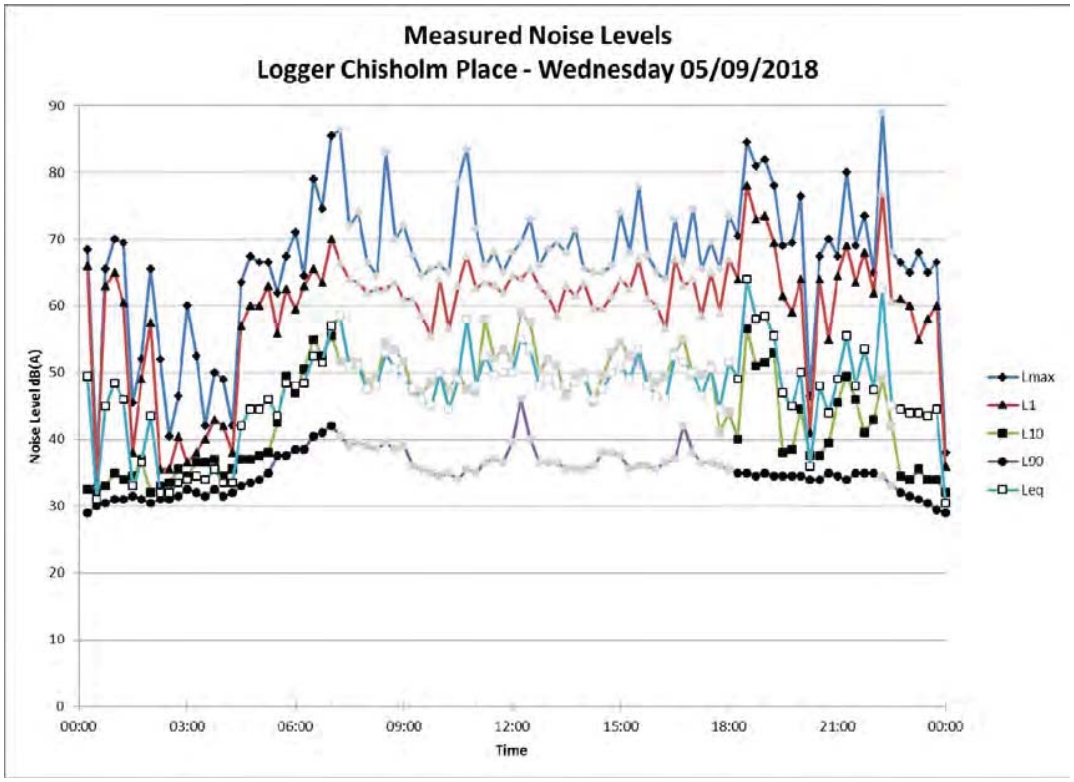


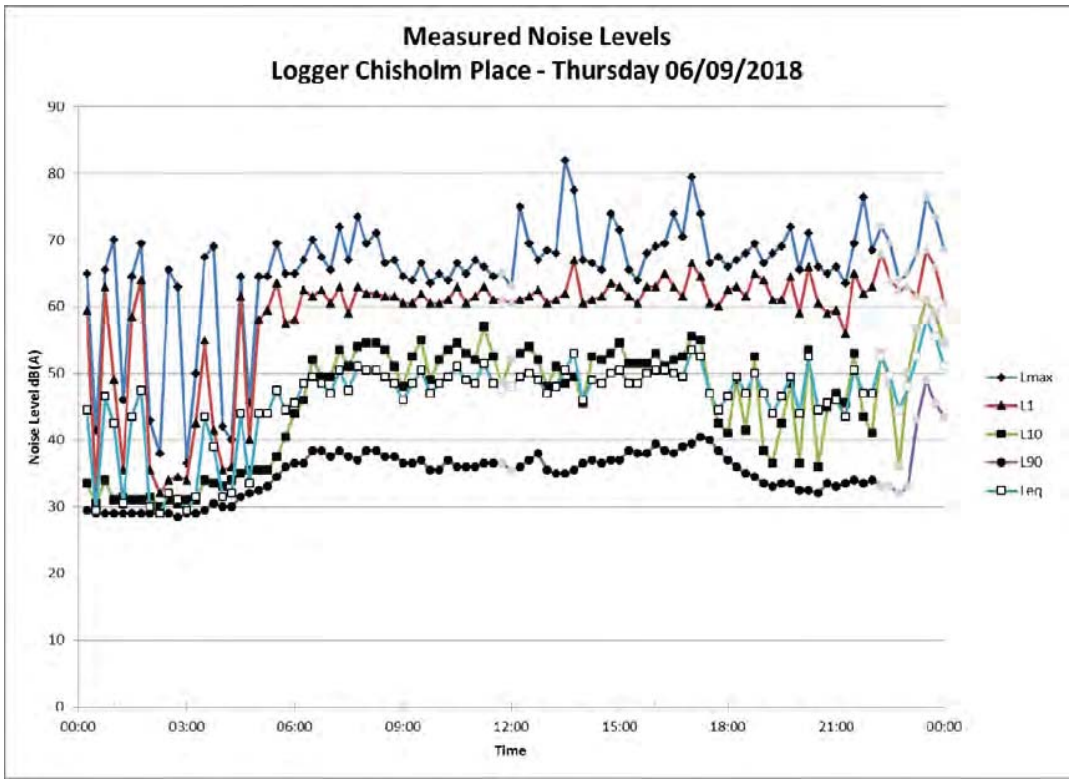


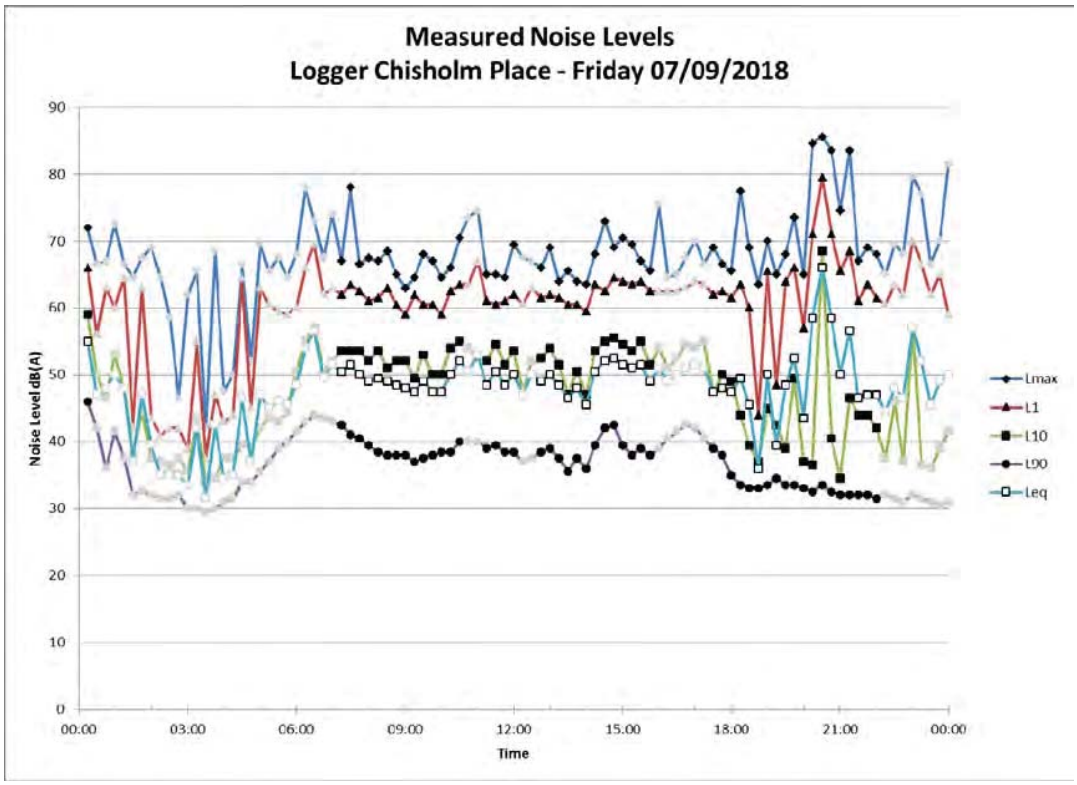


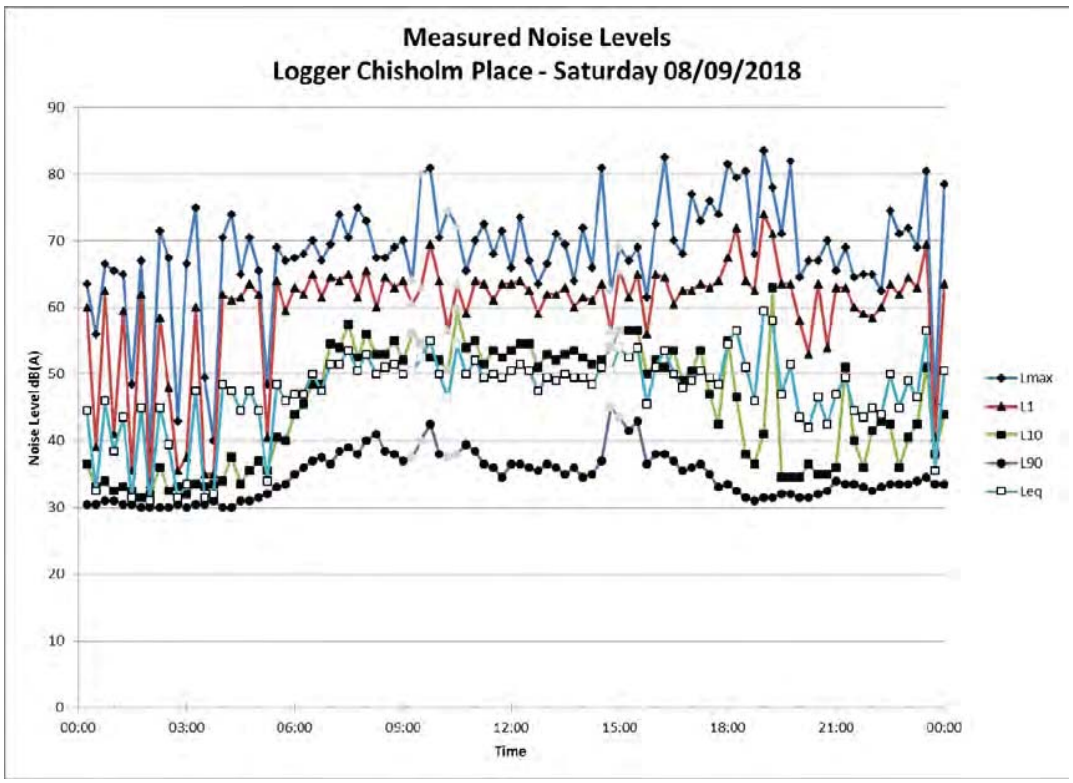


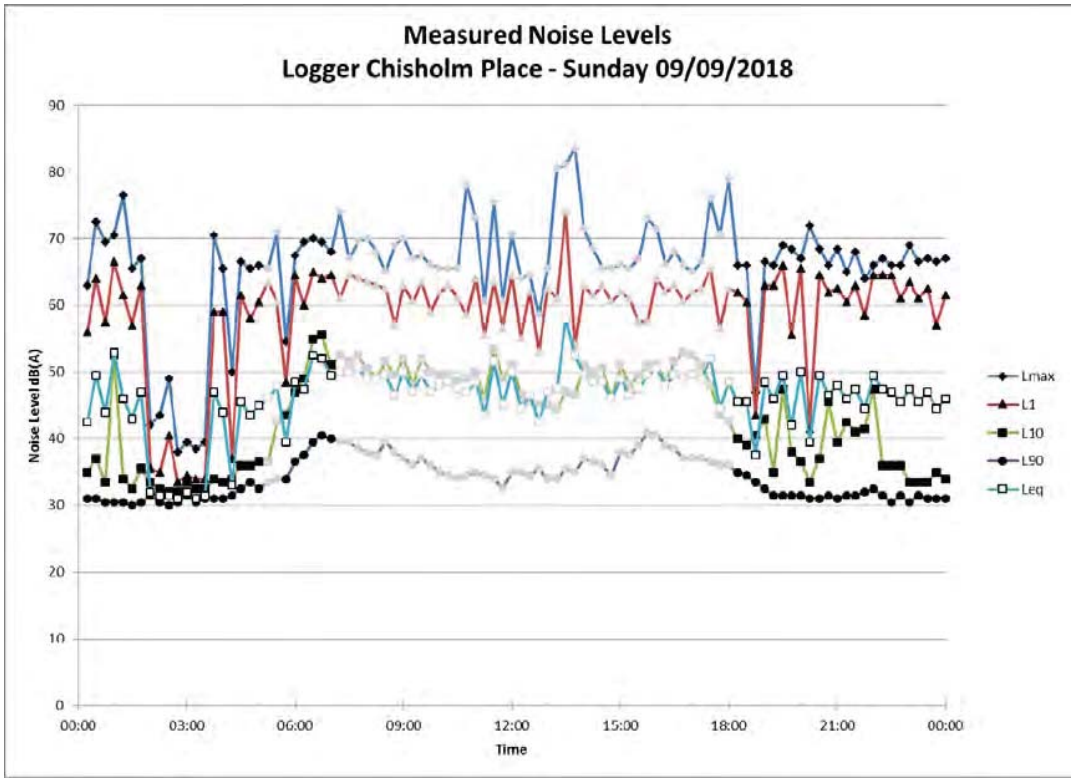


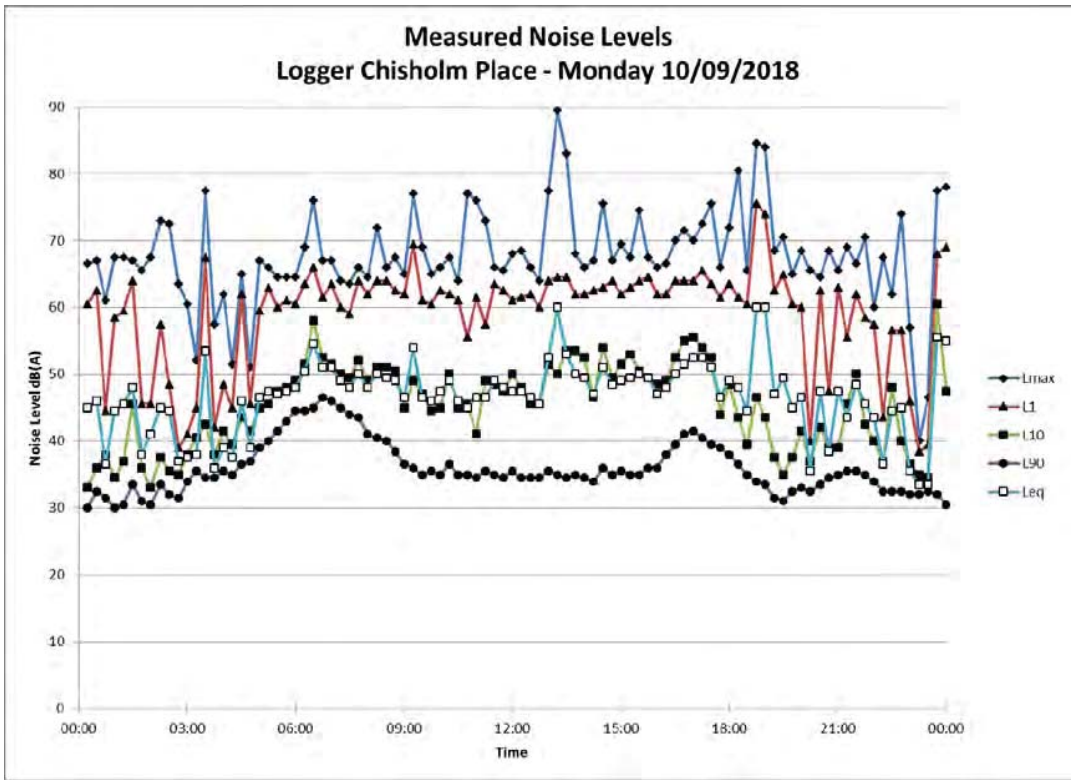


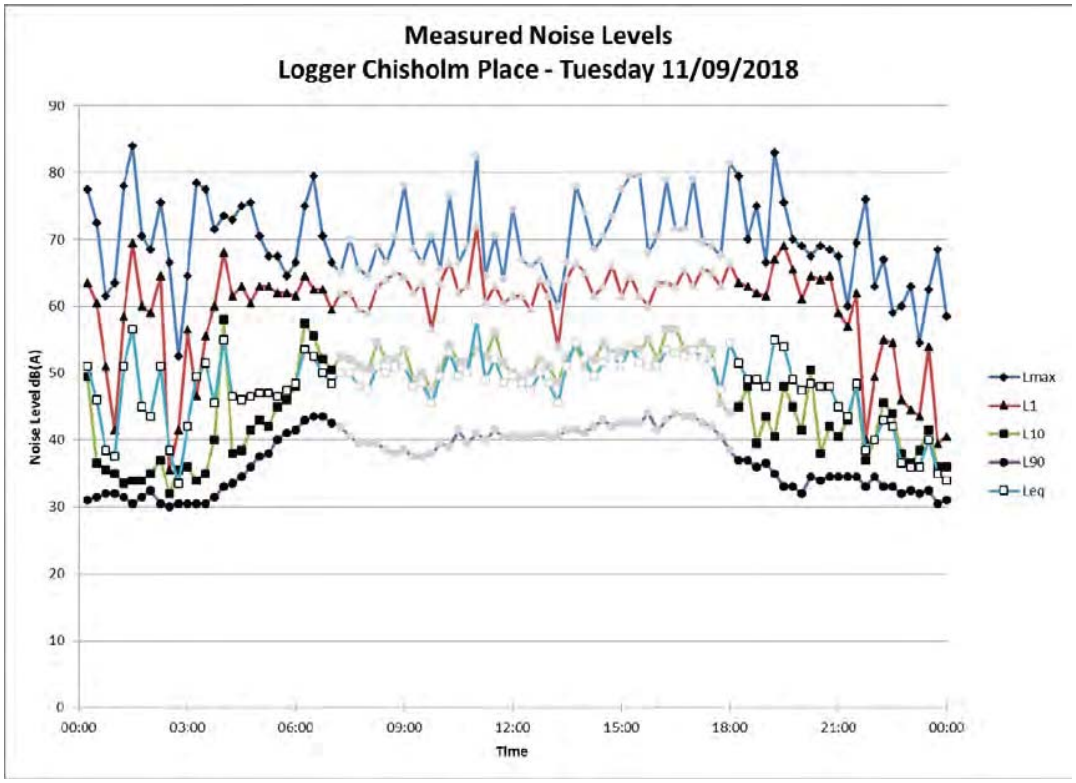


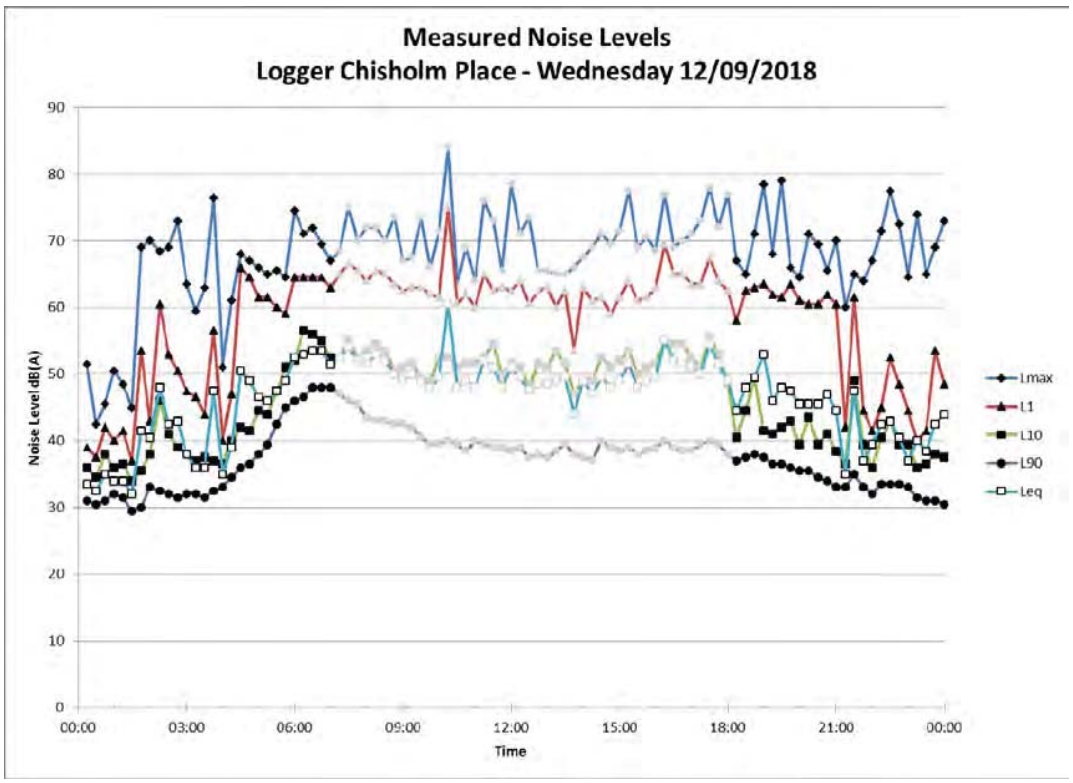


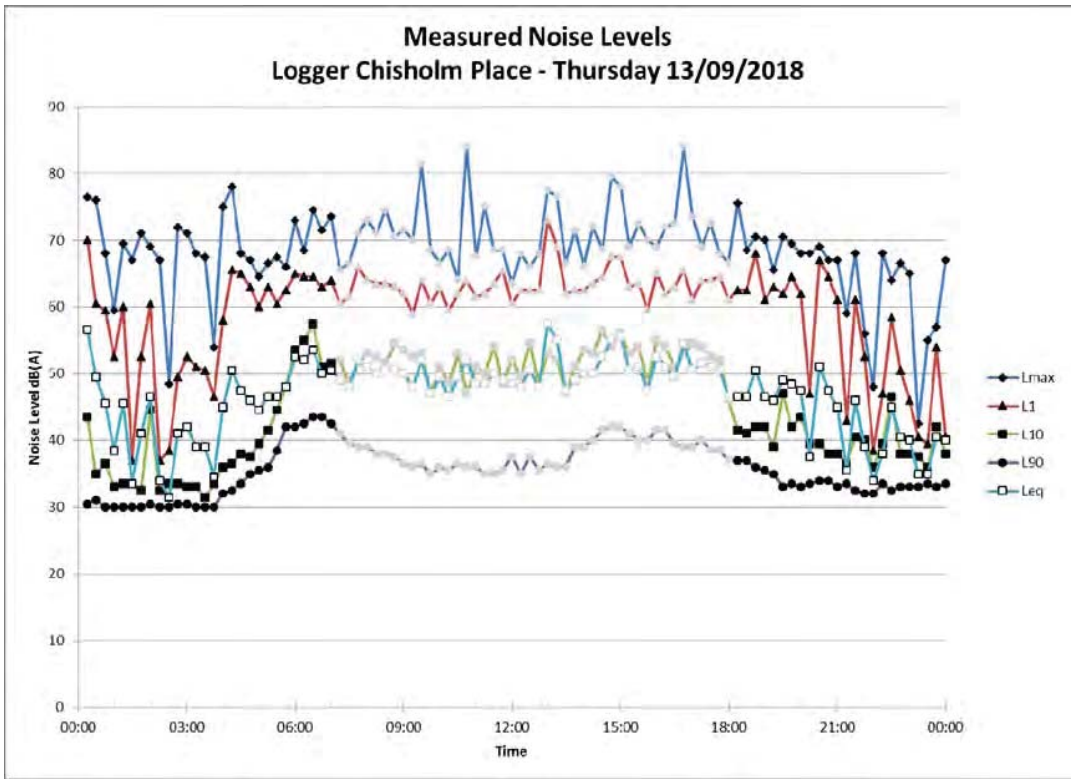


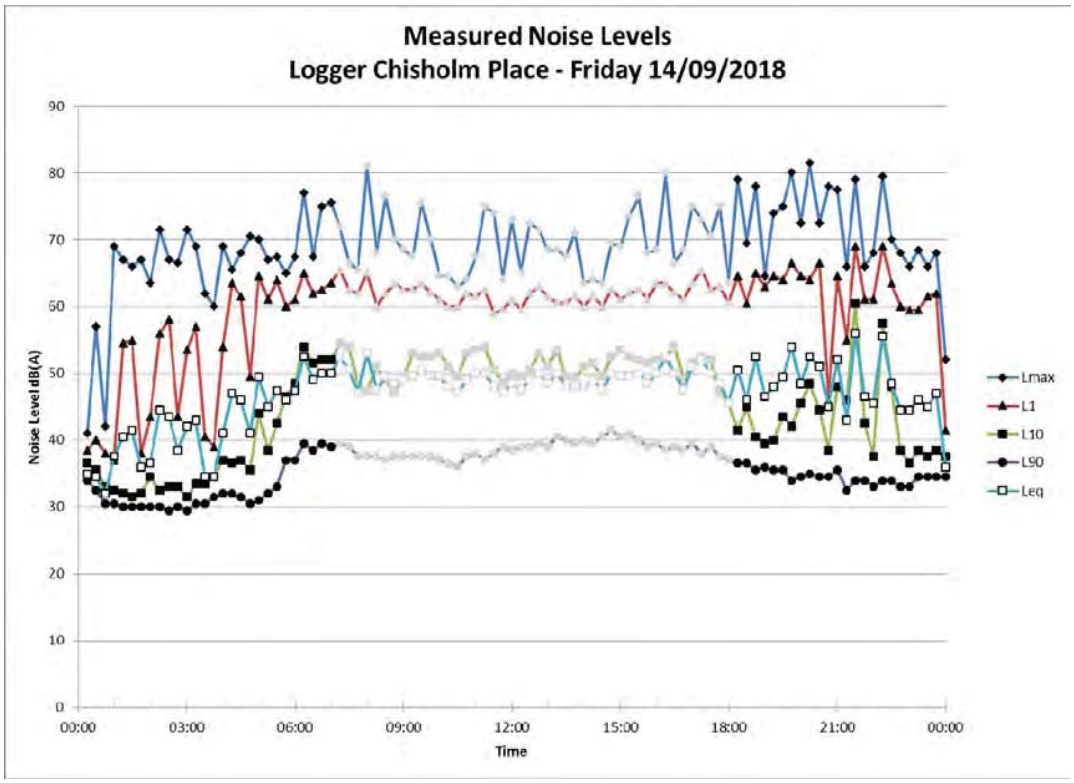


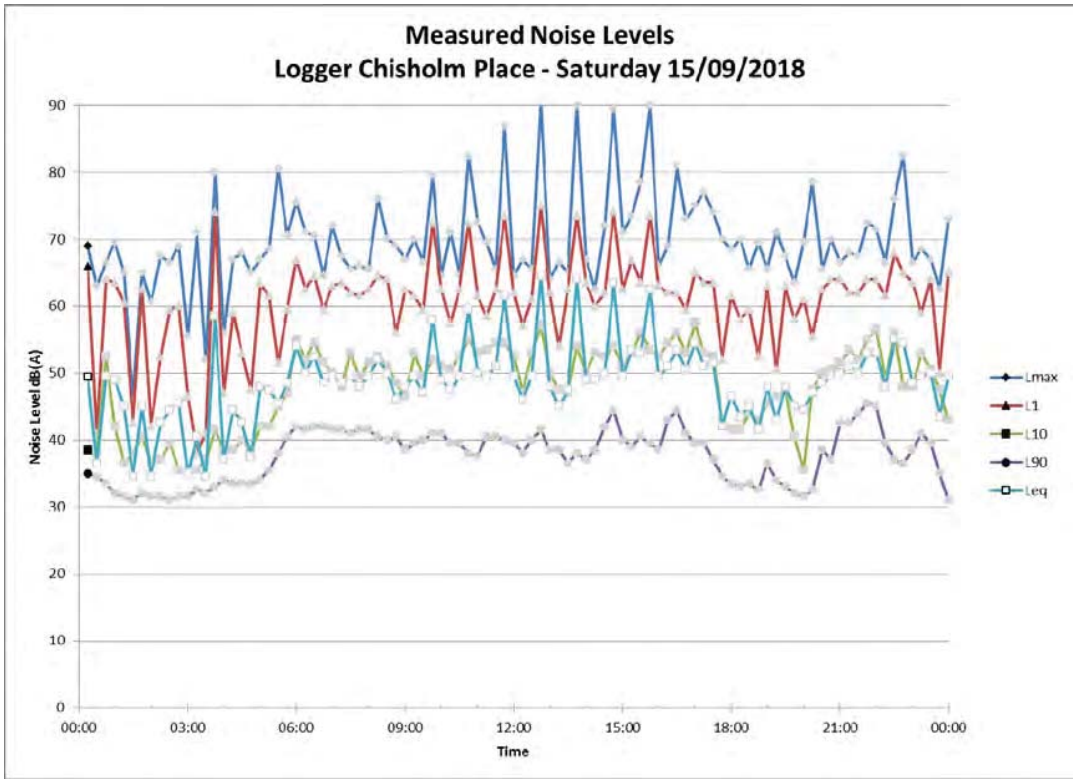


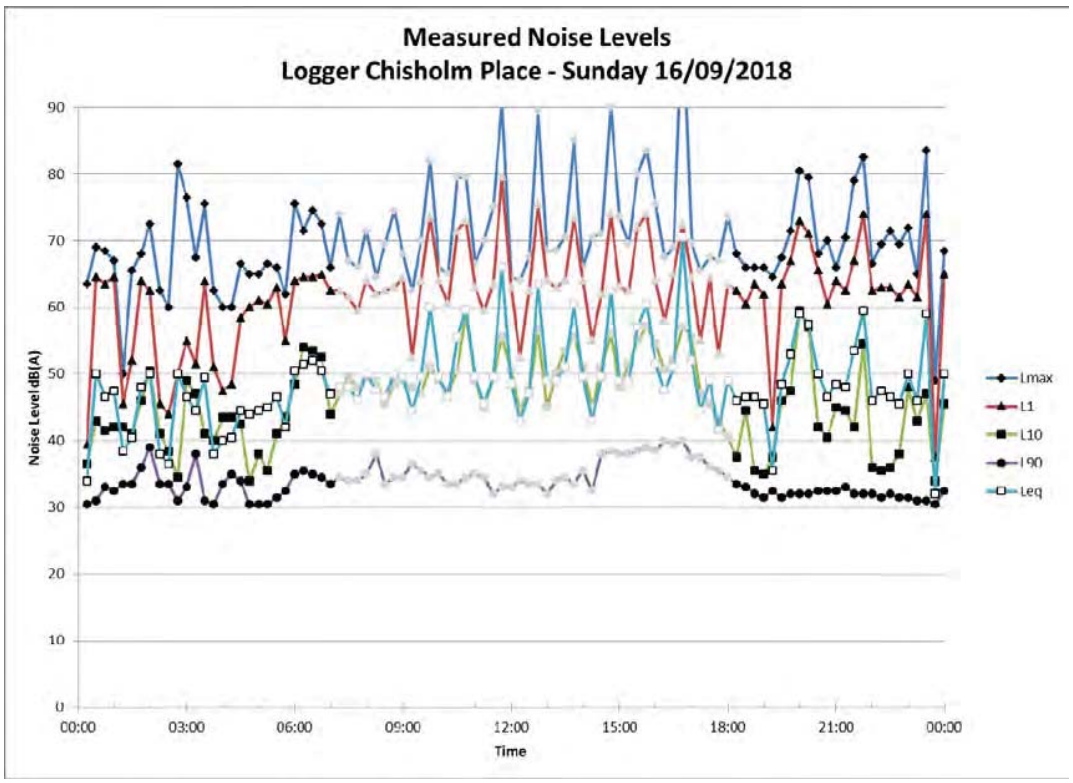


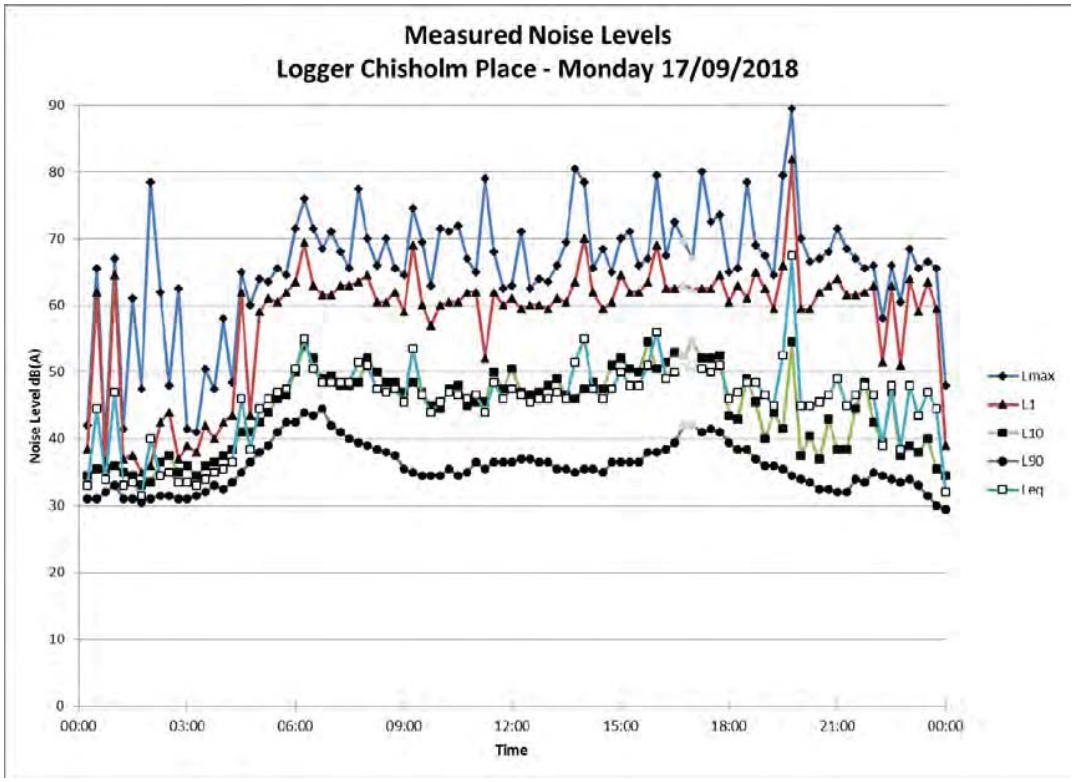


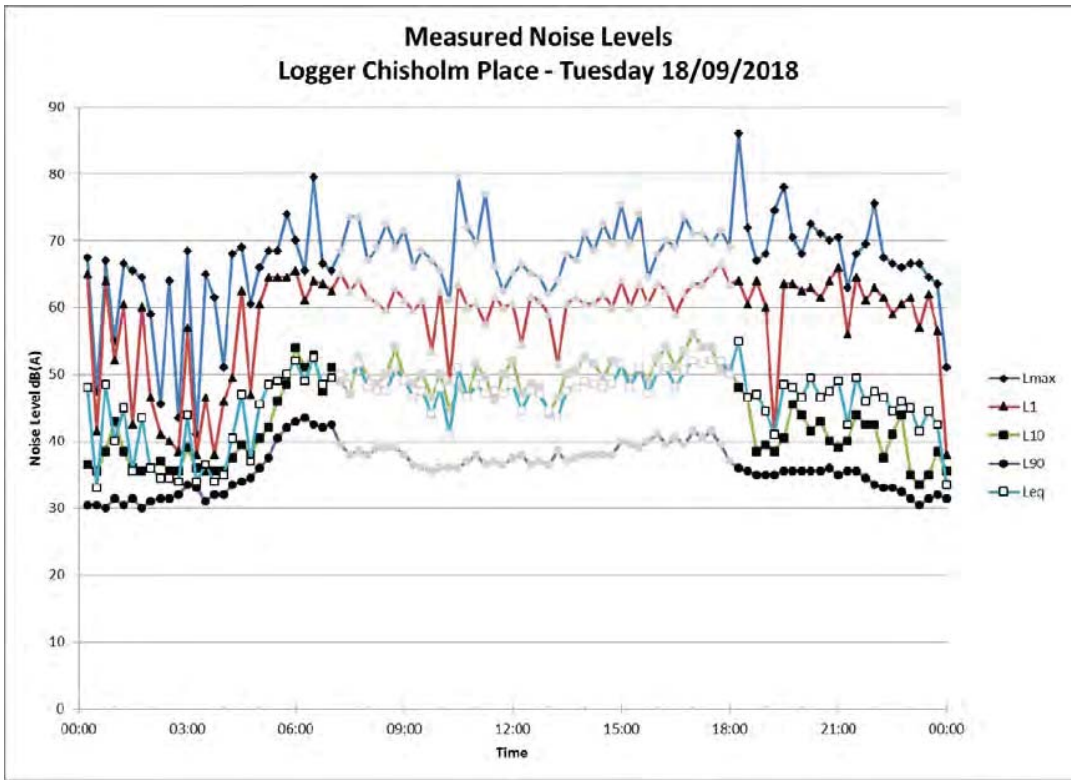


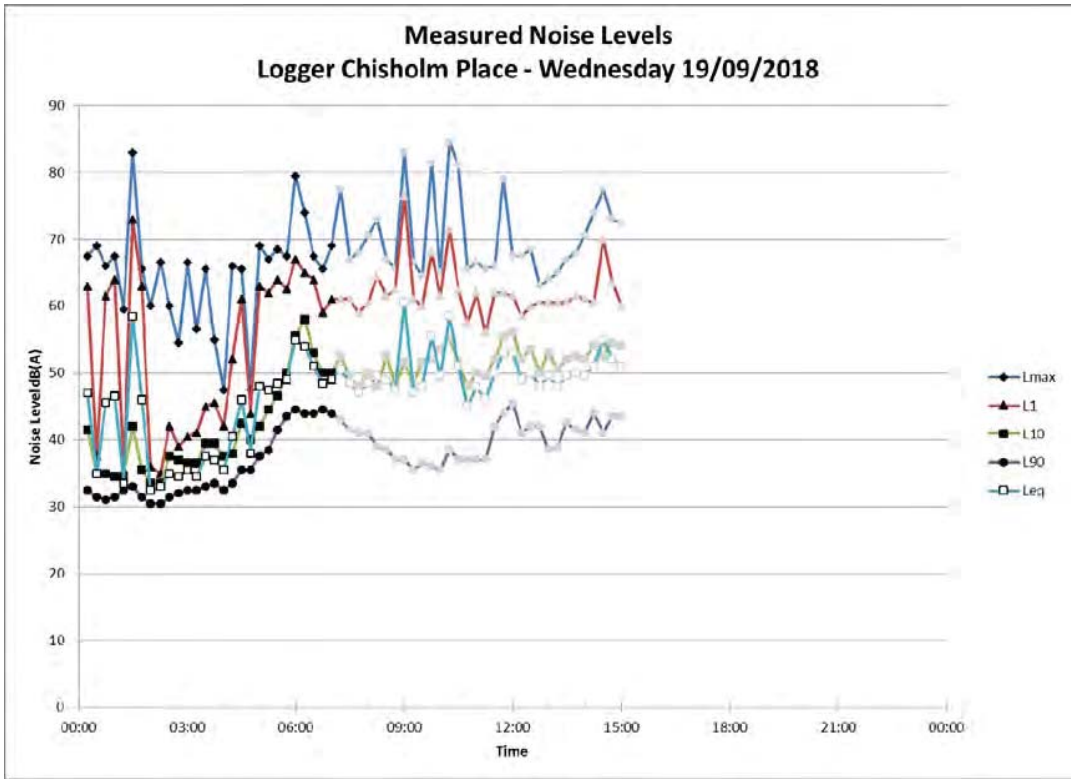












EIS Appendix 6: Soil and Water Assessment, Benbow Environmental

SOIL AND WATER ASSESSMENT
PREPARED FOR
ANDY'S EARTHWORKS PTY LTD
100 FAIREY ROAD, SOUTH WINDSOR NSW 2756

Prepared for: Andy's Earthworks Pty Ltd
MacroPlan Dimasi

Prepared by: Damien Thomas, Graduate Environmental Scientist
Emma Hansma, Senior Engineer
R T Benbow, Principal Consultant

Report No: 181025_SoilWater_Rep_Rev3
September 2019
(Released: 12 September 2019)

Benbow ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

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DOCUMENT CONTROL

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Emma Hansma	Senior Engineer		12 September 2019

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Linda Zanotto	Senior Environmental Engineer		12 September 2019

Approved by:	Position:	Signature:	Date:
R T Benbow	Principal Consultant		12 September 2019

DOCUMENT REVISION RECORD

Revision	Date	Description	Checked	Approved
1	16-11-2018	Draft / Rev1	L Zanotto	R T Benbow
2	15-1-2019	Rev2	L Zanotto	R T Benbow
3	12-9-2019	Rev3	L Zanotto	R T Benbow

DOCUMENT DISTRIBUTION

Revision	Issue Date	Issued To	Issued By
1	16-11-2018	Andy's Earthworks Pty Ltd	Benbow Environmental
2	15-1-2019	Andy's Earthworks Pty Ltd	Benbow Environmental
3	12-9-2019	Andy's Earthworks Pty Ltd	Benbow Environmental

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Visit our Website at www.benbowenviro.com.au

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Attachments

1. INTRODUCTION

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd c/o MacroPlan Dimasi to undertake a Soil and Water assessment to support an Environmental Impact Statement (EIS) for the proposed construction materials processing and recycling plant to be located at 100 Fairey Road, South Windsor NSW 2756. The assessment is a qualitative study that addresses the potential impacts to soil and water from the proposed operations in accordance with the Secretary's Environmental Assessment Requirements (SEARs No. 1188).

1.1 SEARS REQUIREMENTS

Water and soil requirements are listed in the Secretary's Environmental Assessment Requirements (SEAR 1188) dated 15/12/2017 as a key issue and the following table provides the details of requirements addressed in this report.

Table 1-1: SEARS

Requirement	Comment
DP&E REQUIREMENTS	
A description of local soils, topography, drainage and landscapes.	See Section 4.1
The details of stormwater, leachate and wastewater management.	See Section 3.5
The details of sediment and erosion controls.	See Section 3.5
A detailed site water balance.	See Section 3.4.1
The details of water usage including water supply and licences.	See Section 3.4
An assessment of impacts to surface and groundwater resources, flooding impacts and impacts to groundwater dependent ecosystems.	See Section 3.6
Measures that would be implemented to ensure that the development is consistent with the Hawkesbury Floodplain Risk Management Study and Plan.	See Section 3.2
An assessment in accordance with ASSMAC Guidelines for the presence and extent of acid sulfate soils (ASS) and potential acid sulfate soils (PASS) on the site.	See Section 4.1.3
Details of the stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts.	See Section 3.5
A description and appraisal of impact mitigation and monitoring measures.	See Section 5
EPA REQUIRMENTS	
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.	See Section 3.6.1 See Section 3.5 See Section 3.4 See Section 2.6.1
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.	See Section 2

Table 1-1: SEARS

Requirement	Comment
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.	See Section 3.4
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.	See section 0 and 2.4
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.	See Section 2.3.1
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).	See Section 3.6.1
Provide site drainage details and surface runoff yield.	See Section 3.5
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.	See Section 2.3.1
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.	See Section 2.3.1 and 3.6
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).	See Section 3.1

Table 1-1: SEARS

Requirement	Comment
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.	See Section 3.6
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.	See Section 0
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).	See Section 3.2
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.	See Section 3.6.1
Include a rationale, along with relevant calculations, supporting the prediction of the discharges.	See Section 3.6.1
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).	See Section 0, 3.6.6 and 4.2
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).	See Section 3.6
Identify any potential impacts on quality or quantity of groundwater describing their source.	See Section 3.6.6
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.	See Section 3.6.8.1 and 4.1.2
Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.	See Section 4.1.3
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.	See Section 3.5.2

Table 1-1: SEARS

Requirement	Comment
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.	See Section 2.3.1
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.	See Section 2.6
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.	See Section 3.1
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.	See Section 3.1
Reference should be made to Managing Urban Stormwater: Soils and Construction (Landcom, 2004) and Guidelines for Fresh and Marine Water Quality ANZECC 2000)	See Section 3.5
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.	See Section 3.6.5 and 3.6.7
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.	See Section 3.6.8.1
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.	See Section 3.5.4
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.	See Section 3.6.1
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.	a. See Section 2.1 b. See Section 3.5.4 c. See Section 5 d. See Section 3.6.6

Table 1-1: SEARS

Requirement	Comment
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.	See Section 3.6.6
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.	See Section 3.6.8.1, 5
Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004).	See Section 3.6.7
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.	See Section 4.1 and 4.1.4
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.	See Section 4.1.4, 4.2, 3.6.8.1 and 3.6.1,
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).	See Section 3.6.8.1 and 4.1.3

1.2 SCOPE OF WORKS

The assessment is qualitative and the scope of works includes the following:

- Review of relevant plans and documentation relating to the site and proposed development;
- Addressing the key issues for "soil and water" identified in the Secretary's Environmental Assessment Requirements (SEARs) reference: SEAR 1188, dated 15/12/17 including:
  - A description of local soils, topography, drainage and landscapes;
  - The details of stormwater, leachate and wastewater management;
  - The details of sediment and erosion controls;
  - A detailed site water balance;
  - The details of water usage including water supply and licenses;

- An assessment of impacts to surface and groundwater resources, flooding impacts and impacts to groundwater dependent ecosystems;
- Measures that would be implemented to ensure that the development is consistent with the Hawkesbury Floodplain Risk Management Study and Plan;
- Identification of the probability of the occurrence of acid sulfate soils at the site and determination of whether an acid sulfate soil management plan in accordance with ASSMAC guidelines is required; and
- A description and appraisal of impact mitigation and monitoring measures.

The report has been prepared based on the information provided by the client. No soil or water sampling or analysis work was undertaken as part of this assessment. Recommendations for further studies to support the findings of this report are provided where considered necessary.

2. SITE DETAILS AND PROPOSED DEVELOPMENT

This section provides a description of the site, surroundings and proposed development.

2.1 SITE LOCATION

The land is located at 100 Fairey Road, South Windsor NSW 2756, also known as Lot 4, DP264159. The site is located within the Hawkesbury City Council Local Government Area.

Figure 2-1 shows the location within its local setting.

2.2 DESCRIPTION OF THE SITE AND SURROUNDING AREA

The site is located within the Hawkesbury River Catchment and sits on South Creek's floodplain. It covers 22.34 ha, is predominately flat and has been cleared and is covered by grass species. Most large vegetation species have been removed apart from a narrow band of riparian vegetation along South Creek, with some scattered trees populating the site's north-east corner. The site's south-western corner is slightly raised and slopes eastwards down to South Creek. This north flowing tributary of the Hawkesbury River extends the whole length of the site's eastern boundary. A small wetlands exists on the site above the site's development area near the north-western border, and water runs eastwards through the site's north-eastern corner, before joining South Creek (or Wianamatta Creek). The terrain along this northern boundary dips marking the course of the stream bed. Another water course, which is fed by the wetlands immediately south of the site, runs parallel to South Creek (approximately 130 m west) before joining the chain-of-ponds in the site's north-eastern corner.

The site is surrounded by General Industrial IN1 zoned sites to the south-west, west and north-west including Boral Concrete, Snowflake Blast and Powdercoat and V J Glass. Land zoned Primary production RU1 is located to the north, east and south of the site. Further north of the site there is a railway line zoned SP2 Infrastructure and a R2 Low Density Residential area within the suburb of Windsor with a small RE1 Public Recreation area in the centre.

Figure 2-1: Aerial Photograph of Site's Local Setting

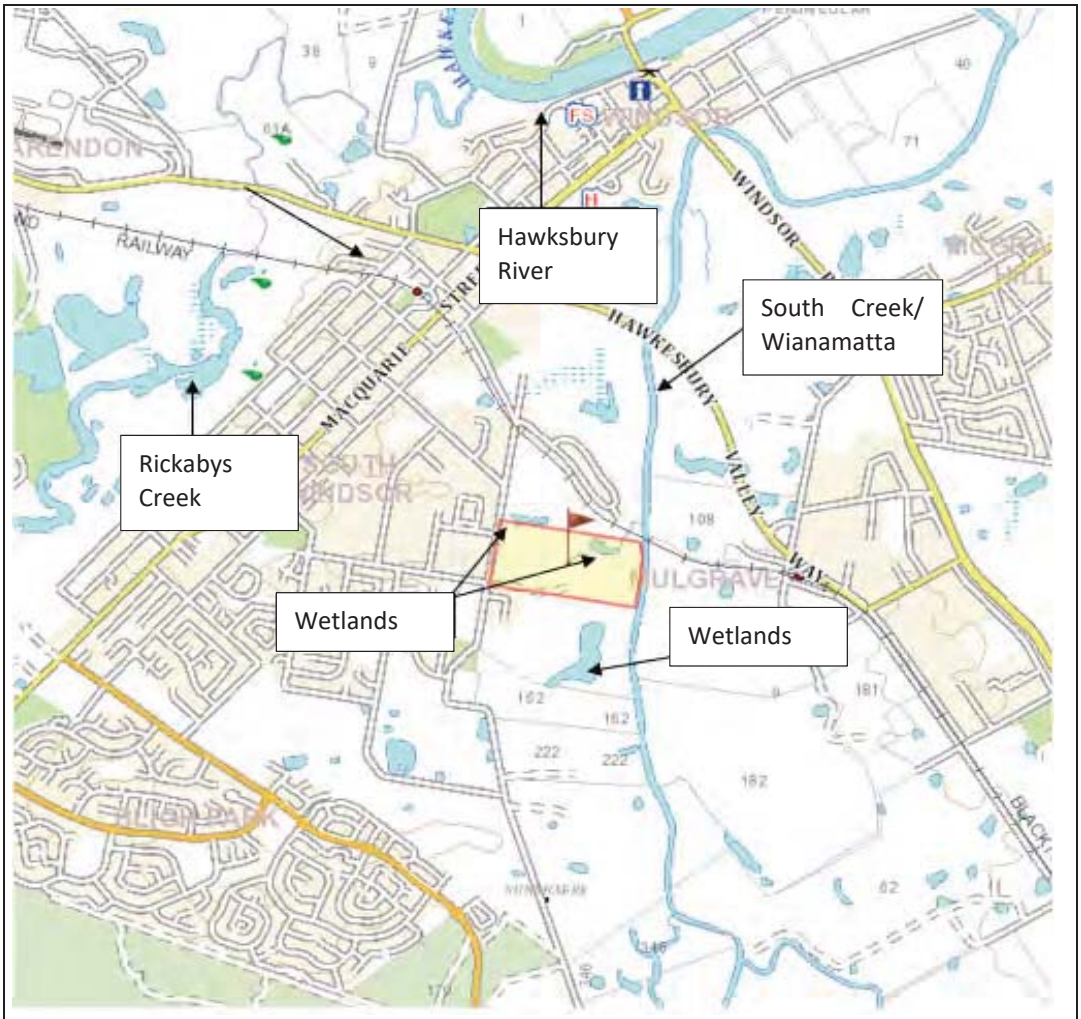
Source: Land and Property Information – SixMaps

N Not to scale	LEGEND: Site boundary	Benbow Environmental 25-27 Sherwood Road Northmead NSW 2152

2.3 NEAREST WATERWAYS

The nearest waterways to the site are shown in Figure 2-2. Small wetlands and associated small tributaries are the only water bodies existing onsite. South Creek, a perennial stream, marks the site's physical eastern boundary. Immediately below the site's southeast corner are larger Wetlands as identified on the Hawkesbury Wetland Map see Figure 2-3.

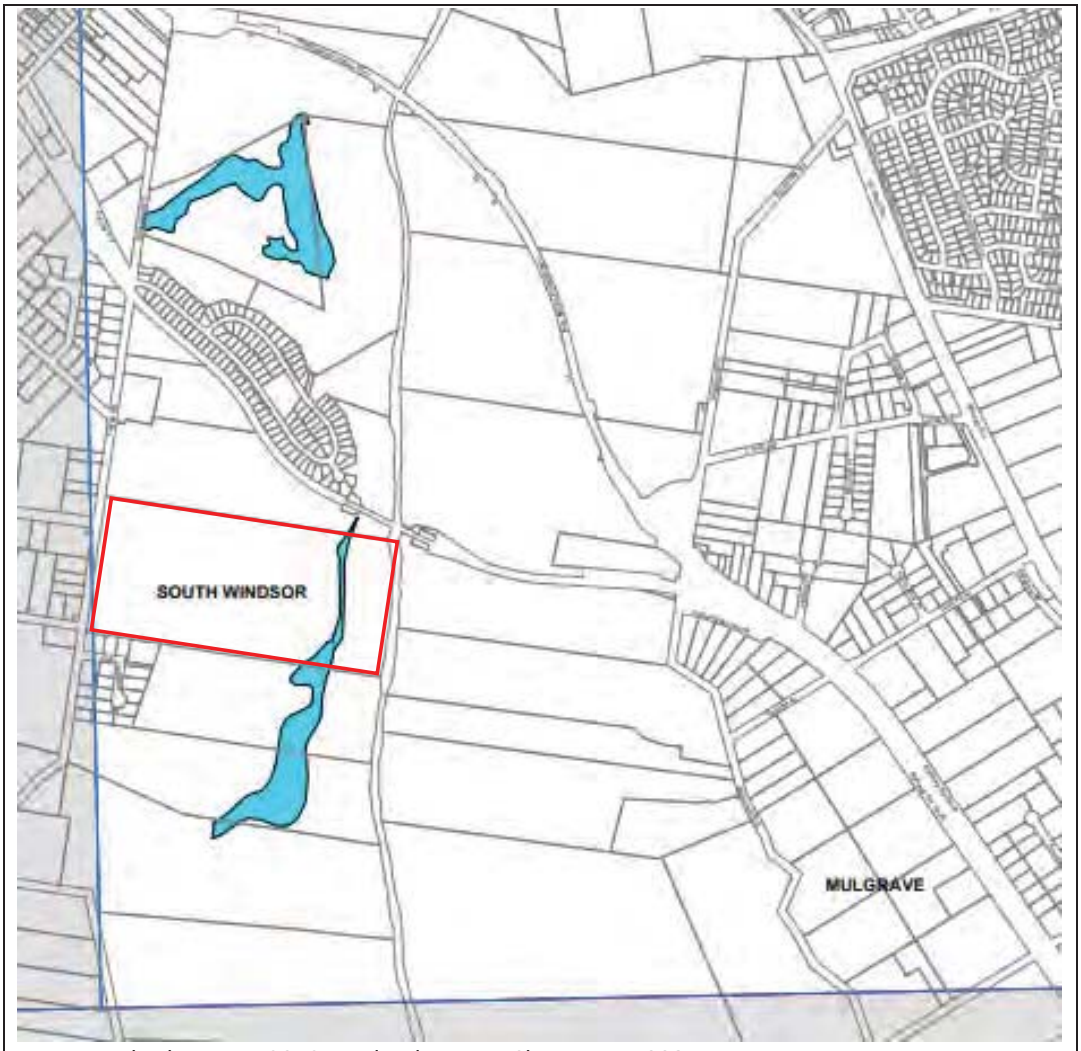
Figure 2-2: Nearest Rivers and Waterbodies



Source: SixMaps

N Not to scale	LEGEND - Site Boundary	Benbow Environmental 25-27 Sherwood Road Northmead NSW 2152

Figure 2-3: Wetland Map



Source: Hawkesbury LEP 2012 Wetlands Map – Sheet WET_008DB

N Not to scale	LEGEND: - Site Boundary Wetlands	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

2.3.1 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).

Therefore the NSW Water Quality Objectives are considered to be met if the proposed development complies with the relevant trigger levels set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines).

2.4 CATCHMENT MANAGEMENT PLAN

The site is located within the Hawkesbury-Nepean River Catchment.

2.5 RAINFALL

The BoM IFD Design Rainfall Depth (mm) for the site area is provided in table Table 2-1 below, based on the 2016 Rainfall IFD Data System.

Table 2-1: Annual Exceedance Probability (AEP) Depth -33.626354, 150.817142)

Duration	63.20%	50%#	20%*	10%	5%	2%	1%
1 min	1.99	2.27	3.16	3.77	4.39	5.22	5.87
2 min	3.26	3.67	4.97	5.86	6.74	7.96	8.92
3 min	4.54	5.11	6.96	8.24	9.5	11.2	12.6
4 min	5.7	6.45	8.85	10.5	12.2	14.4	16.2
5 min	6.76	7.67	10.6	12.6	14.6	17.4	19.5
10 min	10.8	12.3	17.2	20.6	24	28.6	32.2
15 min	13.4	15.4	21.5	25.8	30.1	35.8	40.3
30 min	18.2	20.7	28.8	34.5	40.1	47.7	53.6
1 hour	23.2	26.2	35.8	42.6	49.3	58.6	65.9
2 hour	28.8	32.2	43.5	51.5	59.6	71	80.1
3 hour	32.8	36.6	49.2	58.3	67.6	80.7	91.3
6 hour	41.7	46.6	62.9	74.9	87.5	105	120
12 hour	54.4	61.2	84.2	102	120	145	165
24 hour	71.4	81.4	116	141	169	205	233
48 hour	91.4	106	155	192	231	278	314
72 hour	103	119	176	220	266	317	357
96 hour	110	128	189	235	285	338	379
120 hour	115	133	196	244	295	349	390
144 hour	118	136	199	247	299	353	395
168 hour	120	138	200	248	299	354	39

2.6 DESCRIPTION OF THE PROPOSAL

The proposed facility will receive, handle and process up to 98,000 tonnes of construction and demolition (C&D) waste per year. This includes virgin excavated natural material (VENM) and excavated natural material (ENM). This material will be crushed and screened within a purpose built building and sorted into individual stream products for reuse.

Separated waste streams will be stored within designated covered storage bays externally. A front end loader will be used to transfer materials to and from the storage bays and the material will then be taken off site by truck to sell to market or to landfill.

2.6.1 Land forming and Excavation Works

The proposed area will be levelled to approximately 18.0 – 17.3 AHD (Australian Height Datum) from the existing range of 18.13-13.8 AHD. Soil required to raise the level would come from elsewhere on the subject site shown in The Concept Bulk Earthwork Depth Cut to Fill Plan provided within the Stormwater and Flood Management Report (Attachment 1). The proposed operational area of the site would be capped with road base material hardstand which would come from a supplier offsite.

Some areas of the site are within 500 m of class 4 acid sulfate soils and due to the extent of the proposed earthworks an acid sulfate soil management plan is recommended. Acid sulfate soils are discussed in further detail in Section 4.1.3.

2.6.2 Proposed Operational Activities

The operation of the proposed facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening of C&D waste including VENM, ENM, recycled crushed concrete, brick and excavated rock products within the building; and
- Material storage in external covered storage bays.

The mobile vehicles and machinery used on site will be refuelled by a tanker. All mobile vehicles and machinery will be serviced by contractors who will bring their own chemicals including lubricant and hydraulic oils. Only water will be used in the wheel wash. No chemicals will be stored on site.

2.7 EXISTING SITE CONTAMINATION

The Phase I Environmental Site Assessment undertaken by Benbow Environmental in September 2018 (Ref: 181025_Phase1_Rev4), found no evidence of soil or water contamination.

3. WATER ASSESSMENT

This section provides the water assessment for the proposed development. Attachment 1 provides the Stormwater and Flood Management Report prepared by Sparks and Partners Consulting Engineers. Findings of this report have been considered in this assessment.

3.1 LICENSING REQUIREMENTS

The two key pieces of legislation for the management of water in NSW are the *Water Act 1912* and the *Water Management Act 2000*.

3.1.1 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.

3.1.2 Water Management Act 2000

The *Water Management Act 2000* 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, construction of works relating to water use and controlled activities carried out on waterfront land can be obtained under the Act.

Clause 91(2) of the Water Management Act, 2000 (WMA Act) requires an activity approval to carry out a controlled activity in, on or under waterfront land. The following definitions apply:

> ***"controlled activity"*** *means:*
>
> *a) the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or*
> *b) the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or*
> *c) the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or*
> *d) the carrying out of any other activity that affects the quantity or flow of water in a water source.*
>
> ***"waterfront land"*** *means:*
>
> *a) the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river, or*
> *(a1) the bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and the prescribed distance inland of, the shore of the lake, or*

(a2) the bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the estuary, or

b) if the regulations so provide, the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters,

where the prescribed distance is 40 metres or (if the regulations prescribe a lesser distance, either generally or in relation to a particular location or class of locations) that lesser distance. Land that falls into 2 or more of the categories referred to in paragraphs (a), (a1) and (a2) may be waterfront land by virtue of any of the paragraphs relevant to that land.

Waterbodies and a wetland are identified to exist at the site itself and the excavation works involved with the proposed development would be within 40 metres of these waterbodies. Therefore, the proposed modifications require a controlled activity approval.

The proposed development constitutes integrated development as the works require a controlled activity approval under the Water Management Act 2000.

3.1.3 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.

3.2 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

Clause 120 of the *Protection of the Environment Operations Act 1997* states the following:

120 Prohibition of pollution of waters
(1) A person who pollutes any waters is guilty of an offence.
Note. An offence against subsection (1) committed by a corporation is an offence attracting special executive liability for a director or other person involved in the management of the corporation—see section 169.
(2) In this section:
pollute waters includes cause or permit any waters to be polluted.

The proposed development will not breach the above clause with regard given to the proposed mitigation measures and safeguards to be implemented as described throughout this report.

3.3 SYDNEY REGIONAL ENVIRONMENTAL PLAN NO. 20 – HAWKESBURY NEPEAN RIVER

The site contains environmentally sensitive areas. "Environmentally sensitive areas" are defined under the SREP No. 20 as:

> *"areas where environmental characteristics mean that the potential impacts of land use are greater than elsewhere in the catchment. Environmentally sensitive areas identified by the Hawkesbury-Nepean Environmental Strategy in the Hawkesbury-Nepean catchment are: the river; riparian land; escarpments and other scenic areas; conservation area sub-catchments; national parks and nature reserves; wetlands; other significant floral and faunal habitats and corridors; acid sulphate soils and potential acid sulphate soils."*

The site contains riparian land, wetlands and Class 5 acid sulfate soils and is within 500 m of class 4 acid sulfate soils.

Clause 6 lists the Specific planning policies and recommended strategies of the Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River. Relevant strategies for the proposed development are provided Table 3-1 and addressed throughout this report, referenced as follows:

Table 3-1: Specific Planning Policies and Recommended Strategies - SREP No. 20

Policy / Strategies	Comment
(1) Total catchment management (b) Consider the impact of the development concerned on the catchment	See section 3.6.3
(2) Environmentally sensitive areas (d) Protect wetlands (including upland wetlands) from future development and from the impacts of land use within their catchments.	See section 3.6.4
(g) Consideration should be given to the impact of the development concerned on the water table and the formation of acid sulphate soils.	See section 4.1.3
(3) Water quality (a) Quantify, and assess the likely impact of, any predicted increase in pollutant loads on receiving waters	See section 3.6.5
(b) Consider the need to ensure that water quality goals for primary contact recreation and aquatic ecosystem protection are achieved and monitored	See section 3.6.7
(12) Metropolitan strategy (e) Consider the implications of predicted climate change on the location of development and its effect on conservation of natural resources.	See section 3.6.9

3.4 WATER USAGE & SUPPLY

The site will use mains water for the demountable office and amenities and wheel wash. The mains water will be supplied from the existing Evoqua facility connection and be stored within two storage tanks.

A primary and secondary sedimentary detention basin will be located on the eastern side of the site. Water from the sediment detention basins will provide water for landscaped and vegetated areas.

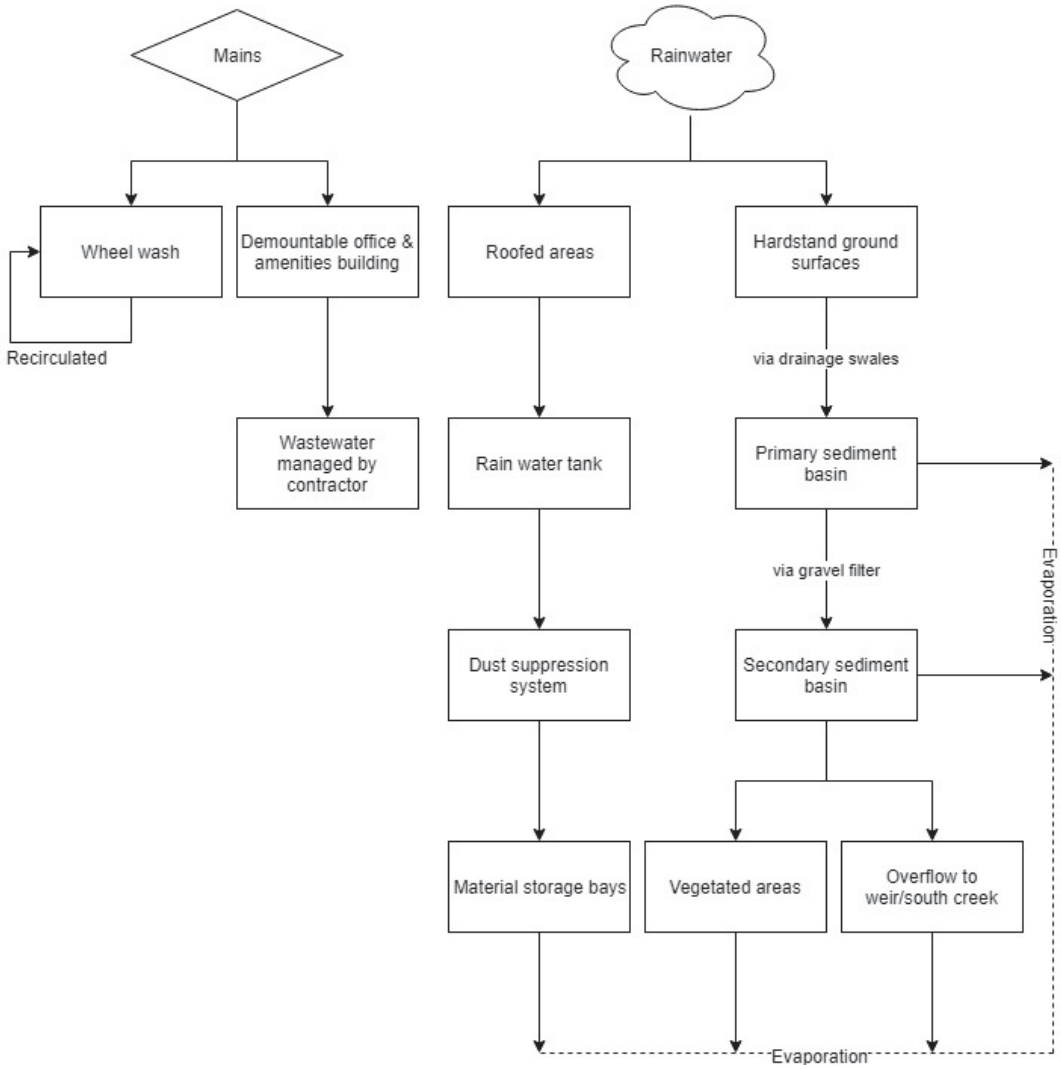
A rainwater tank would capture water from the roofed area of the proposed building. Rainwater would be used for dust suppression purposes.

Wastewater and sewerage from the demountable office and amenities buildings will be managed by a contractor.

3.4.1 Site Water Balance

The following figure shows the site's water balance.

Figure 3-1: Site Water Balance Diagram



3.5 STORMWATER & WASTEWATER MANAGEMENT

This section discusses the management of stormwater and wastewater that would be undertaken as part of the proposed development. Attachment 1 provides the Stormwater and Flood Management report prepared by Sparks and Partners Consulting Engineers. This report details the conceptual design of the stormwater system and presents the results of the MUSIC modelling which was undertaken to confirm the treatment efficiency of the system.

The results demonstrate that with the system in place, the site will achieve a reduction in pollutant export, with the stormwater runoff quality improving.

3.5.1 Stormwater System

The stormwater from the proposed operational area will runoff the hardstand surface into the primary and secondary sediment detention basins shown in the plans in Attachment 1. Grassed drainage channels will direct the water along the northern and southern border of the development area to the sediment detention basins.

Roof water from the proposed building would be captured within a 30kL water tank.

3.5.2 Drainage Swales

Grassed lined drainage swales would convey the collected runoff to sediment basins located on the eastern area of the proposed operational area whilst also filtering any collected course sediments. These grassed drainage swales have been sized to convey the 1:100 year storm flows. The swales would discharge the collected runoff to a primary sedimentation basin which is sized as per the requirements of Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition.

3.5.3 Sediment Basins

The primary basin would remove sediments and Total Suspended Solids (TSS) from the collected runoff and is conceptually sized to treat and hold the 80th percentile 1:10 year ARI storm event. A secondary basin would be provided downstream of the first and is conceptually sized at half the size of the primary basin. Each basin will have a stilling baffle arrangement that maximises the retention time in the basins for any collected runoff to ensure settling of collected sediments and TSS is achieved.

3.5.4 Wastewater

The wastewater generated from the demountable office and amenities buildings will be managed by a contractor.

No other wastewater will be generated from the proposed facility.

3.5.5 Wheel Wash

The wheel wash is a closed loop system that would recirculate water for the washing of truck wheels. The system may need periodic top up with mains water. No wastewater would be

generated. No chemicals will be used in the wheel wash. Regular servicing of the system would be undertaken. Any residual waste generated as part of the regular maintenance would be removed from site by a licenced waste contractor.

3.6 ASSESSMENT OF POTENTIAL IMPACTS ON WATER

Assessment of potential impacts of the proposed development to surface and groundwater resources, and flooding is presented in this section.

3.6.1 Surface Water

The operation of the facility would contribute negligible additional quantities to surface water runoff. Some water may be generated from the use of fine mist water sprayers for dust suppression. However, the water from the water sprayers is unlikely to contribute to surface waters as the volume of water would be negligible and the majority would evaporate. Dust suppression would consist of water sprays/water cannon that provide a mist to adequately dampen materials and working areas. This would be a fine mist that would be switched off once stockpiles are damp. Any residual water from dust suppression would be captured within the drainage channels and managed within the sediment basin arrangement.

Surface waters would be generated from a rain event where water would land on the external storage and processing areas. While some of the water may seep through the hardstand and drainage channels the majority of water from external hardstand ground surfaces would flow into the drainage channels and then into the primary detention basin, and then during significant rainfall events the secondary basin.

3.6.2 Potential Pollutants

This section identifies potential pollutants of concern at the site, the relevant source materials, the potential receptors (including wetlands, south creek and downstream tributaries) and the potential exposure pathways.

The primary release mechanism expected on site, is generation of debris and sediment during material handling and sorting procedures, of various materials that potentially contain pollutants. Surface water may provide an avenue for debris and potential pollutants to be transported.

The main potential pollutants of concern include sediments containing high alkalinity (high pH, pH>7) and total suspended solids (TSS). Other lower risk potential pollutants include total recoverable hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX) and Polycyclic Aromatic Hydrocarbons (PAH) as shown in Table 3-2.

Table 3-2: Conceptual Model of Potential Contaminants and their Source

Known and Potential Primary Sources of Contamination	Primary Release Mechanism	Contaminants of Potential Concern	Potential Environmental Receptors	Exposure Pathways	Risk Level
Concrete	Processing	pH (highly alkaline) Sediments	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff Alkaline surface waters seeping into ground water	Moderate
Bricks/Tiles	Processing	Sediments	Wetlands, streams and native habitats	Surface water runoff	Moderate
Treated Timbers	Debris generated during sorting procedures	Arsenic, Chromium and Copper	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Negligible
Lead Based Paints	Receiving waste containing remnants of materials with Lead Based Paints	Lead	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Negligible
Diesel Fuel and Oils	Leaks/spills from transport vehicles	TRH BTEX PAH	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Low
Plasterboard	Debris generated during sorting procedures	Sulfate Calcium	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Negligible
Metal C&D Waste	Debris generated during sorting procedures and metal ions dissolved in water	Zinc Chromium Cadmium Copper Lead Manganese Iron Aluminium	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Low

Table 3-2: Conceptual Model of Potential Contaminants and their Source

Known and Potential Primary Sources of Contamination	Primary Release Mechanism	Contaminants of Potential Concern	Potential Environmental Receptors	Exposure Pathways	Risk Level
Pesticides/ Herbicides	Soil/sand material containing pesticide/ herbicide contaminated soil/sand	OCP and OPP	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Low
Soil, Organic Matter or Fertilisers	Release of chemicals of concern	Nitrogen Phosphorus Ammonia	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Low
Asphalt Waste	Debris generated during sorting procedures	Hydrocarbons, PAH	Wetlands, streams, groundwater ecosystems and native habitats	Surface water runoff, dissolved pollutants seeping into ground water	Negligible

TRH: Total Recoverable Hydrocarbons
BTEX: Benzene, Toluene, Ethylbenzene and Xylenes
PAH: Polycyclic Aromatic Hydrocarbons
OCP: Organochlorine Pesticide
OPP: Organophosphorus Pesticide

3.6.3 Catchment Impacts

The major impacts to the catchment from the proposed development are associated with the surface water and ground water impacts; these are assessed in the following sections.

3.6.4 Wetland Impacts

The major impacts on the surrounding wetlands would involve the potential pollutants detailed in section 3.6.2 being released from site and contaminating the nearby wetlands which could result in harm to the aquatic ecosystems. The mitigation measures are provided in the following sections.

3.6.5 Surface Water Impacts

3.6.5.1 Construction

The main surface water impact from construction works would be the release of sediments into receiving waters. Erosion and sediment controls are presented in Attachment 1.

The proposed construction works involve the cut and fill of the site area as shown in The Concept Bulk Earthwork Depth Cut to Fill Plan (Attachment 1). During the construction phase erosion and sediment controls will be implemented.

During cut and fill works it is recommended that the areas to be excavated outside the development area are undertaken in stages to minimise the total area disturbed at any one time. This will allow each area to be stabilised and revegetated with pastoral grasses immediately following the excavations works.

In addition there is a low risk of impacts from leakages of oils and fuel from construction work machinery. Refuelling and maintenance would be undertaken by contractors trained in spill prevention procedures.

A construction environmental management plan (CEMP) is recommended to ensure effective management of surface water runoff.

3.6.5.2 Operations

Based on the proposed operations and infrastructure associated with the development, assessment of the potential impacts on surface water is discussed as follows:

- Spillages or releases of dangerous goods, being diesel or lubricating oil entering and contaminating surface waters. No dangerous goods or chemicals would be stored on site. This would greatly reduce to risk of contamination of waters by these substances. Diesel, fuel and lubricating oils would be used within the equipment and machinery on site. The mobile vehicles and machinery used on site will be refuelled by a tanker. All mobile vehicles and machinery will be serviced by contractors who will bring their own chemicals including lubricant and hydraulic oils.

- Product/Waste releases entering and contaminating surface waters.

- Material processed by the facility would be stored externally in designated covered storage areas. This would minimise the potential for the release of pollutants off site. Stormwater would be directed to the primary and secondary sediment basin to remove any sediment via settling. The drainage channels would also be designed to capture sediment. These pollution control devices would be regularly inspected, cleaned and maintained. It is recommend that ongoing testing and monitoring of the water discharge from the sediment basins is undertaken.

The site would contain controls to prevent the contamination of waters. Implementation of an Environmental Management Plan (EMP) would also ensure appropriate management of on-site stormwater.

In addition it is recommended a water monitoring program be put in place to test water in the on-site detention system at the site to ensure no pollutants have been released offsite. This program would be detailed in the EMP.

3.6.6 Groundwater

3.6.6.1 Excavations

The proposed area will be levelled to approximately 18.0 – 17.3 AHD (Australian Height Datum) from the existing range of 18.13-13.8 AHD. Soil required to raise the level would come from elsewhere on the subject site shown in The Concept Bulk Earthwork Depth Cut to Fill Plan (Attachment 1). The proposed development area would be capped with road base material hardstand which would come from a supplier offsite. The excavated area surrounding the development area would be revegetated with pastoral grasses.

Some areas of the site are within 500 m of class 4 acid sulfate soils due to the extent of the earthworks an acid sulfate soil management plan is recommended.

Excavations are expected to have a minimal impact on groundwater.

3.6.6.2 Operations

- There is a risk of contaminants from waste materials entering groundwater through seepage. However the risk is considered to be low due to:
  - The majority of materials brought on site do not pose a contamination risk;
  - The contaminants that may be released would be transported to the sediment basins via surface runoff; and
  - The soil beneath the road base is expected to be weakly pedal orange heavy clays and clayey sand which will reduce water seepage.
- Groundwater monitoring is recommended to ensure potential contamination can be adequately identified. If groundwater contamination is identified a remediation action plan is to be undertaken.
- There is a risk of contaminants from waste material entering the ground water beneath the sediment basins through seepage. It is recommended that that sediment detention basins be sealed with a liner to prevent seepage, this can be achieved with well compacted impervious soil layer(s)/synthetic membranes/bentonite.

- Potential spillages of diesel and lubricating oil could occur during refuelling and equipment maintenance; the risk is considered to be low as these activities will be undertaken by suitably trained contractors.

The site has been designed with safeguards to minimise the potential for the contamination of ground waters. Implementation of an Environmental Management Plan (EMP) would also ensure appropriate management of on-site stormwater.

In addition it is recommended a water monitoring program be put in place to include groundwater and water from the sediment detention basins at the site. This would enable action to be taken should contamination be identified. Details of this program would be provided in the EMP.

3.6.6.3 Groundwater Dependant Ecosystems

GDEs are defined ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants, animals, ecological processes and ecosystem services.

Types of GDEs have been defined which can be split into three categories:

1. Ecosystems that depend on the surface expression of groundwater (lacustrine, palustrine, riverine, estuarine and marine);
2. Ecosystems that depend on the subsurface presence of groundwater (riverine wetlands, terrestrial) and;
3. Ecosystems dependent on the subterranean presence of groundwater (aquifer, cave).

If groundwater sources are altered, polluted or contaminated, surrounding GDEs would be impacted.

Effects on the function of GDEs (Habitat, groundwater level, connectivity)

Potential contamination of groundwater sources can have significant impacts on GDEs. Any changes in stream connectivity between the groundwater sources and the nearby wetlands and South Creek can impact GDE persistence and the spread of contaminated waters. An increase in contaminates such as heavy metals, shifts in levels of nitrogen and phosphorous in the soils and changes to the soils pH and salinity levels (i.e. via sulphate and calcium) will be damaging to surrounding GDEs.

Targeted searches showed there are no threatened floral or faunal species, or populations, sited within or in close proximity to the subject site. The risk of potential contamination through groundwater connectivity to surrounding water bodies is low due to the safeguards and control measures that have been designed into the site.

Potential Safeguard Measures for and GDEs

A number of mitigation and monitoring protocols will be put in place to minimise the potential for contamination of groundwater sources, thus acting as 'safeguard' measures for surrounding GDEs. These protocols will include:

- Install a monitoring bore to test periodically levels of any contaminates.
- Regularly monitoring and ensuring hardstand areas are clean and free of contaminates (i.e. spills and leaks of engine oils and fuels).
- Ensuring hardstand areas are compacted in such manner that this area will simply filter through clean water whilst the sediments are trapped in the top layers of materials.
- Undertaking regular inspections of all areas of the site to ensure safeguards and control measures are maintained in good working order and areas containing vegetation remain healthy.

3.6.7 Water Monitoring Program

This section details the water monitoring program recommended for the proposed development. Monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004).

3.6.7.1 Surface Water Discharge Monitoring

It is recommended the water from the discharge outlet of the sediment basins be monitored after heavy rain events.

It is recommended water be tested for the pollutants listed in the table below.

Table 3-3: Proposed Sampling List and Relevant Trigger Values

Analytes	ANZECC Trigger Value*	Test Method /Reference	Analytical Limit
Metals			
Arsenic	24 (as III), 13 µg L^{-1} (as V)	ICP-MS	0.001 mg/L
Copper	1.4 µg L^{-1}	ICP-MS	0.001 mg/L
Chromium	1.0 µg L^{-1} (as CrVI)	ICP-MS	0.001 mg/L
Zinc	8 µg L^{-1}	ICP-MS	0.005 mg/L
Lead	3.4 µg L^{-1}	ICP-MS	0.001 mg/L
Aluminium	55 µg L^{-1} (pH>6.5)	ICP-MS	0.01 mg/L
Nickel	11 µg L^{-1}	ICP-MS	0.001 mg/L
Cadmium	0.02 µg L^{-1}	ICP-MS	0.0001 mg/L
Mercury (Inorganic)	0.06 µg L^{-1}	ICP/MS	0.0001 mg/L
Nutrients			
Oxides of Nitrogen	40 µg L^{-1}	APHA 4500	0.002 mg/L
Filterable Reactive Phosphorus	20 µg L^{-1}	APHA 4500	0.01 mg/L
Total Ammonia	900 µg L^{-1} (at pH 8)	APHA 4500	0.01mg/L
Physical			
pH	6.5-8 (Lower-Upper Limit)	APHA 4500 or in situ	0.01 (pH units)
Electrical Conductivity	200-300 µScm^{-1}	APHA 2510 or in situ	1µS/cm
Sulfate	(1)	APHA 4500	1 mg/L
Total Suspended Solids	50 mg/L(2)	APHA 2540	1 mg/L

Table 3-3: Proposed Sampling List and Relevant Trigger Values

Analytes	ANZECC Trigger Value*	Test Method /Reference	Analytical Limit
Polycyclic Aromatic Hydrocarbons			
Napthalene	16 µg L^{-1}	EP075B Sim	1 µg/L
BTEX			
Benzene	950 µg L^{-1}	EP080	1 µg/L
Toluene	(3)	EP080	2 µg/L
Ethylbenzene	(3)	EP080	2 µg/L
O-Xylene	350 µg L^{-1}	EP080	2 µg/L
Total Recoverable Hydrocarbons			
TRH (C6-C40)	(3)	EP071,80	20-100 µg/L
Organochlorine Pesticides			
Chlordane	0.03 µg L^{-1}	EP068A	0.5 µg/L
Endosulfan	0.003 µg L^{-1}	EP068A	0.5 µg/L
Endrin	0.01 µg L^{-1}	EP068A	0.5 µg/L
Heptachlor	0.01 µg L^{-1}	EP068A	0.5 µg/L
Organophosphorus Pesticides			
Azinphos methyl	0.01 µg L^{-1}	EP068B	0.5 µg/L
Chlorpyrifos	0.01 µg L^{-1}	EP068B	0.5 µg/L
Diazinon	0.01 µg L^{-1}	EP068B	0.5 µg/L
Malathion	0.05 µg L^{-1}	EP068B	0.5 µg/L
Parathion	0.004 µg L^{-1}	EP068B	2 µg/L
Herbicides and Fungicides			
2,4-D	280 µg L^{-1}	EP202	10 µg/L
2,4,5-T	36 µg L^{-1}	EP202	10 µg/L

The outlet should be checked after/during any rain event greater than 25 mm/day and sampled if water is being released. If no water is being released, this should be recorded. After the first year, this data will provide an indication of the rain events that will result in release of water. The monitoring program and sampling regime can then be revised.

The EMP will provide an action plan for measures to be implemented if the trigger values are exceeded.

3.6.7.2 Water Monitoring

It is recommended that a ground water monitoring well be installed in the hardstand surface at the site.

It is recommended that periodic water monitoring be undertaken:

- From the ground water monitoring bore; and
- From the sediment detention basins (including water and sediment basins).

These locations are to be monitored for the analytes shown in Table 3-3. If the levels exceed the relevant criteria a remediation action plan is to be undertaken.

It is recommended sampling be undertaken every 3 months for the first year and then frequency and analytes may be revised after the first year of monitoring.

3.6.8 Flooding

The S149 Certificate for the subject site (No. PC0069/19) states the land is subject to riverine flood related development controls.

The proposed development area will be levelled to a finished surface level of RL17.300 along the boundaries of the IN1 zone. This level provides 300 mm freeboard from the 100 year flood level of 17,000.

Attachment 1 provides the Stormwater and Flood Management Report prepared by Sparks and Partners Consulting Engineers.

3.6.8.1 Hawkesbury Floodplain Risk Management Study and Plan

The Hawkesbury Floodplain Risk Management Study and Plan flood risk precincts map shows the site in an area of high-extreme flood risk, Figure 3-2.

The proposed development is consistent with the objectives of the Hawkesbury Floodplain Risk Management Study and Plan.

Chapter 9 (Volume 2) of Hawkesbury Floodplain Risk Management Study and Plan provides guidelines for development on a floodplain.

Rules for general development - Objectives:

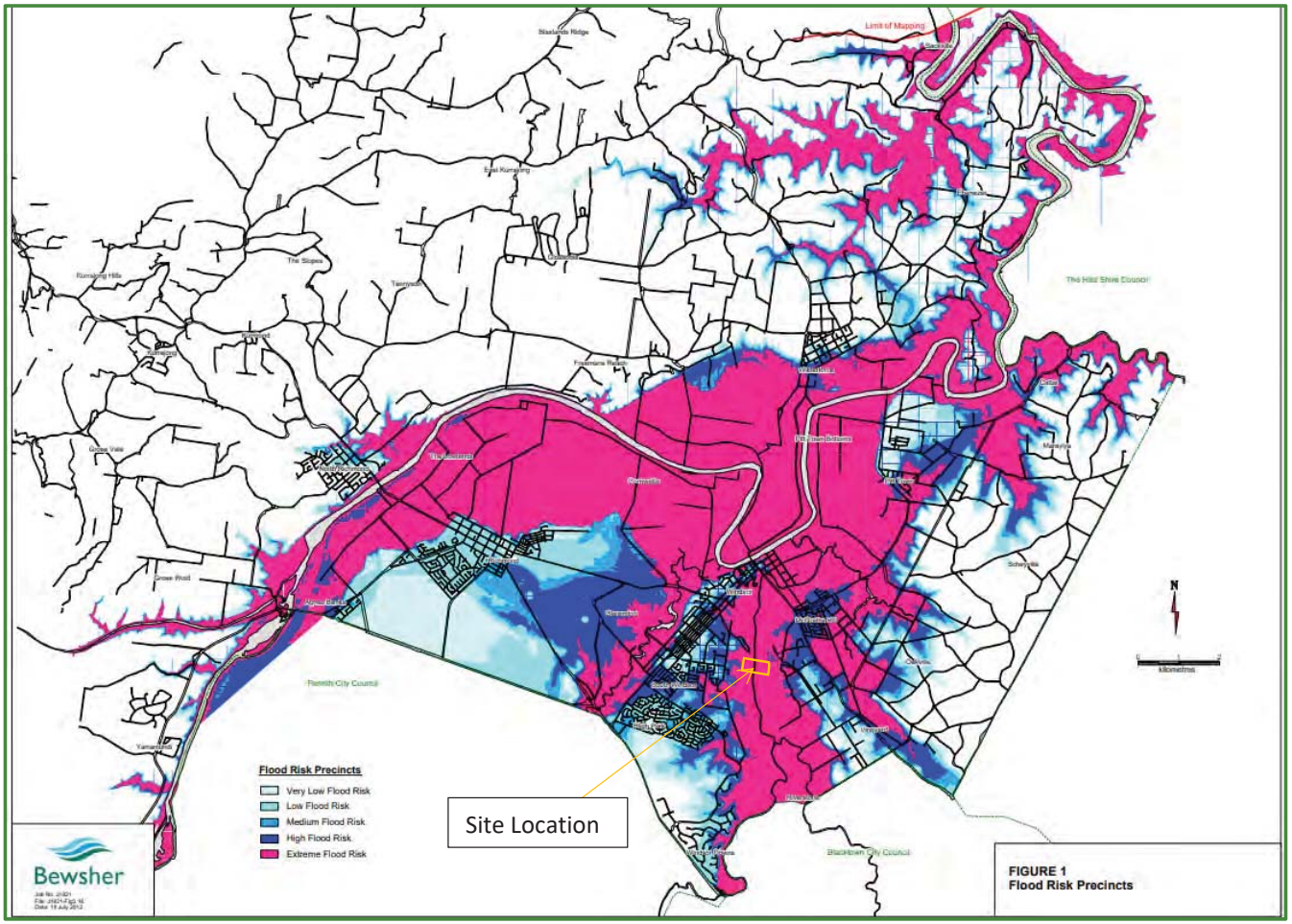
a) To ensure the flood risk associated with development, comprising danger to life and damage to property is minimised and not increased beyond the level acceptable to the community;
b) To ensure the proponents of development and the community in general are fully aware of the potential flood hazard and consequent risk associated with the use and development of land within the floodplain;
c) To ensure that proposed development does not exacerbate flooding on other properties;
d) To minimise the risk to life by ensuring the provision of appropriate evacuation measures are available within areas affected by flooding up to a PMF event;
e) Where permitted, to maximise the potential for buildings to be returned to use as quickly and efficiently as practical, after being affected by flooding; and
f) To ensure that the design and siting controls and built form outcomes required to address the flood hazard do not result in unreasonable impacts on the:
- *Amenity and character of an area;*
- *Streetscape and the relationship of the building to the street; and*
- *The environment and ecology.*

The proposed development will minimise the danger to life and damage to property from flood risks. This is largely achieved by raising process area above the 100 year flood level. It is recommended a flood emergency plan be prepared for construction and operations. This will ensure the proponents are fully aware of the potential flood hazards and will provide appropriate evacuation measures.

The proposed development will not exacerbate flooding on other properties and the soil used to raise the site out of the flood area will come from elsewhere in the site, within the flood risk precinct, increasing the flood capacity of the surrounding site by the volume displaced from the proposed earthworks. A report prepared by Sparks and Partners, Attachment 1, demonstrates that the development will not increase flood impacts elsewhere.

The design and siting controls will not unreasonably impact the amenity of the area, streetscape and the environment and ecology.

Figure 3-2: Flood Risk Precincts



3.6.9 Climate Change

Rising temperature and sea levels are expected to increase the frequency and severity of storm events. This may increase the likelihood of wet weather events leading to stormwater release from the site. Contingency measures for this issue can include increasing the capacity of the sediment detention basins if required.

3.7 EROSION & SEDIMENT CONTROLS

Attachment 1 presents the erosion and sediment controls prepared by Sparks and Partners. A list of general sediment and erosion control requirements are presented in the Concept Cover Sheet, Locality Plan and Drawing Schedule of the attachment. The Concept Sediment and Erosion Control Plan & Details show the concept design details of the stabilised site access, stockpile stabilisation, sediment fence design maintenance and notes. The Concept Sediment Basin Plan & Details Sheet provides the concept design details of the grass swales and sediment detention basin designs.

A Construction Environmental Management Plan (CEMP) and Environmental Management Plan (EMP) are recommended for the construction and operational phases to ensure that erosion and sediment controls are adequately implemented and maintained.

4. SOIL ASSESSMENT

This soil assessment addresses the following:

- A description of local soils, topography, drainage and landscapes; and
- Consideration of any contaminated soil, including acid sulfate soils.

Reference is made to the Phase I Ref: (181025_Phase1_Rev4) throughout this soil assessment.

4.1 EXISTING SOIL CONDITIONS

4.1.1 Local Soils

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

Tl: Londonderry Clay - Clay, patches of ferruginized, consolidated sand.

Tr: Rickabys Creek Gravel - Conglomerate, matrix suspended.

The Soil and Land Resources of the Hawksbury-Nepean Catchment Map shows that the subject site is located in across two soil landscaping areas classified as Alluvial and Beach

The soil map 'Soil Landscape of Penrith 1:100,000 Sheet 9030' shows that the subject site is located in across two soil landscape areas classified as Fluvial landscapes. 'Berkshire Park' (bp) and 'Freemans Reach' (fr) landscapes are described as follows:

Fluvial landscape 'Berkshire Park' (bp)

> *Landscape: dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system*
>
> *Soils: weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large (up to 20 cm) silcrete boulders occur in sand/clay matrix. Solods (Dy 3.41), Yellow Podzolic soils (Dy4.11, Dy2.11, Dy2.21, Dy2.22), Red Podzolic Soils (Dr4.11), Chocolate Soils (Dr4.11, Dr4.61), Structured plastic clays (Uf5.23, Gn4.11 and Gn3.11)*
>
> *Limitations: very high wind erosion hazard if cleared. Gully, sheet and rill erosion on dissected areas. Waterlogging, impermeable subsoils, low fertility.*

Fluvial landscape 'Freemans Reach' (fr)

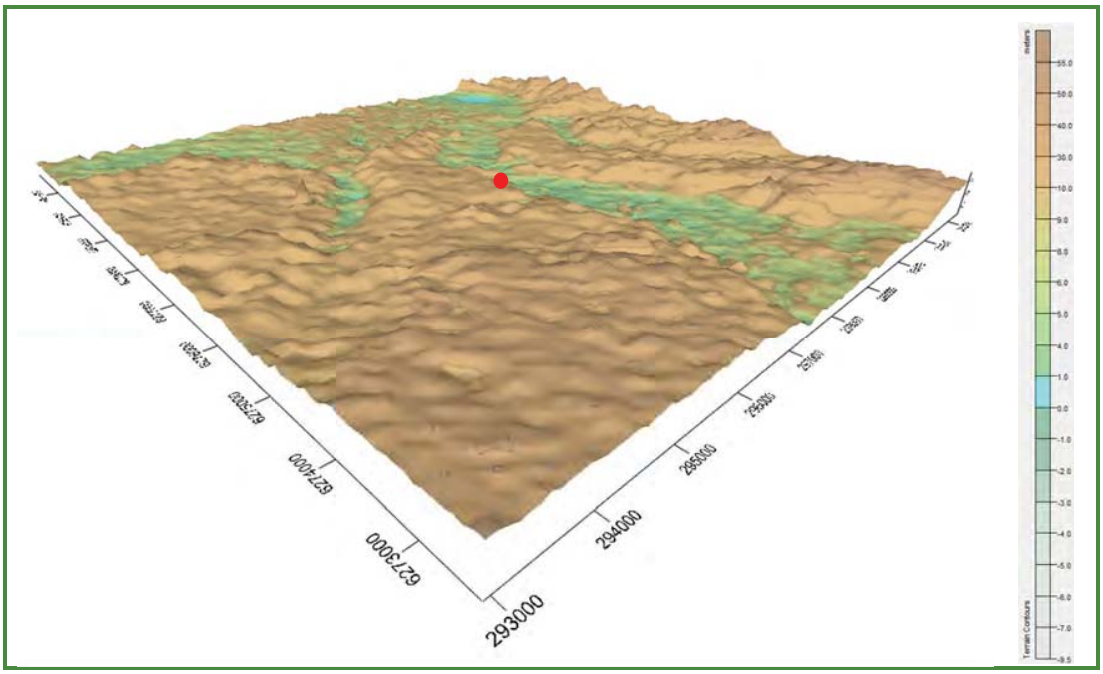
> *Landscape: present active floodplain of the Nepean River. Level with minor (< 10 m) relief to meander scrolls, levees and back swamps.*
>
> *Soils: Deep brown sands and loams, apedal to moderately structured, usually friable. Alluvial Soils (Uc1.21, Uc1.24), Solods (Dy3.41), dark Podzolic soils (Db3.51)*
>
> *Limitations: High streambank erosion hazard, frequent flooding.*

4.1.2 Topography, Drainage and Landscapes

The south-west corner of the site is slightly raised with the site gently sloping downwards towards South Creek along the eastern boundary. Along the northern boundary the terrain also dips down where the stream runs across the site.

A three-dimensional view of the local topography surrounding the site has been provided in Figure 4-1, 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 4-1: Local Topography with Vertical Exaggeration of 10



Note: ● = Approximate location of site

4.1.3 Acid Sulfate Soil

Information on the SEED (Sharing and Enabling Environmental Data) Map Viewer of Acid Sulfate Soils Risk shows that there is a low probability of occurrence on approximately less than one third of the eastern side of the subject site.

A search from the Australian Soil Resource Information System (ASRIS) of the Atlas of Australian Acid Sulfate Soils database developed by the CSIRO, shows that there is an extremely low to low probability of occurrence of acid sulfate soils (ASS) on the subject site or within close proximity to the site. A map is shown in Figure 4-2 to illustrate these findings.

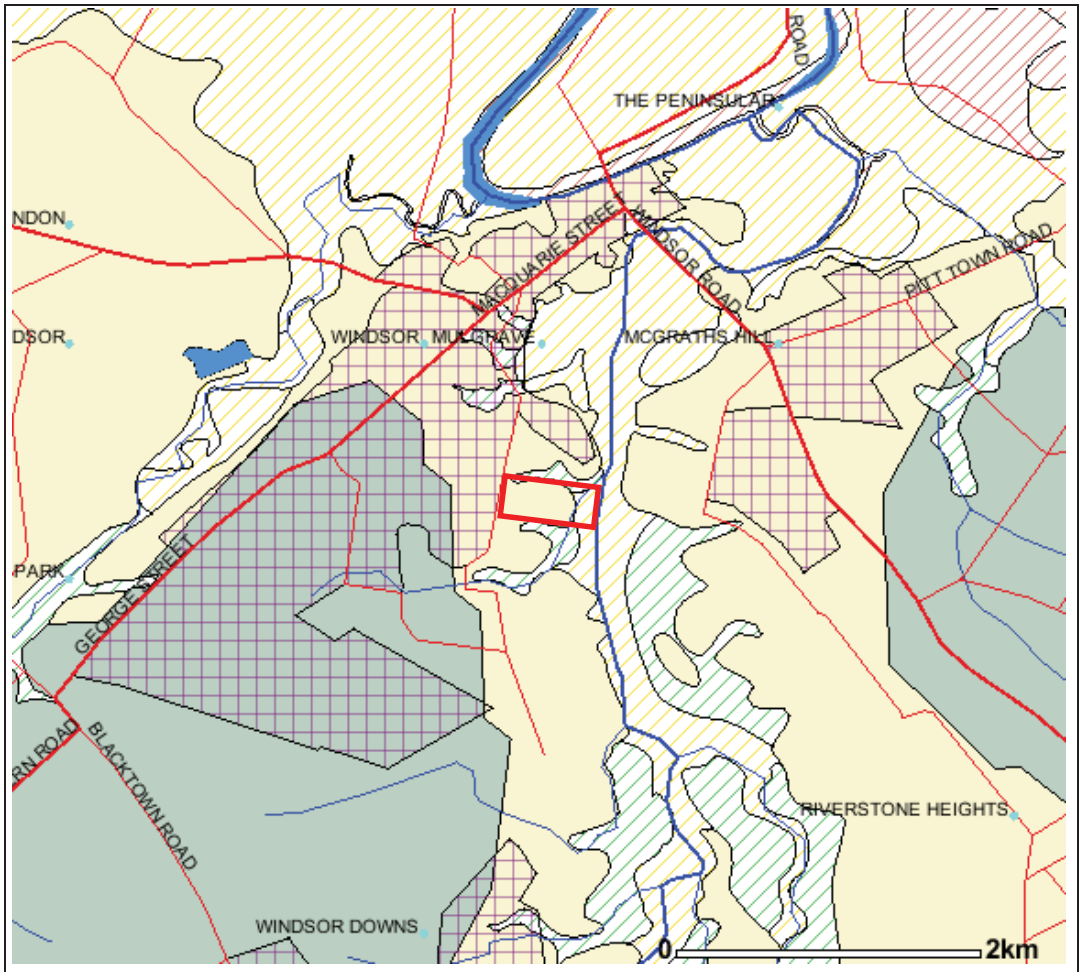
Furthermore, Hawkesbury City Council has further mapping available as part of the Hawkesbury Local Environmental Plan 2012. Under this plan, the subject site is located on land of Class 5 acid sulfate soils, shown in Figure 4-3.

The S10.7 certificate no. PC0069/19 for the property indicates that special provision under Clause 6.1 Acid sulfate soils from the Hawkesbury Local Environmental Plan may apply. In relation to Class 5 land, the following is relevant:

> *6.1 Acid sulfate soils*
>
> *(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works.*
>
> *Class of land Works*
>
> *5 Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*

Some areas of the site are within 500 m of adjacent class 4 land, due to the extent of the earthworks proposed it is recommended an acid sulfate soil management plan be undertaken. A Salinity and Acid Sulfate Assessment prepared by Anderson Environmental is provided in attachment 2.

Figure 4-2: Probability of Acid Sulfate Soil Occurrence at the site.



Source: ASRIS 2018

↑N
Not to scale

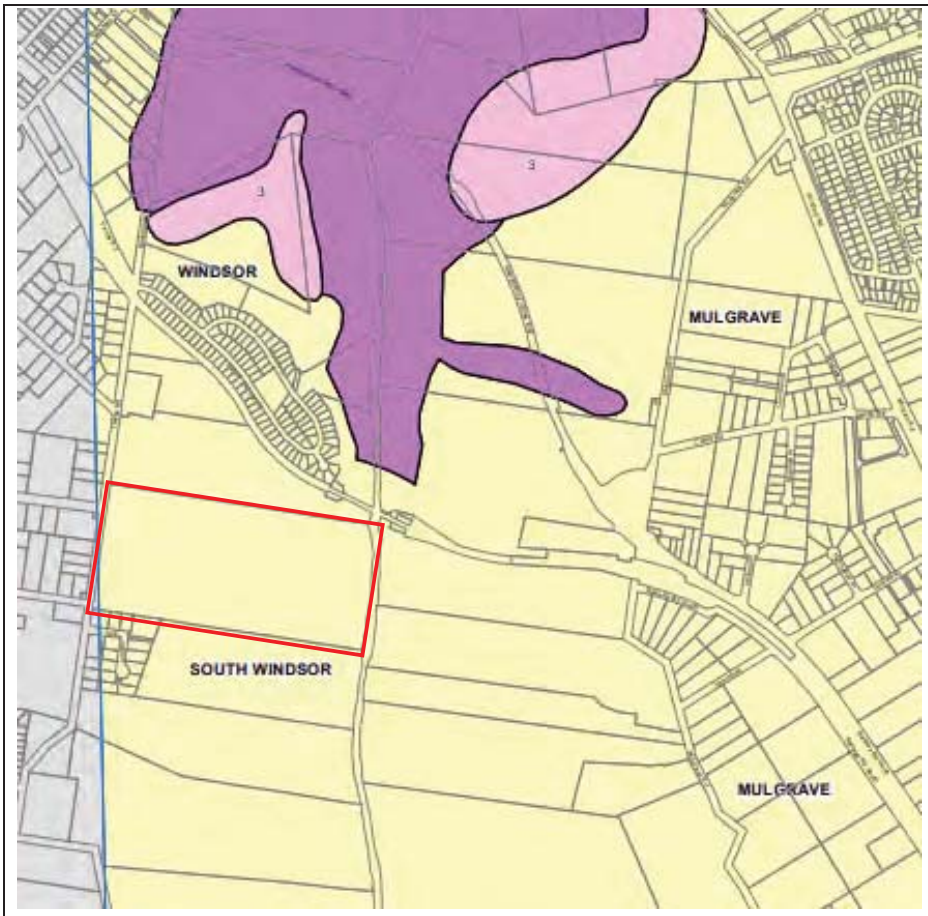
LEGEND:

Approximate site location

- A1 High Probability/High Confidence
- A2 High Probability/Moderate Confidence
- A3 High Probability/Low Confidence
- A4 High Probability/Very Low Confidence
- A- High Probability/Confidence Unknown
- B1 Low Probability/High Confidence
- B2 Low Probability/Moderate Confidence
- B3 Low Probability/Low Confidence
- B4 Low Probability/Very Low Confidence
- B- Low Probability/Confidence Unknown
- C1 Extremely Low Probability/High Confidence
- C2 Extremely Low Probability/Moderate Confidence
- C3 Extremely Low Probability/Low Confidence
- C4 Extremely Low Probability/Very Low Confidence
- C- Extremely Low Probability/Confidence Unknown

Benbow Environmental
25-27 Sherwood St
Northmead NSW 2152

Figure 4-3: Acid Sulfate Soil Map from Hawkesbury LEP 2012



Source: Hawkesbury LEP 2012 Acid Sulfate soils Map – Sheet ASS_008DB

↑N Not to scale	LEGEND: Approximate site location **Acid Sulfate Soils** 1 Class 1 2 Class 2 3 Class 3 4 Class 4 5 Class 5	Benbow Environmental 25-27 Sherwood St Northmead NSW 2152

4.1.4 Existing Contaminated Soil

The conclusions of the Phase I environmental site assessment is reproduced as follows:

- A group of old chemical storage containers, water tanks and IBCs on site but they are all clean which represents a low risk of contamination.
- A couple of mounds of fill are on site but no likely contaminants were found.
- A small amount of spilt fertiliser was found near the shipping containers.
- Old fuses were found in a metal box on the site but there were no signs of leakages.
- Some run-off from the adjacent concrete batching plant gets onto site along the southern boundary.

The site environmental assessment and detailed search into the site's history has not found evidence of contaminating activities to have occurred at the site.

Further investigation of the site, in regards to a Phase II Assessment, is not considered warranted.

However, the following recommendations are made:

- The spilled fertiliser near the shipping containers should be cleaned up.
- Waste scattered around the site of the development should be removed appropriately.
- Run-off from the concrete batching plant onto the site should be prevented.

Some areas of the site are within 500 m of adjacent class 4 land, due to the extent of the earthworks proposed it is recommended an acid sulfate soil management plan be undertaken. A salinity and acid sulfate soil assessment prepared by Anderson Environmental is provided in Attachment 2.

4.2 Potential Impacts on Soil

Construction

An impact to soil during the construction phase is soil erosion; this is addressed in Section 3.6.9.

There are no likely impacts to soil based on the construction activities proposed.

An acid sulfate soil management plan should be implemented during construction.

Operation

The potential sources of contamination are the use of fuel and oils and waste as well as any contamination of surface waters migrating into the soil. Potential contaminants are shown in Table 3-2.

- Potential spillages of diesel and lubricating oil could occur during refuelling and equipment maintenance; the risk would be minimised through procedures and training in appropriate methods and signage showing how to avoid spills and the use of appropriately trained contractors.

- Good housekeeping practices are important to prevent contamination. These include regular cleaning of all hardstand areas, inspection of the integrity of equipment and inspection, cleaning and maintenance of stormwater/surface water system.

5. SAFEGUARDS AND MITIGATION MEASURES

A summary of the soil and water environmental safeguards are provided as follows:

- Installation of primary and secondary sediment detention basins and associated stormwater safeguards and infrastructure;
- Construction erosion and sediment controls implemented and maintained;
- Sediment detention basins designed to prevent seepage by provision of a sealed liner;
- Water quality testing of surface and groundwater;
- Maintenance of all stormwater infrastructure including drainage swales and sediment detention basins;
- Preparation of a flood emergency response plan;
- Staff trained in spill response and emergency procedures, including flood emergency response and maintenance and EMP procedures;
- Implementation of a Construction Environmental Management Plan that includes an Acid Sulfate Soil Management Plan; and
- Implementation of an Environmental Management Plan that includes a Regular workplace inspection to maintain a high standard of housekeeping;

5.1 MONITORING REGIME

The water quality of the discharge water and water within the sediment detention basins will be monitored.

A ground water monitoring bore will be installed in the hardstand area for monitoring. Groundwater monitoring should be undertaken prior to the commencement of operations to establish baseline conditions.

It is recommended the onsite detention basins and groundwater be monitored every 3 months for the first year and to be revised thereafter. The secondary sediment basin discharge outlet will also be monitored after major rain events when discharge is likely.

A water monitoring program would be detailed within the site's EMP and would include sampling methods, equipment and frequency, water quality indicators and laboratory requirements and test methods. The monitoring regime may be revised after the first year of operations.

6. CONCLUDING REMARKS

Benbow Environmental has been engaged by Andy's Earthworks Pty Ltd c/o MacroPlan Dimasi to undertake a Soil and Water assessment to support an Environmental Impact Statement (EIS) for the proposed construction materials processing and recycling plant to be located at 100 Fairey Road, South Windsor NSW 2756. The assessment is a qualitative study that addresses the potential impacts to soil and water from the proposed operations in accordance with the Secretary's Environmental Assessment Requirements (SEARs No. 1188).

With the control measures and monitoring procedures recommended in this report, the potential soil and water impacts of the proposed development are considered low.

This concludes the report.

Damien Thomas Graduate Environmental Scientist	Emma Hansma Senior Engineer	R T Benbow Principal Consultant

7. 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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

8. REFERENCES

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ATTACHMENTS

Attachment 1: Sparks & Partners - Stormwater & Flood Management Report (TBA)

Attachment 2: Anderson Environmental – Salinity and Acid Sulfate Soil Assessment

SALINITY AND ACID SULFATE ASSESSMENT FOR A PROPOSED DEVELOPMENT AT

100 FAIREY ROAD

SOUTH WINDSOR

HAWKESBURY CITY COUNCIL

LOCAL GOVERNMENT AREA

Job number: 2289

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Version 1

Version	Date drafted	Drafted by
1	22/08/2018	Jason Anderson
Version	**Date reviewed**	**Reviewed by**
1	28/08/2018	Jason Anderson
Approved by		**Date**
Jason Anderson (Director)		28/08/2018

EXECUTIVE SUMMARY

Introduction

Anderson Environmental was contracted to conduct a soil salinity assessment and acid sulfate soils assessment for a proposed development at Lot 4 DP264159 - 100 Fairey Road, South Windsor, in the Hawkesbury City Council Local Government Area (LGA), hereafter referred to as the subject site.

The subject site is proposed to be developed as a Concrete Recycling Facility. Andy's Earthworks Pty Ltd is seeking development consent to establish a construction materials crushing and recycling plant.

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

The subject site is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt.

Methodology

Salinity

Assessment followed the guidelines found in "*Site Investigations for Urban Salinity*" by the Department of Land and Water Conservation (2002). The subject site was assessed visually to determine signs of potential soil salinity; bare soil patches, stressed vegetation, salt encrustations etc.
Soil was also collected for field and laboratory analysis from six locations across the subject site. This locations were selected to give a good representation of the subject site in relation to the proposed development.

Collected samples were analysed by Envirolab Sydney for salinity analysis.

Acid Sulfate

The assessment followed;

- *"Acid Sulfate Soils Assessment Guidelines"* Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia.
- *Acid Sulfate Soils Planning Guidelines.* Published by the Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia.
- *Acid Sulfate Soils Laboratory Methods Guidelines*. Published by the Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia.

Soil was also collected for field and laboratory analysis from six locations across the subject site. This locations were selected to give a good representation of the subject site in relation to the proposed development.

Collected samples were analysed by Envirolab Sydney for salinity and acid sulfate analysis.

Results

No visible signs of soil salinity were apparent during the field survey. The site was well vegetated with mainly exotic paddock grasses and there were no significant areas of exposed soil which could not be explained by other causes.

Laboratory testing confirmed that salinity levels were well below the thresholds listed in the guidelines for saline soils.

Laboratory analysis for Acid Sulfate indicate that the soils are below the required thresholds.

Conclusion

This assessment determined that soil salinity and acid sulfate are not limiting factors for the proposed development on the subject site. Any excavation is understood to be limited and based on the proposal it appears that most of the soil will be capped by a hard surface thus largely limiting any significant soil profile disturbance.

Table of Contents

1. Introduction

1.1 Background

Anderson Environmental was engaged to conduct a Salinity Assessment (SA) and Acid Sulfate Assessment (ASA) for a proposal at 100 Fairey Road, South Windsor, Hawkesbury Shire Council Local Government Area, hereafter referred to as the subject site.

The subject site is proposed to be developed as a Concrete Recycling Facility. Andy's Earthworks Pty Ltd is seeking development consent to establish a construction materials crushing and recycling plant.

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

The subject site is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt. The subject site is proposed to be developed as a concrete recycling facility utilising the south-western quarter of the subject site.

1.2 Subject Site

The subject site and its local context is shown in **Figure 1.1** below.

The subject site is composed of mainly pasture improved grassland for cattle grazing. There is a wetland on the north-eastern quarter of the site. The site drains to the east where it adjoins South Creek. South Creek is part of the Hawkesbury-Nepean catchment, located on the Cumberland Plain, Greater Western Sydney, New South Wales.

Note: All figures in this report are to be considered indicative. Distances specified are to be assessed on the ground by qualified surveyors prior to the conduction of any works.

Figure 1.1: Subject site showing local context – Source: Six Maps

1.3 Soils

The Blacktown soil group comprises the soils on the subject site as described from the Soil Landscapes of Penrith 1:100000 Sheet (Bannerman, S.M., and Hazelton, P.A., 1990), see **Table 1.2**.

Table 1.2: Soil mapping

Bt = Blacktown (670km^2)	
Landscape	Gently undulating rises on Wianamatta Group shales. Local relief to 30m, slopes 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 (<100cm) 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 (Dr2.11, Dy3.11) on lower slopes and in drainage lines
Limitations	Moderately reactive highly plastic subsoil, low fertility soil, poor soil drainage

This mapping appears accurate for the subject site based on observations made during field work.

1.4 Salinity Information

The assessment of the subject site followed the document "*Site Investigations for Urban Salinity*" by the Department of Land and Water Conservation (2002). A saline soil is defined as a soil which contains sufficient soluble salt to adversely affect plant growth and/or land use. A soil is often considered saline if it has an ECe of 4 dS/m (deciSiemens per metre). More sensitive plants may show effects at 1-2 dS/m. This is however also influenced by the pH and

the relative amounts of the various cations (positively charged ions) in the soil such as sodium, calcium, potassium and magnesium.

1.5 Acid Sulfate Soils Information

The assessment of the site followed the document "Acid Sulfate Soils Assessment Guidelines" (August 1998).

Acid sulfate soils is the common name given to naturally occurring soils and sediments that contain iron sulfide (pyrite). As sea levels slowly rose (between 6,000 and 10,000 years ago), substantial deposits of pyritic sediments formed in estuarine mud, where tidal seawater (containing sulfur) met and mixed with freshwater outflows (containing iron). Acid sulfate soils are defined as either:

- **Actual** acid sulfate soils - where the soils have already been exposed to oxygen and have a pH < 4, or
- **Potential** acid sulfate soils - where the soils have not been exposed but have the potential to generate sulfuric acid if exposed.

Left undisturbed, acid sulfate soils do not pose any harm as they are in an anerobic condition. However, if they are disturbed and exposed to oxygen (air) through activities such as excavation or the lowering of the water table, sulfuric acid may be produced in large quantities. A tonne of acid sulfate soils has the capacity to generate 1.6 tonnes of pure sulfuric acid. Depending on the particular sediment's ability to buffer acid generation, sulfuric acid can continue to be generated for many hundreds of years if not treated correctly.

Impacts of acid sulfate soils

Sulfuric acid can have detrimental effects on the natural or built environment by:

- Corroding and weakening concrete, iron, steel and certain aluminium alloys.
- Dissolving certain essential elements from the soil, making it toxic and adverse to plant growth.
- Affecting biodiversity and ecological integrity by degrading habitat, soil and water quality, potentially resulting in the death or disease of fish and other organisms.

Where are acid sulfate soils found?

Acid sulfate soils are typically found in low lying areas near the coast, such as mangrove and salt marsh areas, tidal areas, at the bottom of coastal lakes, estuaries and under sand dunes. They usually occur below 5 metres AHD and beneath the water table but occasionally have been found above the water table.

Acid sulfate soil classes and impact triggers

Acid sulfate soils have been classified based on the likelihood of the acid sulfate soils being present in particular areas and at certain depths. There are five classifications:

Class 1

Acid sulfate soils in a Class 1 area are likely to be found on and below the natural ground surface. Any works will trigger the requirement for assessment and may require management.

Class 2

Acid sulfate soils in a Class 2 area are likely to be found below the natural ground surface. Any works beneath the natural ground surface, or works which are likely to lower the water table, will trigger the requirement for assessment and may require management.

Class 3

Acid sulfate soils in a Class 3 area are likely to be found beyond 1 metre below the natural ground surface. Any works that extend beyond 1 metre below the natural ground surface, or works which are likely to lower water table beyond 1 metre below the natural ground surface, will trigger the requirement for assessment and may require management.

Class 4

Acid sulfate soils in a Class 4 area are likely to be found beyond 2 metres below the natural ground surface. Any works that extend beyond 2 metres below the natural ground surface, or works which are likely to lower the water table beyond 2 metres below the natural ground surface, will trigger the requirement for assessment and may require management.

Class 5

Acid sulfate soils are not typically found in Class 5 areas. Areas classified as Class 5 are located within 500 metres on adjacent class 1,2,3 or 4 land. Works in a Class 5 area that are likely to lower the water table below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land will trigger the requirement for assessment and may require management.

Note: *Australian Height Datum, and 'work' is defined as any works that disturb more than one (1) tonne of soil, or lower the water table.*

Table 1.3 – Classification of Acid Sulfate Soils

Field pH of water	*Water analysis Cl^{1-}:SO_4^{2-} (by mass)*	*Field soils or water indicators*	*Typical soil reaction to 30% H_2O_2*	*Preliminary Assessment*
6-8	approx 7 but may be between 5-9	nil	nil reaction and no drop in pH	no sulfidic material present
		ASS indicators	mild to strong effervescence and drop in pH	sulfide present but probably has not been oxidised at any time
<5	approx 7 but may be between 5-9	nil	nil reaction and no drop in pH	no sulfidic material present and low pH can be attributed to other causes
		ASS indicators	mild effervescence and drop in pH	sulfide has probably not been oxidised at any time and low pH can be attributed to other causes
6-8	2 - 5	unclear indicators	mild effervescence and drop in pH	presence of sulfidic material is uncertain; must be verified by chemical analysis or visual observation of crystals
	<2	indicators of actual or potential ASS	mild to strong effervescence and drop in pH	presence of sulfidic material plus the presence of a buffering agent
< 5	2 - 5	unclear indicators	mild effervescence and drop in pH	presence of sulfidic material is uncertain; must be verified by chemical analysis or visual observation of crystals
< 5	<2	indicators of actual or potential ASS	mild to strong effervescence and drop in pH	presence of sulfidic material with little buffering agent

Source: Acid Sulfate Soils Manual

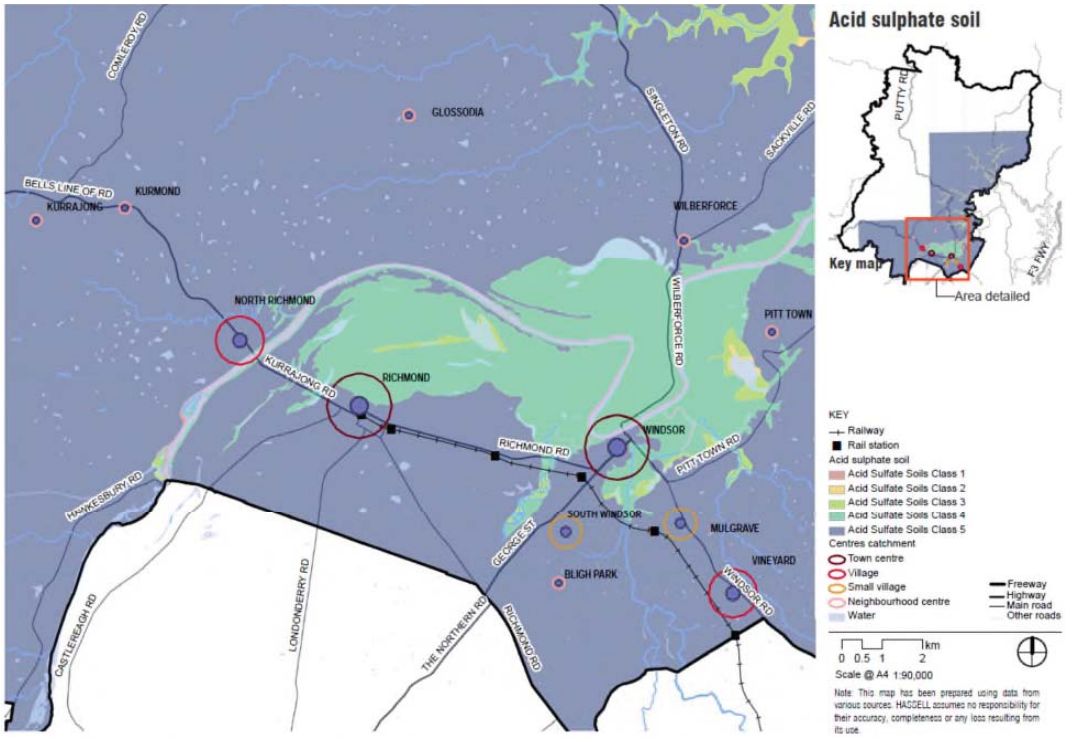

Figure 4.4: Hawkesbury Residential Strategy Acid Sulphate Soils *(Source: Hawkesbury City Council GIS, October 2009)*

Figure 1.2: Subject site Acid Sulfate Class Mapping (Class 5 for the Subject Site)

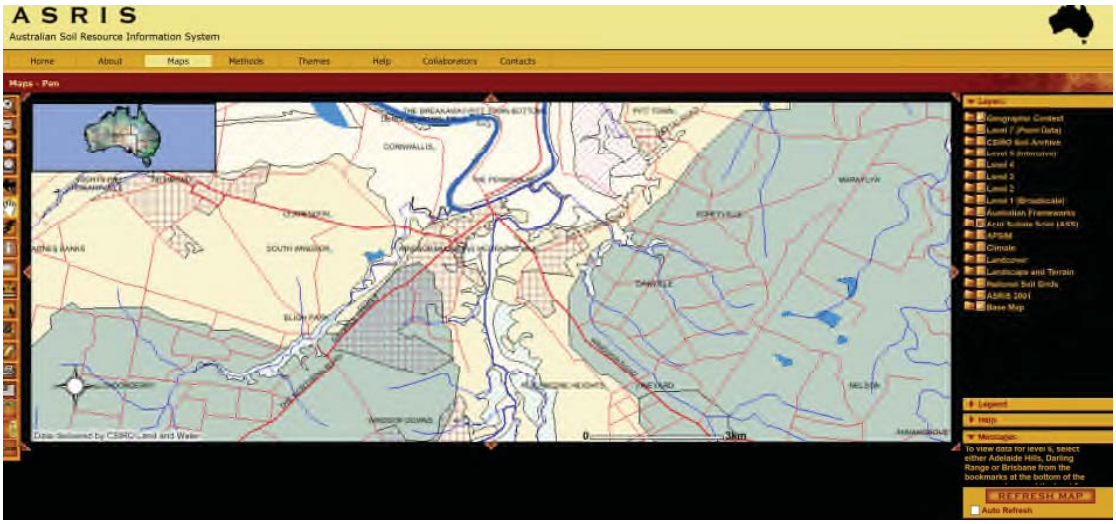

Figure 1.3: Subject site Acid Sulfate ASRIS Mapping

2. Methodology

2.1 Site Assessment

The site was assessed according to the broad guidelines provided in the *Site Investigations for Urban Salinity* guideline and the Acid Sulfate Soils Assessment Guidelines (1998).

The first step is an overview of the site and its conditions followed by soil sampling and analysis.

The site was assessed on foot to determine any obvious signs of potential salinity at ground level. After this soil sampling was undertaken at strategic judgemental locations to cover the development area and site.

2.2 Soil Assessment

The soil assessment was carried out using a vehicle mounted 100mm hydraulic auger and a hand-held 50mm motorized core sampler. A core sample was extracted from each sampling location and examined to catalogue its stratigraphic profile. Records were made on a borehole log in the field, with the following parameters recorded:

- Soil colour;
- Soil type (sandy loam, loamy clay etc.);
- Percentage of coarse fragments;
- Presence of water table;
- Local relief (decimal degrees); and
- Any evidence of shrink/swell reactivity.

A total of six samples were collected across the subject site. Sample locations are shown below in **Figure 2.1**. Samples were collected at a depth of 200mm.

Soils were analysed by Envirolab which is a NATA accredited laboratory.

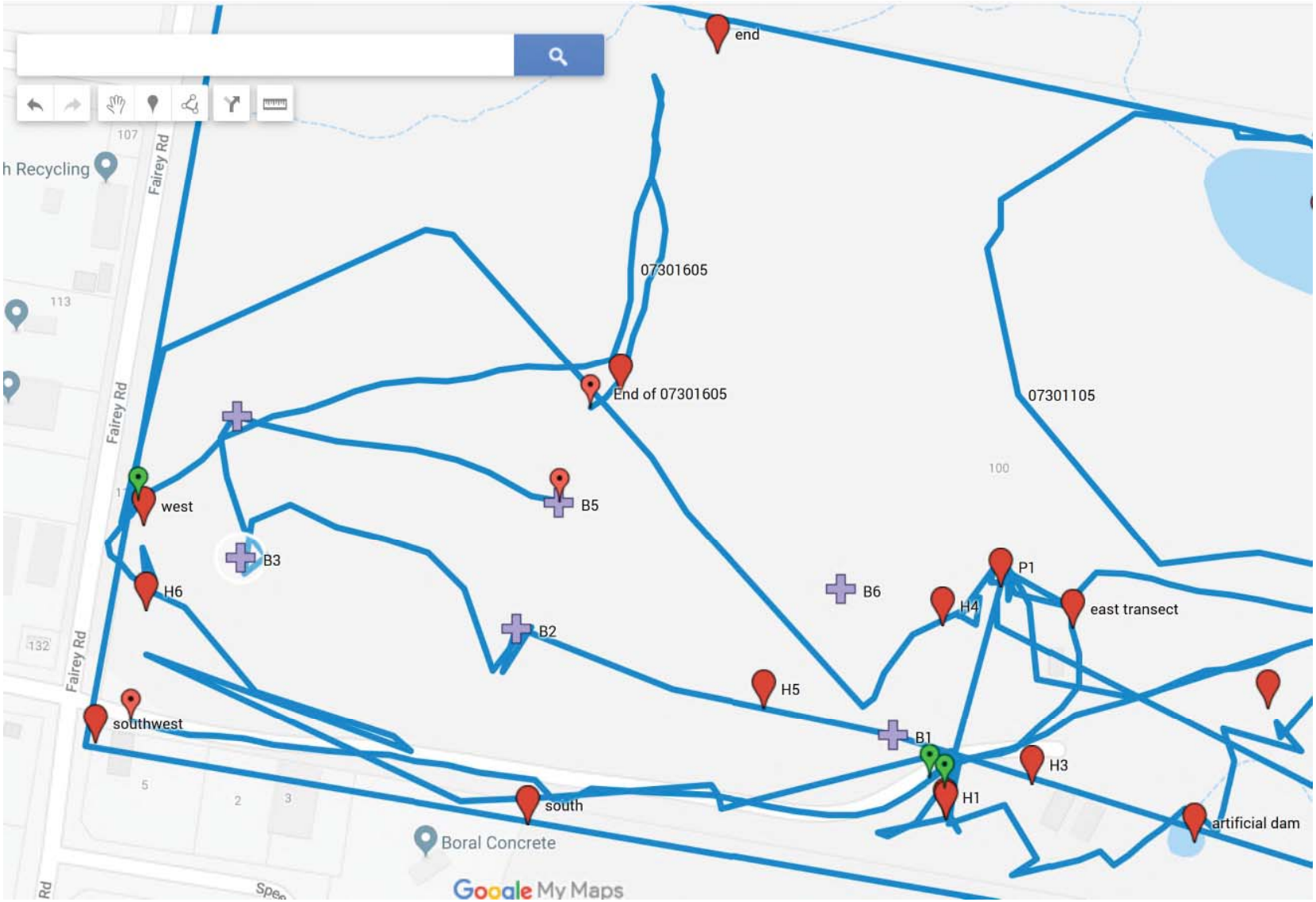

Figure 2.1: Soil sampling locations B1-B6 = Boreholes 1-6

3. Results

3.1 Site Assessment Results

The soils were broadly similar across the subject site, with shallow clay loams overlying clays followed by heavy clays. Sampling depth was to 80cm with all boreholes being similar.

3.2 Laboratory testing

Collected samples were analysed by Envirolab Sydney which is a NATA registered Laboratory. The results indicate that the soils are not saline and are well within the guidelines for acid sulfate potential.

4. Conclusion

This site assessment for salinity indicates that the site contains low salinity (within acceptable levels). Soil pH is typical of soils in this local area and the likelihood of aggressive corrosion to concrete and steel is low according to AS:2159:2009.

The results of both the field surveys, field soil structural and textural assessment and chemical analysis indicates that the soil is not saline and does not represent a significant salinity risk. The soil properties are also not likely to be aggressive in relation to concrete or steel. As such these factors are not a limitation to the proposed development.

The assessment for Acid Sulfate Soils indicates that the soils are within the acceptable parameters. As such the development does not place the environment as risk as a result of any reduction of acid sulfate material.

5. References

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Site Investigations for Urban Salinity by the Department of Land and Water Conservation (2002)

6. Appendix 1: Disclaimer and Limitation of Liability

The use of this report is for the client only and is based on an assessment of the site at the point in time of assessment. The material in this report reflects the judgement of Anderson Environmental Pty Ltd in light of background information and site conditions at the time of assessment and we take no responsibility for any database inaccuracies or other inaccuracies in background and or other information. The report is not to be reproduced or released to any other party, in whole or in part, without the express written consent of Anderson Environmental Pty Ltd. This report is Copyright protected and is not to be reproduced in part or whole or used by a third party without the express written permission of Anderson Environmental Pty Ltd. If you are not the client who commissioned this report or a local government authority for which approval is being sought as part of the formal DA process and are in possession of this report you are in breach of the law and we reserve the right to recover damages from any individuals, companies or other parties as a result of such breaches. Any use, which a third party makes of this report, or any reliance or discussions based on it, is the responsibility of such Third Parties and as outlined above is in breach of the law. Anderson Environmental and its staff accepts no responsibility for damages, if any, suffered by any third party because of decisions made or actions taken based on this report and reserves the right to recover damages from the third party from breaches as outlined above.

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7. Appendix 2: Soil Analysis Results

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customerservice@envirolab.com.au
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CERTIFICATE OF ANALYSIS 197314

Client Details	
Client	Anderson Environmental Pty Ltd
Attention	Jason Anderson
Address	PO Box 7451, Baulkham Hills, NSW, 2153

Sample Details	
Your Reference	2289
Number of Samples	6 Soil
Date samples received	30/07/2018
Date completed instructions received	30/07/2018

Analysis Details
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details	
Date results requested by	07/08/2018
Date of Issue	06/08/2018
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***	

Results Approved By
Nick Sarlamis, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By
Jacinta Hurst, Laboratory Manager

8.

Client Reference: 2289

Misc Inorg - Soil						
Our Reference		197314-1	197314-2	197314-3	197314-4	197314-5
Your Reference	UNITS	S1	S2	S3	S4	S5
Depth		20cm	20cm	15cm	20cm	20cm
Date Sampled		30/07/2018	30/07/2018	30/07/2018	30/07/2018	30/07/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/08/2018	01/08/2018	01/08/2018	01/08/2018	01/08/2018
Date analysed	-	01/08/2018	01/08/2018	01/08/2018	01/08/2018	01/08/2018
pH 1:5 soil:water	pH Units	5.8	6.2	7.9	6.4	5.7
Electrical Conductivity 1:5 soil:water	µS/cm	48	35	78	29	110
Estimated Salinity*	mg/kg	160	120	260	99	370

Misc Inorg - Soil		
Our Reference		197314-6
Your Reference	UNITS	S6
Depth		20cm
Date Sampled		30/07/2018
Type of sample		Soil
Date prepared	-	01/08/2018
Date analysed	-	01/08/2018
pH 1:5 soil:water	pH Units	5.8
Electrical Conductivity 1:5 soil:water	µS/cm	73
Estimated Salinity*	mg/kg	250

Client Reference: 2289

sPOCAS + %S w/w						
Our Reference		197314-1	197314-2	197314-3	197314-4	197314-5
Your Reference	UNITS	S1	S2	S3	S4	S5
Depth		20cm	20cm	15cm	20cm	20cm
Date Sampled		30/07/2018	30/07/2018	30/07/2018	30/07/2018	30/07/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	01/08/2018	01/08/2018	01/08/2018	01/08/2018	01/08/2018
Date analysed	-	01/08/2018	01/08/2018	01/08/2018	01/08/2018	01/08/2018
pH $_{kcl}$	pH units	4.6	4.7	5.6	5.0	4.3
TAA pH 6.5	moles H$^+$ /t	16	16	<5	9	26
s-TAA pH 6.5	%w/w S	0.03	0.03	<0.01	0.01	0.04
pH $_{ox}$	pH units	3.7	4.1	3.7	3.3	4.0
TPA pH 6.5	moles H$^+$ /t	<5	15	<5	<5	52
s-TPA pH 6.5	%w/w S	<0.01	0.02	<0.01	<0.01	0.08
TSA pH 6.5	moles H$^+$ /t	<5	<5	<5	<5	26
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	0.04
ANC$_E$	% $CaCO_3$	<0.05	<0.05	<0.05	<0.05	<0.05
a-ANC$_E$	moles H$^+$ /t	<5	<5	<5	<5	<5
s-ANC$_E$	%w/w S	<0.05	<0.05	<0.05	<0.05	<0.05
S$_{KCl}$	%w/w S	<0.005	<0.005	0.005	<0.005	0.006
S$_P$	%w/w	0.02	0.01	0.02	0.01	0.01
S$_{POS}$	%w/w	0.02	0.009	0.01	0.009	0.006
a-S$_{POS}$	moles H$^+$ /t	9	5	9	6	<5
Ca$_{KCl}$	%w/w	0.04	0.05	0.08	0.05	0.02
Ca$_P$	%w/w	0.04	0.06	0.08	0.05	0.02
Ca$_A$	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg$_{KCl}$	%w/w	0.021	0.019	0.045	0.017	0.039
Mg$_P$	%w/w	0.023	0.029	0.055	0.024	0.050
Mg$_A$	%w/w	<0.005	0.010	0.010	0.008	0.011
S$_{HCl}$	%w/w S	<0.005	<0.005	<0.005	<0.005	0.012
S$_{NAS}$	%w/w S	<0.005	<0.005	<0.005	<0.005	0.006
a-S$_{NAS}$	moles H$^+$ /t	<5	<5	<5	<5	<5
s-S$_{NAS}$	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
Fineness Factor		1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H$^+$ /t	25	22	10	15	33
s-Net Acidity	%w/w S	0.04	0.04	0.02	0.02	0.05
Liming rate	kg $CaCO_3$/t	1.9	1.6	0.75	1.1	2.5
s-Net Acidity without -ANCE	%w/w S	0.041	0.035	0.016	0.023	0.053
a-Net Acidity without ANCE	moles H$^+$ /t	25	22	10	15	33
Liming rate without ANCE	kg $CaCO_3$/t	1.9	1.6	0.75	1.1	2.5

sPOCAS + %S w/w		
Our Reference		197314-6
Your Reference	UNITS	S6
Depth		20cm
Date Sampled		30/07/2018
Type of sample		Soil
Date prepared	-	01/08/2018
Date analysed	-	01/08/2018
pH $_{kcl}$	pH units	4.9
TAA pH 6.5	moles H$^+$ /t	6
s-TAA pH 6.5	%w/w S	0.01
pH $_{ox}$	pH units	3.5
TPA pH 6.5	moles H$^+$ /t	<5
s-TPA pH 6.5	%w/w S	<0.01
TSA pH 6.5	moles H$^+$ /t	<5
s-TSA pH 6.5	%w/w S	<0.01
ANC$_E$	% $CaCO_3$	<0.05
a-ANC$_E$	moles H$^+$ /t	<5
s-ANC$_E$	%w/w S	<0.05
S$_{KCl}$	%w/w S	<0.005
S$_P$	%w/w	0.01
S$_{POS}$	%w/w	0.009
a-S$_{POS}$	moles H$^+$ /t	6
Ca$_{KCl}$	%w/w	0.06
Ca$_P$	%w/w	0.07
Ca$_A$	%w/w	0.005
Mg$_{KCl}$	%w/w	0.020
Mg$_P$	%w/w	0.029
Mg$_A$	%w/w	0.008
S$_{HCl}$	%w/w S	<0.005
S$_{NAS}$	%w/w S	<0.005
a-S$_{NAS}$	moles H$^+$ /t	<5
s-S$_{NAS}$	%w/w S	<0.01
Fineness Factor	-	1.5
a-Net Acidity	moles H$^+$ /t	12
s-Net Acidity	%w/w S	0.02
Liming rate	kg $CaCO_3$/t	0.90
s-Net Acidity without -ANCE	%w/w S	0.019
a-Net Acidity without ANCE	moles H$^+$ /t	12
Liming rate without ANCE	kg $CaCO_3$/t	0.90

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

Client Reference: 2289

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			01/08/2018	1	01/08/2018	01/08/2018		01/08/2018	
Date analysed	-			01/08/2018	1	01/08/2018	01/08/2018		01/08/2018	
pH 1:5 soil:water	pH Units		Inorg-001		1	5.8	5.8	0	101	
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	48	48	0	103	
Estimated Salinity*	mg/kg	5	Inorg-034	<5	1	160	160	0		

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			01/08/2018	1	01/08/2018	01/08/2018		01/08/2018	
Date analysed	-			01/08/2018	1	01/08/2018	01/08/2018		01/08/2018	
pH $_{kcl}$	pH units		Inorg-064		1	4.6	4.6	0	91	
TAA pH 6.5	moles H$^+$/t	5	Inorg-064	<5	1	16	16	0	95	
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	0.03	0.03	0		
pH $_{ox}$	pH units		Inorg-064		1	3.7	4.0	8	95	
TPA pH 6.5	moles H$^+$/t	5	Inorg-064	<5	1	<5	<5	0	101	
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0		
TSA pH 6.5	moles H$^+$/t	5	Inorg-064	<5	1	<5	<5	0		
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0		
ANC$_E$	% $CaCO_3$	0.05	Inorg-064	<0.05	1	<0.05	<0.05	0		
a-ANC$_E$	moles H$^+$/t	5	Inorg-064	<5	1	<5	<5	0		
s-ANC$_E$	%w/w S	0.05	Inorg-064	<0.05	1	<0.05	<0.05	0		
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	0.005	0		
S_P	%w/w	0.005	Inorg-064	<0.005	1	0.02	0.02	0		
S_{POS}	%w/w	0.005	Inorg-064	<0.005	1	0.02	0.01	67		
a-S_{POS}	moles H$^+$/t	5	Inorg-064	<5	1	9	9	0		
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	0.04	0.04	0		
Ca_P	%w/w	0.005	Inorg-064	<0.005	1	0.04	0.04	0		
Ca_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0		
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	0.021	0.021	0		
Mg_P	%w/w	0.005	Inorg-064	<0.005	1	0.023	0.027	16		
Mg_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	0.006	18		
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0		
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0		
a-S_{NAS}	moles H$^+$/t	5	Inorg-064	<5	1	<5	<5	0		
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0		
Fineness Factor	-	1.5	Inorg-064	<1.5	1	1.5	1.5	0		
a-Net Acidity	moles H$^+$/t	5	Inorg-064	<5	1	25	25	0		
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	1	0.04	0.04	0		
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	1	1.9	1.9	0		
s-Net Acidity without ANCE	%w/w S	0.01	Inorg-064	<0.01	1	0.041	0.040	2		
a-Net Acidity without ANCE	moles H$^+$/t	5	Inorg-064	<5	1	25	25	0		

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	1	1.9	1.9	0	[NT]	[NT]

Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions	
Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

EIS Appendix 7: Phase I – Preliminary Site Investigation, Benbow Environmental

PHASE I ENVIRONMENTAL SITE ASSESSMENT
PREPARED FOR
ANDY'S EARTHWORKS
100 FAIREY ROAD, SOUTH WINDSOR NSW

Prepared for: Andy's Earthworks Pty Ltd
MacroPlan Dimasi

Prepared by: Victoria Hale, Graduate Environmental Scientist
Kate Barker, Graduate Environmental Scientist
R T Benbow, Principal Consultant

Report No: 181025_Phase1_Rev5
September 2019
(Released: 11 September 2019)

Benbow ENVIRONMENTAL

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5	11-9-2019	Andy's Earthworks Pty Ltd	Benbow Environmental`

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EXECUTIVE SUMMARY

Benbow Environmental was engaged by Andy's Earthworks Pty Ltd to prepare a Phase I Environmental site Assessment report for the property located at 100 Fairey Road, South Windsor, New South Wales.

The landholding consists of one lot, Lot 4 DP264159, with a land area of approximately 22.34 ha.

As per the Hawkesbury Local Environmental Plant 2012 Land Zoning Map, the site is zoned as RU1 Primary production and IN1 General Industrial

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.

The site environmental assessment and detailed search into the site's history has found no evidence of potentially contaminating activities to have occurred at the site. The Phase I Assessment has identified:

- A group of old chemical storage containers, water tanks and IBCs on site but they are all clean which represents a low risk of contamination.
- Two small mounds of fill material are on site but no likely contaminants were found (see photograph 40 in Section 5.2).
- A small amount of spilt fertiliser was found near the shipping containers (see photograph 22 in Section 5.2).
- Old fuses and debris were found in a metal box on the site but there were no signs of leakages (see photograph 38 and 39 in Section 5.2).
- Some run-off from the adjacent concrete batching plant gets onto site along the southern boundary (see photograph 6 in Section 5.2).

Further investigation of the site such as a Phase II Assessment is considered not warranted.

Some areas of the site are within 500 m of class 4 acid sulfate soils and earthworks within this area are to excavate below 5 metres Australian Height Datum potentially lowering the watertable below 1 m Australian Height Datum on the adjacent land, therefore an acid sulfate soil management plan is required.

Victoria Hale
Graduate Environmental Scientist

Kate Barker
Graduate Environmental Scientist

R T Benbow
Principal Consultant

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Tables

Figures

Attachments

1. INTRODUCTION

A Phase I Environmental Site Assessment has been undertaken for the site located at 100 Fairey Road South Windsor NSW 2756.

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 investigation extends to the following.

- Undertake a Phase I Preliminary Contamination Investigation;
- Undertake a preliminary site inspection to identify any potential 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;
- Identify if a Phase II Environmental Site Assessment (also referred to as a "Detailed Contamination Investigation") is warranted; and
- Provide recommendations in relation to additional investigations if any are considered necessary.

1.2 RELEVANT LEGISLATION AND GUIDELINES

The Phase I Environmental Site Assessment 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; and
- NEPM Assessment of Site Contamination (NEPC, 1999) amended 2013.

1.3 ASSESSMENT OF ISSUES

This Phase I provides an assessment of the following issues:

- Asbestos materials (on site);
- Radioactive material;
- Lead based paints;
- Air emissions of pollutants;
- Surface water and/or groundwater pollution;
- Potential for soil contamination;
- Sensitive receptors;
- Pesticide and herbicide usage and / or contamination;
- Stormwater management;
- Electromagnetic fields;
- Potable water source;
- Historic land use; and
- On site waste.

2. SITE IDENTIFICATION

Site identification information and land use is summarised in the table below.

Table 2-1: Site Identification

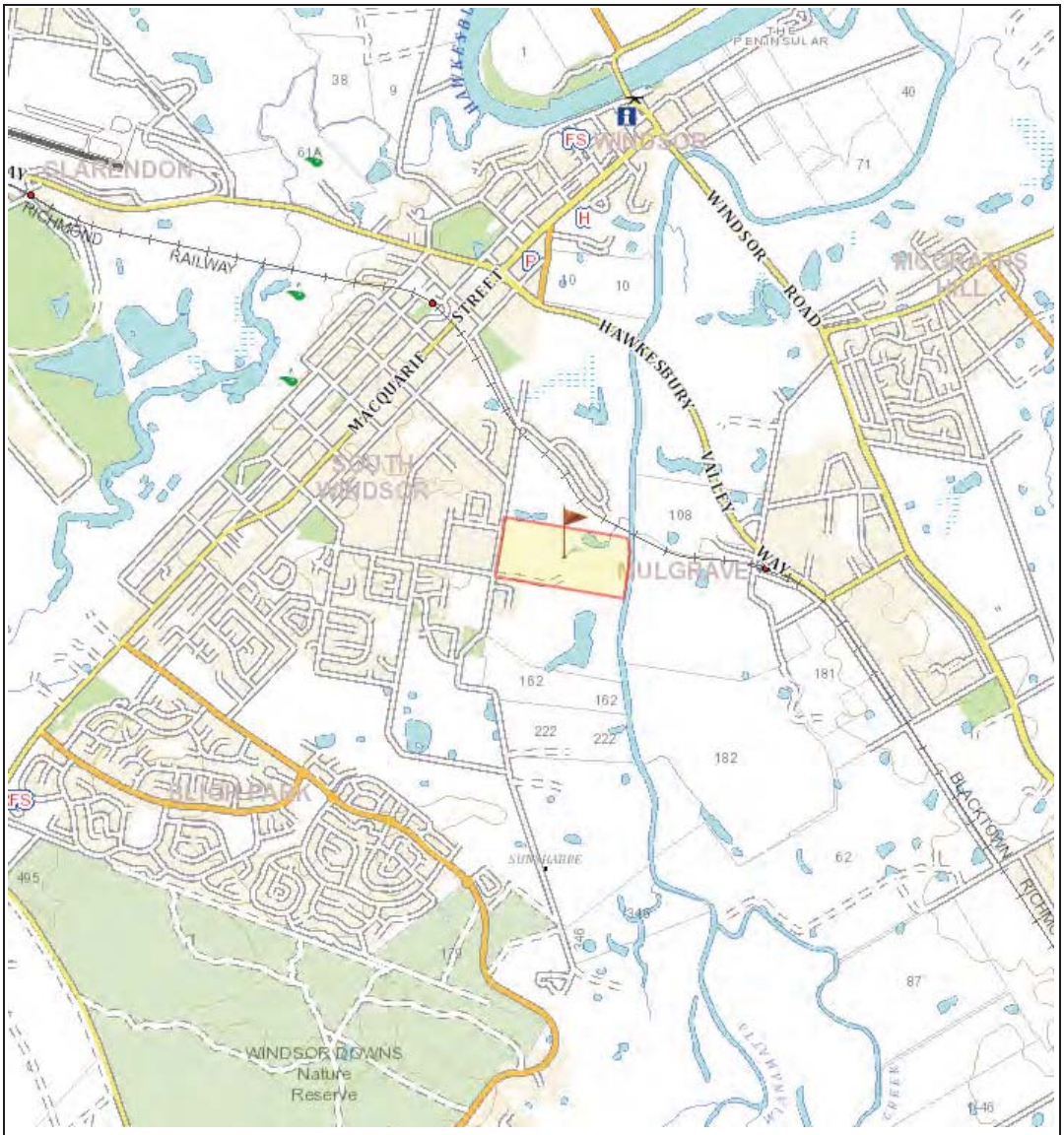
Lot and DP Numbers (Address)[1]	Lot 4 DP264159 (100 Fairey Road, South Windsor)
Coordinates[2] MGA56	297665.828 Easting, 6277169.369 Northing
Approximate Site Area	0.2234 km^2
Local Government Area	Hawkesbury City Council
Current Land Zoning	RU1 Primary production / IN1 General Industrial
Current Site Owner	Andrew Hugh Irwin

Note: [1] Source: http://maps.six.nsw.gov.au/,
[2] Centre of the site

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 LEP drawing from Hawkesbury City Council shows the land use zoning of this area and is presented in Figure 2-3.

Figure 2-1: Site Location



Source: Six Maps

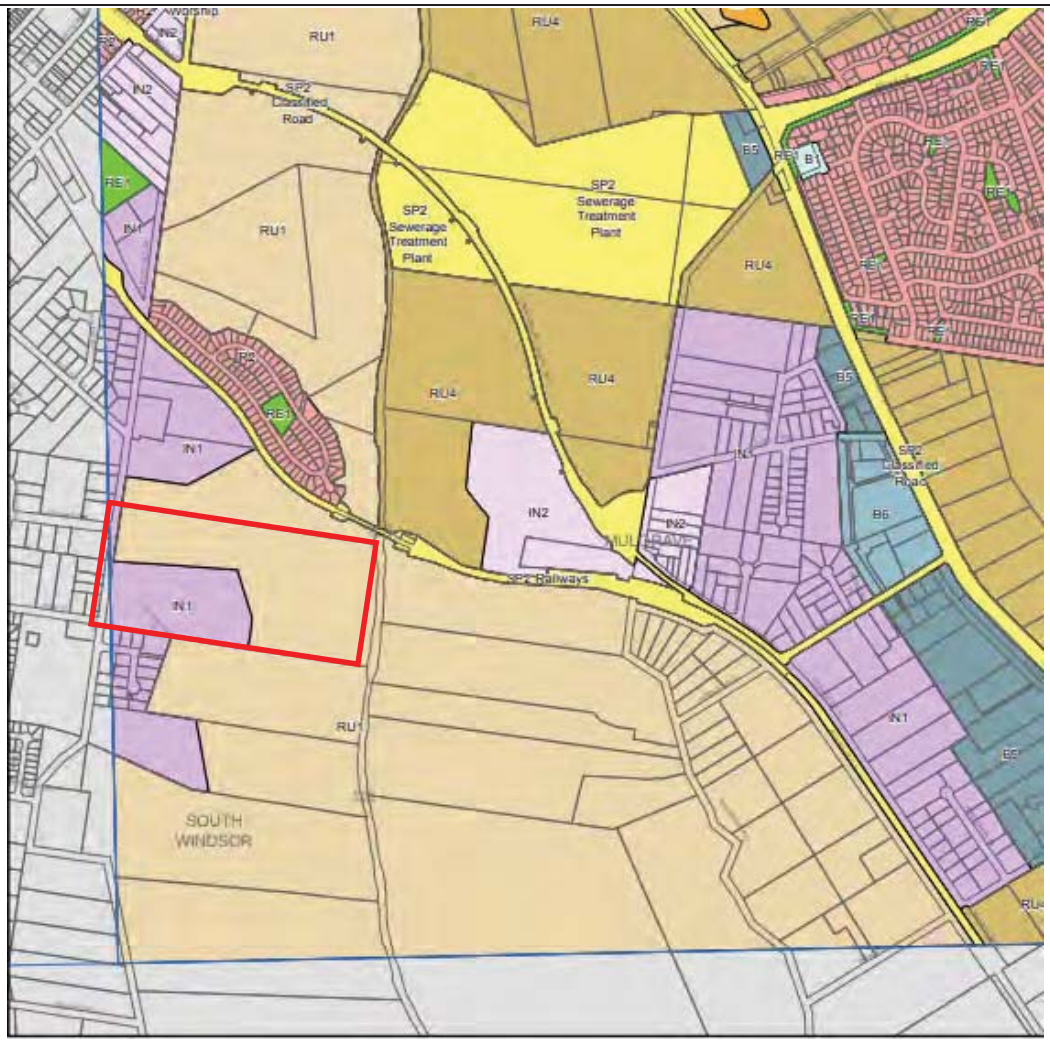
↑N Not to scale	LEGEND: Site Boundaries	Benbow Environmental 25-27 Sherwood Street, Northmead NSW 2152

Figure 2-2: Aerial Photograph of the Site – Lot Boundaries

Source: Land and Property Information – SixMaps

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

Figure 2-3: Hawkesbury LEP 2012 – Land Zoning Map (extract)



Source: Hawkesbury LEP 2012

N

Not to scale

LEGEND

Site Boundaries

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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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:

Tl: Londonderry Clay – Clay, patches of ferruginized, consolidated sand.

Tr: Rickabys Creek Gravel – Congolomerate, matrix suspended.

The Soil and Land Resources of the Hawksbury-Nepean Catchment Map shows that the subject site is located in across two soil landscaping areas classified as Alluvial and Beach

The soil map 'Soil Landscape of Penrith 1:100,000 Sheet 9030' shows that the subject site is located in across two soil landscape areas classified as Fluvial landscapes. 'Berskshire Park' (bp) and 'Freemans Reach' (fr) landscapes are described as follows:

Fluvial landscape 'Berskshire Park' (bp)

> *Landscape: dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system*
>
> *Soils: weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large (up to 20cm) silcrete boulders occur in sand/clay matrix. Solods (Dy 3.41), Yellow Podzolic soils (Dy4.11, Dy2.11, Dy2.21, Dy2.22), Red Podzolic Soils (Dr4.11), Chocolate Soils (Dr4.11, Dr4.61), Srtuctured plastic clays (Uf5.23, Gn4.11 and Gn3.11)*
>
> *Limitations: very high wind erosion hazard if cleared. Gully, sheet and rill erosion on dissected areas. Waterlogging, impermeable subsoils, low fertility.*

Fluvial landscape 'Freemans Reach' (fr)

> *Landscape: present active floodplain of the Nepean River. Level with minor (<10m) relief to meander scrolls, levees and back swamps.*
>
> *Soils: Deep brown sands and loams, apedal to moderately structured, usually friable. Alluvial Soils (Uc1.21, Uc1.24), Solods (Dy3.41), dark Podzolic soils (Db3.51)*
>
> *Limitations: High streambank erosion hazard, frequent flooding.*

3.2 ACID SULFATE SOILS

Information on the SEED (Sharing and Enabling Environmental Data) Map Viewer of Acid Sulfate Soils Risk shows that there is a low probability of occurrence on approximately less than one third of the eastern side of the subject site.

A search from the Australian Soil Resource Information System (ASRIS) of the Atlas of Australian Acid Sulfate Soils database developed by the CSIRO, shows that there is an extremely low to low probability of occurrence of acid sulfate soils (ASS) on the subject site or within close proximity to the site. A map is shown in Figure 3-1 to illustrate these findings.

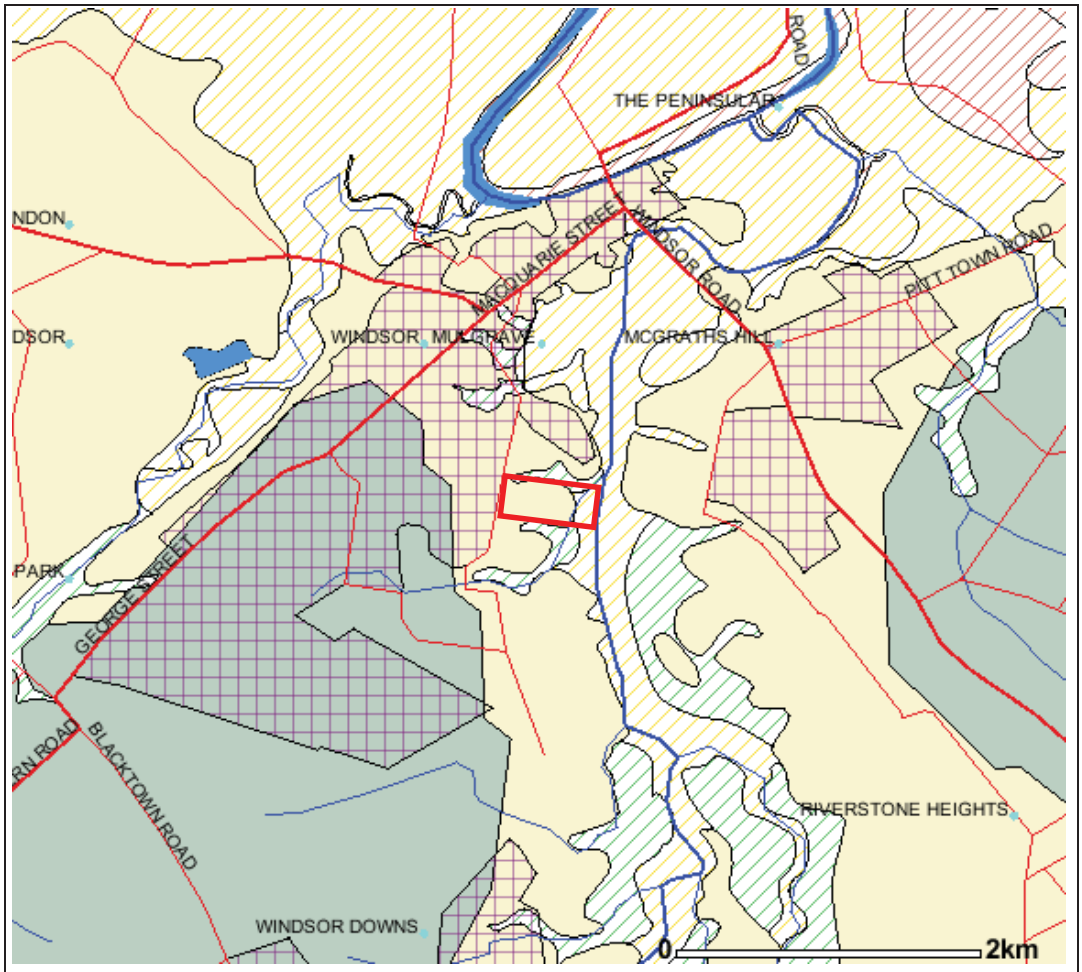
Furthermore, Hawkesbury City Council has further mapping available as part of the Hawkesbury Local Environmental Plan 2012. Under this plan, the subject site is located on land of Class 5 acid sulfate soils, shown in Figure 3-2.

The S10.7 certificate no. PC0069/19 for the property indicates that special provision under Clause 6.1 Acid sulfate soils from the Hawkesbury Local Environmental Plan may apply. In relation to Class 5 land, the following is relevant:

> *6.1 Acid sulfate soils*
>
> *(2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works.*
>
> *Class of land Works*
>
> *5 Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*

Some areas of the site are within 500 m of adjacent class 4 land and due to the scale of the excavation an acid sulfate soil management plan is required.

Figure 3-1: Probability of Acid Sulfate Soil Occurrence at the site.



Source: ASRIS 2018

↑N
Not to scale

LEGEND:

Approximate site location

- A1 High Probability/High Confidence
- A2 High Probability/Moderate Confidence
- A3 High Probability/Low Confidence
- A4 High Probability/Very Low Confidence
- A- High Probability/Confidence Unknown
- B1 Low Probability/High Confidence
- B2 Low Probability/Moderate Confidence
- B3 Low Probability/Low Confidence
- B4 Low Probability/Very Low Confidence
- B- Low Probability/Confidence Unknown
- C1 Extremely Low Probability/High Confidence
- C2 Extremely Low Probability/Moderate Confidence
- C3 Extremely Low Probability/Low Confidence
- C4 Extremely Low Probability/Very Low Confidence
- C- Extremely Low Probability/Confidence Unknown

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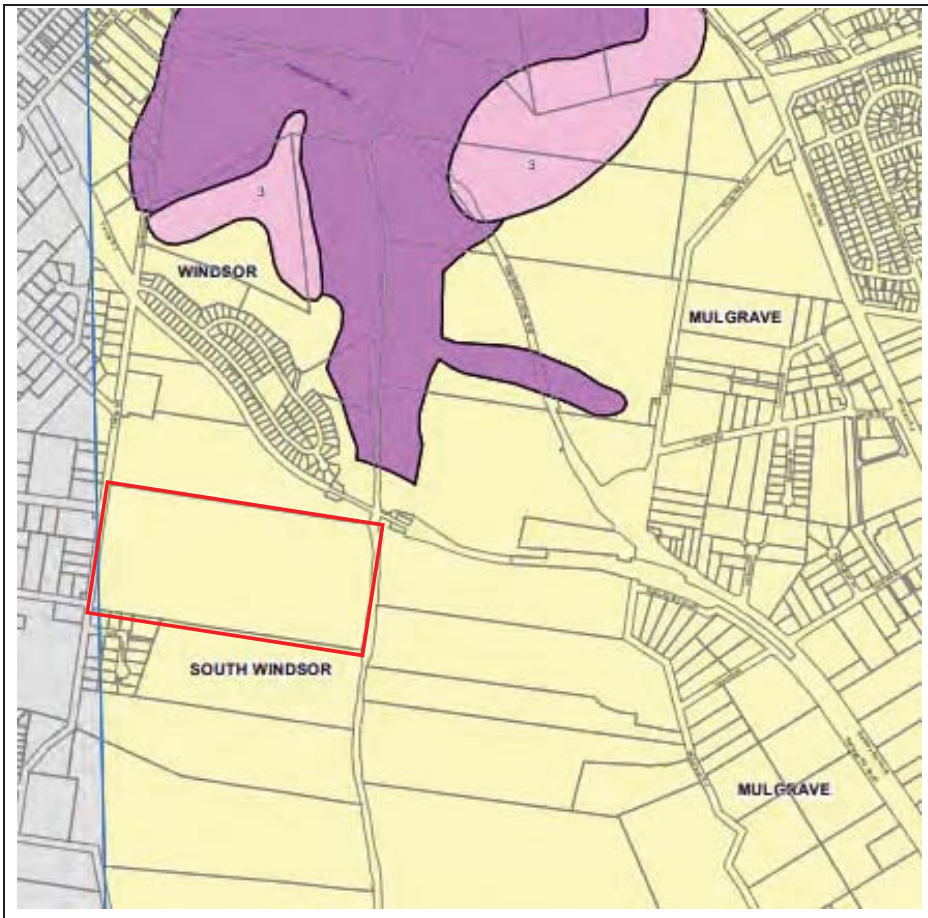
Figure 3-2: Acid Sulfate Soil Map from Hawkesbury LEP 2012



Source: Hawkesbury LEP 2012 Acid Sulfate soils Map – Sheet ASS_008DB

↑N
Not to scale

LEGEND:

Approximate site location

Acid Sulfate Soils

- 1 Class 1
- 2 Class 2
- 3 Class 3
- 4 Class 4
- 5 Class 5

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3.3 SURFACE HYDROLOGY AND LOCAL HYDROGEOLOGY

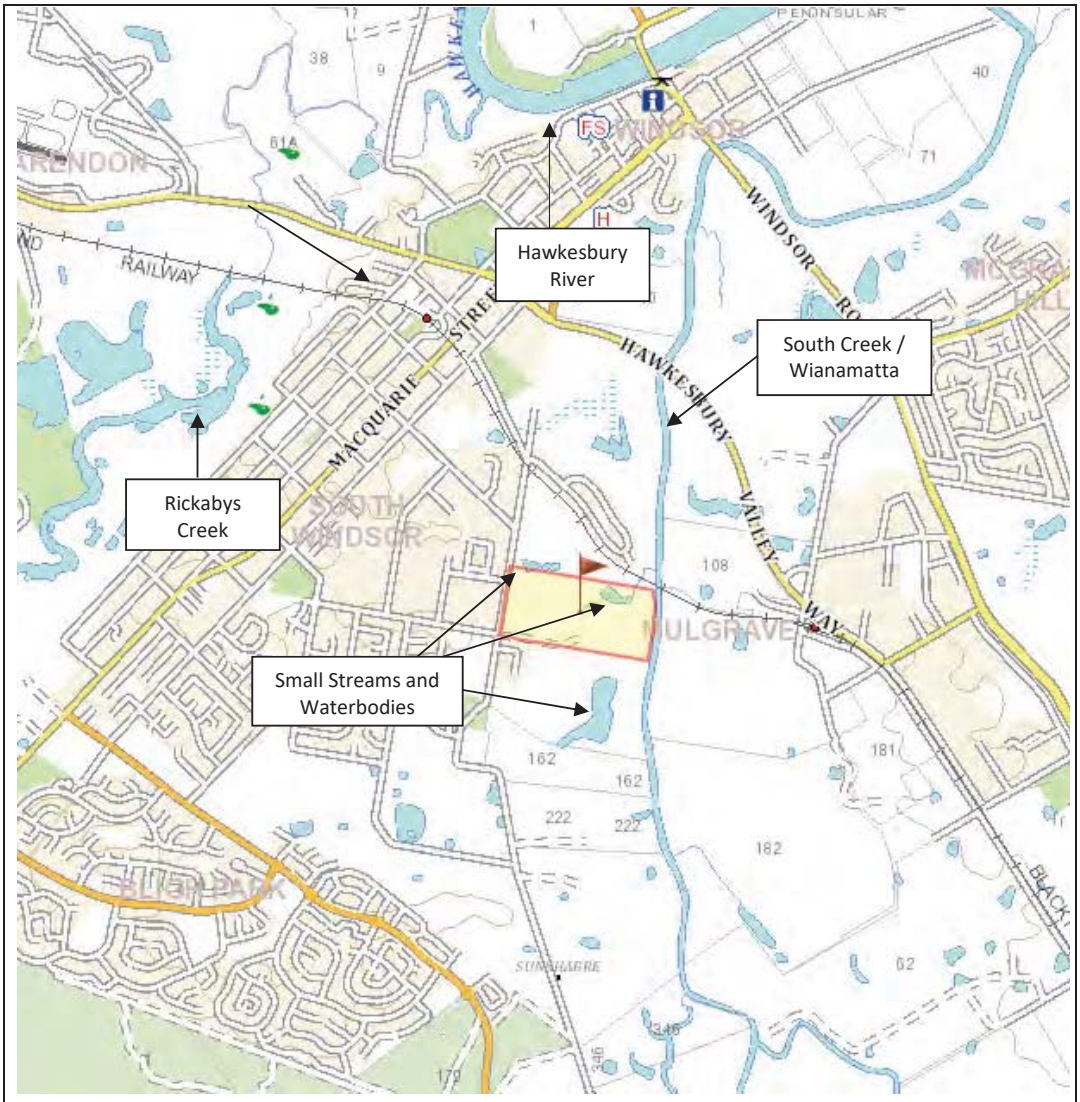
The nearest water bodies to the site include a small wetland area to the north-east of the site itself, which links to South Creek, via a small stream that runs from south to north across the site, The eastern side of the site is divided by an area of wetlands as described by the Hawkesbury LEP 2012 Wetlands mapping, shown in Figure 3-4.

South Creek or Wianamatta runs along the eastern border of the site and is located on the Cumberland Plain and is approximately 70 km long. The Creek rises in Sydney's south western suburbs about 4 km north-east of Narellan and flows generally north, joined by seventeen

tributaries including Badgerys Creek, Kemps Creek, Ropes Creek and Eastern Creek, until reaching its confluence with the Hawkesbury River near Windsor. South Creek has a catchment area of around 620 km^2 and is part of the Hawkesbury-Nepean catchment.

There are also three isolated water bodies just past the north-western boundary of the site and a larger water body, also described as an area of wetlands by the Hawkesbury LEP 2012, 320 m south-east of the site and another one 760 m north of the site, shown in Figure 3-4. The Hawkesbury River is located approximately 2.1 km north of the site.

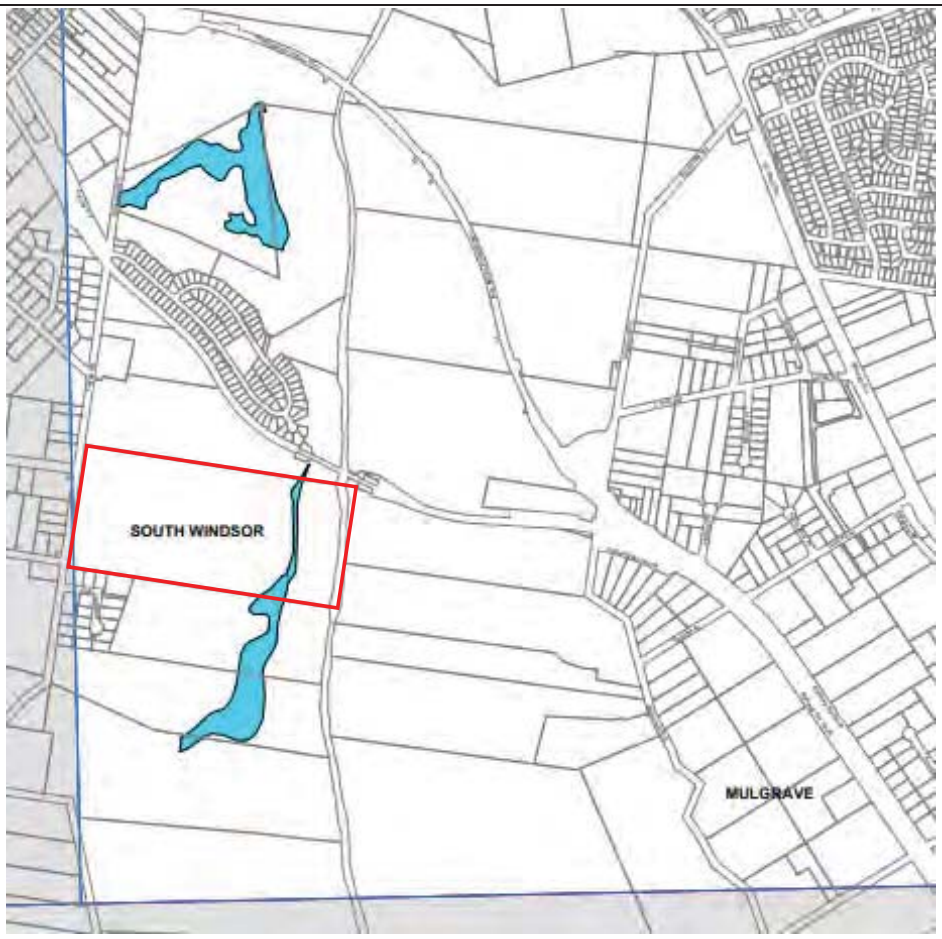
Figure 3-3: Nearest waterways and bodies of water



Source: Six Maps 2018

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

Figure 3-4: Wetlands Mapping



Source: Hawkesbury LEP 2012 Wetlands Map – Sheet WET_008DB

N Not to scale	LEGEND: - Site Boundary Wetlands	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 500 metre radius from the centre of the site, 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 groundwater monitoring bore (GW105482.1.1) within 500 m of the subject site. A summary of information available for this bore has been provided in Table 3-1. The full work summary report is included as Attachment 1.

Table 3-1: Available Data for Groundwater Bores within 500 m of the subject site

Bore	Bore Depth (m)	Drilled date	Purpose	Standing Water Level (m)	Water Bearing Zone from-to (m)	Salinity	Location Co-ordinates
GW105482.1.1	244	17/07/2002	Commercial And Industrial	false	-	true	-33.624261, 150.826083

Note: '–' indicates no data available.

4. SITE HISTORY

The location of the site and a site layout has been presented in Section 2 of this report.

The objective of the site history review is to ensure surety 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 Hawkesbury 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 2. Summaries are provided below:

Lot 4 DP264159

For this land holding there are two (2) notifications:

1. *Reservations and conditions in the Crown Grant(s)*
2. *AN467827 Mortgage to National Australia Bank Limited*

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 3.

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:

- 1947;
- 1961;
- 1970;
- 1982;
- 1991;
- 2002;
- 2012; and
- 2017 (current).

The historical aerial photographs and Google Earth captures have been included in Attachment 4. 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
1947	The site appears to have been cleared of vegetation except an area along the north east border. There are no buildings on the site and some agriculture to the far east of the site.	The area to the west of the site is vegetated with the areas north and south of the site mainly cleared of vegetation. Land to the east appears to be used for agriculture. Running in a south westerly direction to the far west, there is a grid like pattern of roads with agriculture intermixed with housing. A railway line runs in a south-easterly direction to the north of the site crossing over South Creek.
1961	There appear to be no significant changes to the site.	The vegetation to the immediate west of the site has become denser but the grid pattern of roads has encroached on most of the vegetation and now is lined with house rather than agriculture. To the north-west of the site a running track has been built. The land to the north and south has remained the same apart from a few more additional buildings to the north. Agriculture still dominates the area to the east.
1970	The site has been divided up into sections for agriculture.	Vegetation to the immediate west has been mainly cleared, with a pond becoming more established. Below this there still is a rectangle of dense vegetation. Some of the land north of the railway line has become housing but the area to the immediate north, east and south remains as agriculture.
1982	There appear to be no significant changes to the site. The farming activities at the site do not appear to be active, apart from to the east of the site.	The pond and the green area to the west of the site have now gone to make way for roads, factory buildings and housing. The dense rectangle of vegetation has been partially cleared for roads, housing developments and a power station. More houses have appeared in the west and the development north of the railway line has expanded east. Agriculture still dominates to the east of South Creek.

Table 4-1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Areas
1991	There appears to be no significant changes to the site. Agriculture has ceased leaving an area of wetlands to develop around the streams that run through the site and grass to take a hold to the east.	There is significant development immediately to the west, with an area of industry including numerous factory buildings. A housing development has now been established to the west and south of the power station, as well as housing developments encroaching on the last remaining green areas to the far west. Directly south of the site a building has appeared with a road leading to it off the main road. East of the creek agriculture still remains. The running track to the north-west no longer exists.
2002	The site is now completely covered in grass with a few more trees/bushes appearing to the east of the site. A dirt track has appeared along the southern boundary leading to a group of small buildings in the middle of the site, to the south, a couple of which being caravans and a larger building closer to the boundary which is a continuous micro-filtration testing station.	The wetlands area to the south of the site is more established and where there was one building before, a group of industrial buildings has now appeared and a concrete batching plant has been established. Industry to the west has become denser and housing developments have spread further into the green areas in the far west.
2007	The land appears more arid and some shipping containers have appeared opposite the larger building at the end of the track.	Two extra buildings have appeared on the site to the south. The industrial site to the north-west has increased in building density, as well as the site to the north-east, a large industrial building has appeared with several smaller sheds.
2013	Another large shed building has appeared alongside the existing one by the southern boundary and they are both now part of Evoqua's research facility. The vegetation to the east has increased. Along the southern boundary there is an area which looks like a layer of top soil has been spread across, potentially excavated material from the adjacent site.	The industrial area south of the site has increased in the number of buildings and where the pond was the area is all dirt and is potentially used for stockpiling. To the north-east the large industrial building has expanded in size. The industrial area to the north-west has also become more developed.

Table 4-1: Summary of Historical Aerial Photographs

Year	Site	Surrounding Areas
2017	There are a few more structures surrounding the shed that's near the centre of the site.	The industrial area to the south of the site has gained another large factory building and some of the open areas are being used for car parking. Industry to the north-east has become more developed. The agriculture below this has expanded slightly towards South Creek. Industry in the north-west has become denser to fill any empty lots. A running track has appeared to the south-west of the site.

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.

In addition, none of the sites adjoining the subject site are listed in the EPA records.

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 a new licence application on the 15th June 2018 that is pending for chemical storage waste generation by Evoqua Water Technologies Membrane Systems Pty Ltd.

4.5 Hawkesbury City Council

4.5.1 Past Consents

The main information acquired from Hawkesbury City Council is regarding the two approved development applications at the site concerning the construction of a building for a research facility.

Table 4-2: Summary of Council's Development and Building Application / Consent Records

Year	Number	Description	Status
1985	BA0295/85	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Blocks and garage	Approved
1986	BA0084/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Dwelling	Approved
1986	DA0239/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1986	SA0053/86	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1987	DA0392/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; 2 lot subdivision	Withdrawn
1987	DA0393/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; 22 lot industrial subdivision	Approved
1987	SA0071/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivision	Approved
1987	SA0072/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Subdivison	Approved
1987	DA0394/87	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Golf driving range and amenities	Withdrawn
1996	DA0130/96	Lot4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Memfarm installation pump facilities/filtration. The activity undertaken on the site involves a continuous micro-filtration (CMF) testing station. The site was been chosen given its proximity to surface water to enable operation of several CMF units. The CMF testing facility is proposing to expand to enable testing of additional units to expand development of the units.	Approved
2010	DA0183/10	Lot 4 DP 264159 100 Fairey Road, SOUTH WINDSOR NSW 2756; Construction of a building for the purpose of a research facility.	Approved

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 4) from Hawkesbury City Council for the land holding as detailed below:

- Address: 100 Fairey Road, South Windsor, NSW 2756;
- Description: Lot 4 DP264159;
- Certificate Number: PC0069/19; and
- Issue date: 12 July 2018.

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 5.

Gaps in Information

The following are gaps in the information:

- Access to previous owners; and
- Stormwater and sewerage plans.

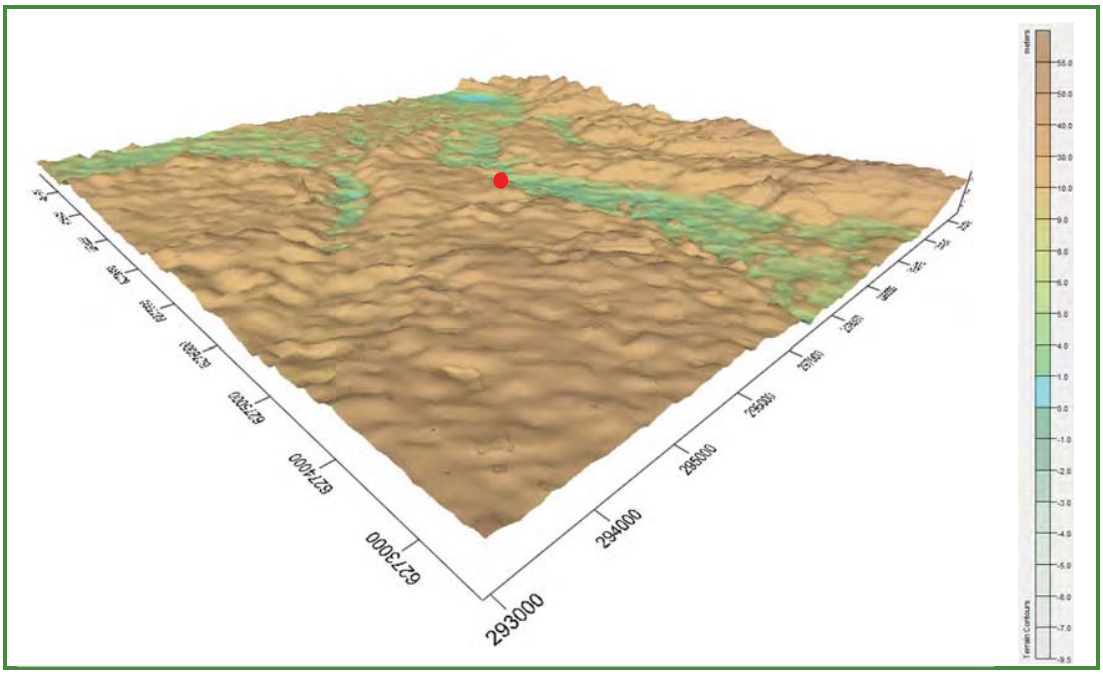
5. SITE CONDITION AND SURROUNDING ENVIRONMENT

5.1 LOCAL TOPOGRAPHY

The south-west corner is slightly raised with the site gently sloping downwards towards South Creek along the eastern boundary. Along the northern boundary the terrain also dips down where the stream runs across the site.

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 12th September 2018 to verify the condition of the site and identify potential contamination sources or discernible evidence of contamination. This section presents the findings of the site walkover accompanied by photographs taken during the site visit.

Photograph 1: View of the site along the southern boundary from the main entrance gate. This photo shows the road base material along the track and the buildings associated with the adjacent concrete batching plant to the right.

Photograph 2: View across the site towards the north-east from the south-west corner.

Photograph 3: Boarded up vacant house, that will be converted into a commercial premises. It is located along the southern border of the site adjacent to the main road.

Photograph 4: Speed signage along the track, to the west of the site.

Photograph 5: View of site further east along the track showing the conveyor and concrete batching plant to the south of the site.

Photograph 6: Area along the southern boundary where run-off from the concrete batching plant has watered the grass.

Photograph 7: Stormwater inlet pipe

Photograph 8: Evoqua Water Technologies research facility buildings, located at the end of the track in the centre of the site along the southern border.

Photograph 9: Close up view of labelled chemical storage shed.

Photograph 10: Empty cattle enclosure.

Photograph 11: Caravans on site near the centre occupied by a caretaker.

Photograph 12: Steel beams/poles near the caravans stored on racking.

Photograph 13: Crusher near caravans.

Photograph 14: Shipping containers opposite the research facility at the centre of the site.

Photograph 15: Old refrigeration system by shipping containers.

Photograph 16: Old excavator behind caravans.

Photograph 17: Old electrical equipment and hot water system near shipping containers.

Photograph 18: Old empty water tank behind shipping containers at the centre of the site.

Photograph 19: Clean empty chemical containers and IBCs by shipping containers.

Photograph 20: Inside of empty IBC.

Photograph 21: Inside of empty containers near the shipping containers.

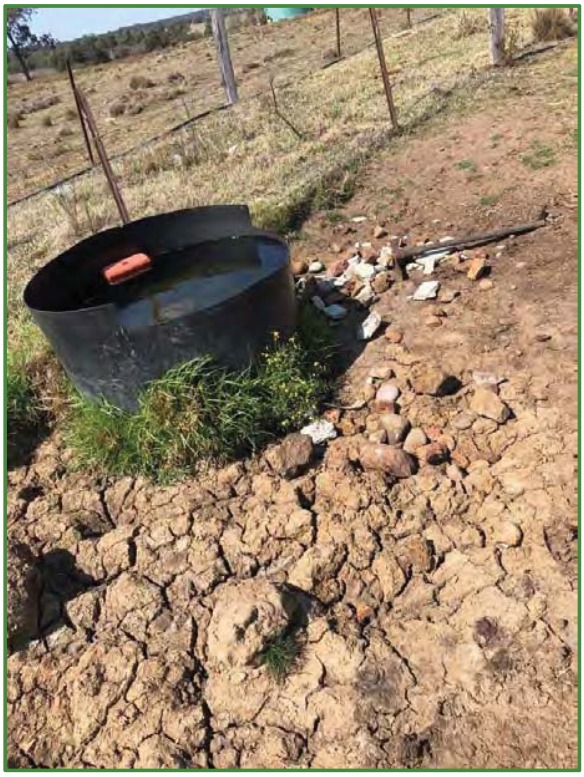
Photograph 22: White granules of fertiliser on the ground by shipping containers.

Photograph 23: Discarded wooden planks by the shipping containers.

Photograph 24: Worn soil and absence of grass near tree at the centre of the site due to cows congregating.

Photograph 25: View towards south-east corner of site featuring research facility and ancillary buildings.

Photograph 26: View from centre of the site towards the east.



Photograph 27: Water station for cattle near the centre of the site. Soil heavily eroded.

Photograph 28: Rubble and hoe adjacent to the cow watering station at the centre of the site.

Photograph 29: View from the centre of the site towards the north-east with the train line in the background.

Photograph 30: Healthy wetlands area to the north-east of the site.

Photograph 31: View from the centre of the site towards the west.

Photograph 32: View from the middle of the northern boundary towards the north-west. Adjacent site has cows.

Photograph 33: Discarded pipes in north-western corner of site.

Photograph 34: Glass bottles and other waste found in north-western corner.

Photograph 35: View of site towards the east from western boundary.

Photograph 36: Broken concrete pipe near western boundary of site.

Photograph 37: Close up of broken concrete pipe. Found near western boundary.

Photograph 38: Metal casing with old fuses, plastic casing and wires inside, located near the western boundary.

Photograph 39: Discarded fuse from metal box with no signs of leakages.

Photograph 40: Mounds of fill material near the south-west corner of the site.

Photograph 41: Close up of fill material made up of some rock conglomerates.

Photograph 42: Exposed soil by tree and shrub along western boundary of the site. Probably eroded as a result of cows gathering in this area.

Photograph 43: Pole for weather vane located along the western boundary.

Photograph 44: View facing north from the west of the site.

Photograph 45: View to the south-east of the site from the west.

Photograph 46: Cow bones near western boundary of site.

Photograph 47: Telephone pit located towards the west of the site.

Photograph 48: View of conveyor and associated structures of the neighbouring concrete batching plant to the south.

Photograph 49: Exposed soil to the south-west of the site.

Photograph 50: Cow bones located in the centre of the western third of the site.

Photograph 51: Western fence line of the site looking to the north.

Photograph 52: View back on to Fairey Road and Ham Street intersection from gate at the south-west corner of the site.

Photograph 53: View along the track from the main access gate from Fairey Road in the south-west corner of the site.

Photograph 54: Fix on fence line along western border.

5.3 POTENTIAL CONTAMINATION ISSUES

A phase I site contamination 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 Asbestos materials

The research facility on the site was not erected till 2010, so there is little risk from asbestos. Similarly, buildings at adjacent sites were not built till more recent years after the regulation of asbestos.

5.3.2 Radioactive material

None expected on site.

5.3.3 Lead Based Paints

The buildings on site were erected long after the peak of using high quantities of lead in paint.

5.3.4 Chemicals and Fuels Stored on Site

Evoqua Water Technologies currently has research facility on the site where they store a variety of acids in a chemical storage building and chlorine in the research facility itself. These chemicals are appropriately stored and labelled and staff wear the correct PPE. There are empty water tanks and chemical containers adjacent to the research facility but they are all empty and there are no signs of any leakages or contamination. No fuel is stored on site.

5.3.5 Air Emissions of Pollutants

None associated with the site.

5.3.6 Soil, Surface Water and/or Groundwater Pollution

The soil at the site has not been disturbed in recent years but prior to 1991 parts of the land was thought to be used for agriculture. There are areas of the ground where soil is exposed due to high cow traffic in the area.

In 2002 a track made from loose road material appears leading to some buildings. The use of unsealed vehicle pathways, over an extended period of time, has the potential to contaminate the soil, surface water and/or groundwater from the leaking of fuels and related automotive liquids. It is suspected that the track has not been used frequently enough to cause concern for contamination, nor are there any obvious signs.

There are a few small mounds of fill that are located to the west of the site, but it doesn't appear to contain any contaminants.

There are a couple small areas along the southern boundary next to the concrete batching plant where the grass is more abundant and green, this is due to the addition of water from run off from the adjacent site but doesn't seem to be a cause for concern.

5.3.7 Pesticide and Herbicide Usage and/or Contamination

Review of the site history indicates agricultural and farming activities have occurred at the site. It is possible that pesticides and herbicides were used in the past but these activities were not recent and were unlikely to have occurred at levels that would create a concern for contamination.

5.3.8 Electromagnetic Fields

Not relevant to this site.

5.3.9 Wastewater Treatment System

Not relevant to this site.

5.3.10 Potable Water Source

Not relevant to the site.

5.3.11 Waste Disposal

Cow manure is present across the site, as well as some cow bones. Scattered wood, two concrete pipes, domestic glass and plastic are also present on the site. This waste is not expected to be hazardous or a contamination concern.

There are a couple of old fuses, IBCs and water tanks but nothing appears to have leaked and they are all clean.

5.3.12 Dams and Ponds

There is a wetland area to the east of the site and a wetland area just past the north-western border of the site. All of which seem to be in a healthy condition.

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	
Vehicle / trucks diesel or Lubricant Oils	Leaks and spills	Soil, Groundwater, Surface Water Soil	Heavy Metals TRH PAH BTEX	Workers on site and neighbouring premises in the case of contamination migrating off-site	Soil, waterways, native habitats	Dermal contact, inhalation of dust and vapours, ingestion	Surface water runoff, soils, groundwater	Low
Pesticides and Herbicides	Use of Pesticide and herbicides at the site in the past	Soil, Groundwater, Surface Water	OCP and OPP	Workers on site	Soil, waterways, native habitats	Dermal contact, ingestion	Soil disturbance, surface water runoff	Low
Fill Materials	Release of chemicals of concern in leachate	Soil, Groundwater	Heavy Metals TRH PAH BTEX	Future site occupants	Groundwater, surface water runoff	Ingestion, inhalation, skin absorption	Soil surface water runoff	Low

7. CONCLUSION AND RECOMMENDATION

The findings of the Phase I Contamination Investigation are summarised as follows:

- A group of old chemical storage containers, water tanks and IBCs on site but they are all clean which represents a low risk of contamination.
- A couple mounds of fill are on site but no likely contaminants were found.
- A small amount of spilt fertiliser was found near the shipping containers.
- Old fuses were found in a metal box on the site but there were no signs of leakages.
- Some run-off from the adjacent concrete batching plant gets onto site along the southern boundary.

The site environmental assessment and detailed search into the site's history has not found evidence of contaminating activities to have occurred at the site.

Further investigation of the site, in regards to a Phase II Assessment, is not considered warranted.

However, the following recommendations are made:

- The spilled fertiliser near the shipping containers should be cleaned up.
- Waste scattered around the site of the development should be removed appropriately.
- Run-off from the concrete batching plant onto the site should be prevented.
- An acid sulfate soil management plan is to be prepared.

Victoria Hale	Kate Barker	R T Benbow
Graduate Environmental Scientist	Graduate 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 Andy's Earthworks Pty Ltd, as per our agreement for providing environmental services. Only Andy's Earthworks 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 Andy's Earthworks 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.

9. REFERENCES

Guidelines for Consultants Reporting on Contaminated Sites (OEH August 2011).

Guidelines for the NSW Site Auditor Scheme (NSW EPA, June 1998).

Both guidelines available at: https://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/statutory-guidelines

Contaminated Land Management Act 1997.
Available at: https://legislation.nsw.gov.au/~/view/act/1997/140/full

NEPM Assessment of Site Contamination (NEPC, 1999) amended 2013.
Available at: https://www.legislation.gov.au/Details/F2013C00288

Hawkesbury LEP 2012

CSIRO Atlas of Australian Acid Sulfate Soils (ASRIS) 2011
Available at: http://www.asris.csiro.au/themes/AcidSulfateSoils.html

Australian Government Bureau of Meteorology, Australian Groundwater Explorer,
Available at: http://www.bom.gov.au/water/groundwater/explorer/map.shtml

NSW Government Planning $ Environment Resources & Energy, 1:100 000 Geological maps, Available at: https://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscience-information/products-and-data/maps/geological-maps/1-100-000

SEED Sharing and Enabling Environmental Data, Acid Sulfaste Soils risk, Available at: https://datasets.seed.nsw.gov.au/dataset/acid-sulfate-soils-risk0196c
View map on :
https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU&runWorkflow=AppendLayerCatalog&CatalogLayer=SEED_Catalog.106

SEED Sharing and Enabling Environmental Data, Soil Landscapes of the Penrith 1:100,000 sheet
https://datasets.seed.nsw.gov.au/dataset/soil-landscapes-of-the-penrith-1-100000-sheet0cca7

ATTACHMENTS

Attachment 1: Land Titles

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 4/264159

SEARCH DATE	TIME	EDITION NO	DATE
11/7/2018	11:31 AM	8	2/7/2018

NO CERTIFICATE OF TITLE HAS ISSUED FOR THE CURRENT EDITION OF THIS FOLIO.
CONTROL OF THE RIGHT TO DEAL IS HELD BY NATIONAL AUSTRALIA BANK LIMITED.

LAND

LOT 4 IN DEPOSITED PLAN 264159
AT SOUTH WINDSOR
LOCAL GOVERNMENT AREA HAWKESBURY
PARISH OF ST MATTHEW COUNTY OF CUMBERLAND
TITLE DIAGRAM DP264159

FIRST SCHEDULE

ANDREW HUGH IRWIN (T AN465826)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AN465827 MORTGAGE TO NATIONAL AUSTRALIA BANK LIMITED

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

181025 PRINTED ON 11/7/2018

Received: 11/07/2018 11:31:53

Attachment 2: Historical Land Title Search

Historical Title

NEW SOUTH WALES LAND REGISTRY SERVICES - HISTORICAL SEARCH

SEARCH DATE
11/7/2018 11:33AM

FOLIO: 4/264159

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 15204 FOL 99

Recorded	Number	Type of Instrument	C.T. Issue
5/6/1987		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
24/6/1987		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
8/7/1988	X677097	DISCHARGE OF MORTGAGE	
8/7/1988	X677098	TRANSFER	EDITION 1
17/6/1991	Z697831	MORTGAGE	EDITION 2
19/5/1994		AMENDMENT: LOCAL GOVT AREA	
25/9/1996	2487826	DISCHARGE OF MORTGAGE	EDITION 3
4/6/2001	7653866	TRANSFER	EDITION 4
22/8/2012	AH191512	TRANSFER	EDITION 5
10/7/2014	AI726544	TRANSFER	EDITION 6
10/7/2015	AJ644000	CHANGE OF NAME	EDITION 7
2/7/2018	AN465826	TRANSFER	
2/7/2018	AN465827	MORTGAGE	EDITION 8 CORD ISSUED

*** END OF SEARCH ***

181025 PRINTED ON 11/7/2018

Attachment 3: Historical Aerial Photographs

1947

1947 enlarged

1961

1961 enlarged

1970

1970 enlarged

1982

1982 enlarged

1991

1991 enlarged

2002

2002 enlarged

2007

2007 Enlarged

2013

2013 Enlarged

2017

2017 Enlarged

Hawkesbury City Council

Planning Certificate

Issued under Section 10.7 of the *Environmental Planning and Assessment Act, 1979*

Benbow Environmental Pty Ltd
PO Box 687
PARRAMATTA NSW 2124
admin@benbowenviro.com.au

Certificate Number	PC0069/19
Your Reference	327131
Date of Endorsement	12 July 2018

Location

Land Description Lot 4 DP 264159, 100 Fairey Road SOUTH WINDSOR NSW 2756

The following information is only applicable as of the date of this certificate and is provided pursuant to Section 10.7 of the *Environmental Planning and Assessment Act 1979*, as prescribed by Schedule 4 of the *Environmental Planning and Assessment Regulation 2000*.

Information pursuant to Section 10.7(2) of the Act

1 Names of relevant planning instruments and Development Control Plans

1.1 The land is affected by the following environmental planning instruments:
Hawkesbury Local Environmental Plan 2012

Sydney Regional Environmental Plan No 9 - Extractive Industry (No 2 - 1995)

Identifies regionally significant extractive resources within the Sydney Region to facilitate their utilisation. The plan ensures extraction is carried out in an environmentally acceptable manner and prohibits extraction from certain environmentally sensitive areas. It ensures that decisions on future urban expansion take into account the ability to realise the full potential of important deposits.

Sydney Regional Environmental Plan No 20 - Hawkesbury Nepean River (No 2 - 1997)

SREP No 20 (No 2 - 1997) was gazetted on 6 November 1997, and is accompanied by the 'Hawkesbury-Nepean Action Plan 1997' and 'Codes of Practice for Consultation'.

The aim of *SREP No 20 (No 2 - 1997)* 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.

SREP No 20 (No 2 - 1997) requires development consent for the purpose of caravan parks or camping grounds; composting facilities or works; buildings works or land uses within conservation area sub-catchments; remediation of contaminated land; filling; certain activities in relation to items of non-aboriginal heritage; intensive horticulture industries; some intensive animal industries; manufactured home estates; marinas; recreational facilities; land uses in or near the river; land uses in riverine scenic areas; sewerage systems or works.

Development for extractive industries is prohibited in some areas. Consent of Council and the concurrence of the Director-General is required for maintenance dredging and extractive operations carried out downstream of the Wallacia Bridge as a consequence of, and ancillary to, works for flood mitigation, bank stabilisation, the construction of bridges or other instream structures (such as marinas) or the licensed or unlicensed withdrawal of water where extraction is necessary to carry out the works. Some intensive animal industries and potentially hazardous or offensive industries are prohibited if carried out on a floodway. Development in mapped wetlands requires the consent of Council and the concurrence of the Director-General of Urban Affairs and Planning.

State Environmental Planning Policy No 19 - Bushland in Urban Areas

Protects and preserves bushland within certain urban areas, as part of the natural heritage or for recreation, educational and scientific purposes. The SEPP is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

State Environmental Planning Policy No 21 - Caravan Parks

Ensures that where caravan parks or camping grounds are permitted under an environmental planning instrument, movable dwellings, as defined in the *Local Government Act 1993*, are also permitted. The specific kinds of movable dwellings allowed under the *Local Government Act* in caravan parks and camping grounds are subject to the provisions of the Caravan Parks Regulation. The SEPP ensures that development consent is required for new caravan parks and camping grounds and for additional long-term sites in existing caravan parks. It also enables, with the council's consent, long-term sites in caravan parks to be subdivided by leases of up to 20 years.

State Environmental Planning Policy No 30 - Intensive Agriculture

Requires development consent for cattle feedlots having a capacity of 50 or more cattle or piggeries having a capacity of 200 or more pigs. The SEPP sets out information and public notification requirements to ensure there are effective planning control over this export-driven rural industry. The SEPP does not alter if, and where, such development is permitted, or the functions of the consent authority.

State Environmental Planning Policy No 33 - Hazardous and Offensive Development

Provides definitions for 'hazardous industry', 'hazardous storage establishment', 'offensive industry' and 'offensive storage establishment'. The definitions apply to all planning instruments, existing and future. The definitions enable decisions to approve or refuse a development to be based on the merit of proposal. The consent authority must carefully consider the specifics of the case, the location and the way in which the proposed activity is to be carried out. The SEPP also requires specified matters to be considered for proposals that are 'potentially hazardous' or 'potentially offensive' as defined in the SEPP. For example, any application to carry out a potentially hazardous or potentially offensive development is to be advertised for public comment, and applications to carry out potentially hazardous development must be supported by a preliminary hazard analysis (PHA). The SEPP does not change the role of councils as consent authorities, land zoning, or the designated development provisions of the *Environmental Planning and Assessment Act 1979*.

State Environmental Planning Policy No 44 - Koala Habitat Protection

Encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range. Local councils cannot approve development in an area affected by the SEPP without an investigation of core koala habitat. The SEPP provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

State Environmental Planning Policy No 50 - Canal Estate Development

Bans new canal estates from the date of gazettal, to ensure coastal and aquatic environments are not affected by these developments.

State Environmental Planning Policy No 55 - Remediation of Land

Introduces state-wide planning controls for the remediation of contaminated land. The SEPP states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The SEPP makes remediation permissible across the State, defines when consent is required, requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires councils to be notified of all remediation proposals.

State Environmental Planning Policy No 62 - Sustainable Aquaculture

Encourages the sustainable expansion of the industry in NSW. The SEPP implements the regional strategies already developed by creating a simple approach to identify and categorise aquaculture development on the basis of its potential environmental impact. The SEPP also identifies aquaculture development as a designated development only where there are potential environmental risks.

State Environmental Planning Policy No 64 - Advertising and Signage

Aims to ensure that outdoor advertising is compatible with the desired amenity and visual character of an area, provides effective communication in suitable locations and is of high quality design and finish.

State Environmental Planning Policy No 65 - Design Quality of Residential Apartment Development

Raises the design quality of residential flat development across the state through the application of a series of design principles. Provides for the establishment of Design Review Panels to provide independent expert advice to councils on the merit of residential flat development.

State Environmental Planning Policy No 70 - Affordable Housing (Revised Schemes)

Extends the life of affordable housing provisions relating to: *Sydney Regional Environmental Plan No. 26 - City West*, *Willoughby Local Environmental Plan 1995* and *South Sydney Local Environmental Plan 1998*. Schemes such as these are helping to provide affordable housing in areas undergoing significant redevelopment.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

This SEPP operates in conjunction with *Environmental Planning and Assessment Amendment (Building Sustainability Index: BASIX) Regulation 2004* to ensure the effective introduction of BASIX in NSW. The SEPP ensures consistency in the implementation of BASIX throughout the State by overriding competing provisions in other environmental planning instruments and development control plans, and specifying that SEPP 1 does not apply in relation to any development standard arising under BASIX.

State Environmental Planning Policy (State Significant Precincts) 2005

Defines certain developments that are major projects under Part 3A of the *Environmental Planning & Assessment Act 1979* and determined by the Minister for Planning. The SEPP also lists State significant precincts.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The SEPP aims to provide for the proper management and development of mining, petroleum and extractive material resources for the social and economic welfare of the State. The SEPP establishes appropriate planning controls to encourage ecologically sustainable development.

State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007

Provides for the erection of temporary structures. The SEPP supports the transfer temporary structures (such as tents, marquees and booths) from the *Local Government Act 1993* to the *Environmental Planning and Assessment Act 1979*.

State Environmental Planning Policy (Repeal of Concurrence and Referral Provisions) 2004

Amends various environmental planning instruments so as to omit provisions requiring consent authorities to obtain certain concurrences or refer matter to various persons or bodies.

State Environmental Planning Policy (State and Regional Development) 2011

The aims of this SEPP are to identify development that is State significant development, to identify development that is State significant infrastructure and critical State significant infrastructure, to confer functions on joint regional planning panels to determine development applications.

State Environmental Planning Policy (Repeal of Concurrence and Referral Provisions) 2008

Removes duplicative or unnecessary requirements in environmental planning instruments which require concurrence from or referral to government agencies.

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

Aims to provide streamlined assessment processes for development that complies with specified development standards.

State Environmental Planning Policy (Affordable Rental Housing) 2009

Aims to provide a consistent planning regime for the retention and provision of affordable rental housing.

State Environmental Planning Policy (Infrastructure) 2007

Provides a consistent planning regime for infrastructure and the provision of services across NSW, along with providing for consultation with relevant public authorities during the assessment process. The SEPP supports greater flexibility in the location of infrastructure and service facilities along with improved regulatory certainty and efficiency.

State Environmental Planning Policy (Integration and Repeals) 2016

This SEPP repealed a number of SEPPs and deemed SEPPs including State Environmental Planning Policy No 32-Urban Consolidation (Redevelopment of Urban Land) and Sydney Regional Environmental Plan No 19-Rouse Hill Development Area.

State Environmental Planning Policy (Vegetation in Non-Urban Areas)

The aim of this Policy is to protect the biodiversity values and the amenity of non-rural areas of the State through the preservation of trees and other vegetation.

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

Encourage the development of high quality accommodation for our ageing population and for people who have disabilities - housing that is in keeping with the local neighbourhood.

State Environmental Planning Policy (Coastal Management) 2018

This Policy promotes an integrated and co-ordinated approach to land use planning in the coastal zone consistent with the objects of the *Coastal Management Act 2016* through the mapping of coastal management areas and the establishment of a land use planning framework, including controls for development within the coastal zone.

The land may be affected by the following environmental planning instrument:
State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017

The aim of this Policy is to facilitate the effective delivery of educational establishments and early education and care facilities across the State by providing a consistent planning regime including the establishment of consistent assessment requirements, design considerations and consultation for these types of development.

1.2 The land is affected by the following proposed environmental planning instruments that are or have been the subject of community consultation or on public exhibition under the *Environmental Planning and Assessment Act 1979* (excludes instruments where Council has been notified that the making of the proposed instrument has been deferred indefinitely or has not been approved):

Draft State Environmental Planning Policy - Integrating Land Use and Transport

Draft State Environmental Planning Policy (Application of Development Standards) 2004

Draft State Environmental Planning Policy (Competition) 2010

Draft State Environmental Planning Policy (Infrastructure) Amendment (Review) 2016

Amendment to *State Environmental Planning Policy No. 44 Koala Habitat Protection*

Draft State Environmental Planning Policy (Primary Productions and Rural Development) 2017

Draft State Environmental Planning Policy (Environment) 2017

Amendment to *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2014* – Site Compatibility Certificates

Amendment to *State Environmental Planning Policy No. 55 – Remediation of Land*

Amendment to *Standard Instrument Local Environment Plan* – Retail land use definitions

Amendment to *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* – Housekeeping Amendments

1.3 The land is affected by the following Development Control Plans:

Hawkesbury Development Control Plan 2002

Note: In this section a proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

2 Zoning and land use under relevant Local Environmental Plans

2.1 The land is zoned:

RU1 Primary Production under *Hawkesbury Local Environmental Plan 2012*.

IN1 General Industrial under *Hawkesbury Local Environmental Plan 2012*.

2.2 Under the provisions of *Hawkesbury Local Environmental Plan 2012* the purposes for which development may be carried out within the zone without development consent are referred to in the Land Use Table Annexure.

2.3 Under the provisions of *Hawkesbury Local Environmental Plan 2012* the purposes for which development may not be carried out within the zone except with development consent are referred to in the Land Use Table Annexure.

2.4 Under the provisions of *Hawkesbury Local Environmental Plan 2012* the purposes for which the carrying out of development is prohibited within the zone are referred to in the Land Use Table Annexure.

The following special provisions of *Hawkesbury Local Environmental Plan 2012* may apply to the subject land:

- Clause 2.5 Additional permitted uses for particular land.
- Clause 2.6 Subdivision – consent requirements.

- Clause 2.7 Demolition requires development consent.
- Clause 2.8 Temporary use of land.
- Part 3 Exempt and complying development.
- Clause 4.2 Rural subdivision.
- Clause 4.2A Residential development and subdivision prohibited on certain land.
- Clause 5.1 Relevant acquisition authority.
- Clause 5.1A Development on land intended to be acquired for public purposes.
- Clause 5.3 Development near zone boundaries.
- Clause 5.7 Development below mean high water mark.
- Clause 5.8 Conversion of fire alarms.
- Clause 5.10 Heritage conservation.
- Clause 5.11 Bush fire hazard reduction.
- Clause 5.12 Infrastructure development and use of existing buildings of the Crown.
- Clause 6.1 Acid sulfate soils.
- Clause 6.2 Earthworks.
- Clause 6.11 Residential accommodation at Johnston and New Streets, Windsor.
- Clause 6.12 Certain development at Richmond Lowlands.

These special provisions may alter the development shown in the Land Use Table which may be carried out with or without development consent and prohibited land uses. Please refer to the above mentioned provisions of *Hawkesbury Local Environmental Plan 2012* to determine applicability.

2.5 Has Council adopted any development standards providing fixed minimum land dimensions for the erection of a dwelling house on the land?

No.

2.6 Does the land include or comprise critical habitat?

No.

2.7 Is the land in a conservation area under *Hawkesbury Local Environmental Plan 2012* or a proposed instrument referred to in section 1 of this certificate (other than a SEPP or proposed SEPP)?

No.

2.8 Is an item of environmental heritage under *Hawkesbury Local Environmental Plan 2012* or a proposed instrument referred to in section 1 of this certificate (other than a SEPP or proposed SEPP) situated on the land?

No.

Note: The land may also be subject to a proposed environmental planning instrument (see section 1.2 of this certificate) that may change the information given in this section of the certificate.

3 Complying Development under each of the codes for complying development because of the provisions of clauses 1.17A(1)(c) to (e), (2), (3) and (4), 1.18(1)(c3), and 1.19 of *State Environmental Planning Policy* (Exempt and Complying Development Codes) 2008.

3.1 Housing Code.

Can complying development under the Housing Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral*

Rainforests Area Map (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.2 Housing Alterations Code.

Can complying development under the Housing Alterations Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.3 Commercial and Industrial Alterations Code.

Can complying development under the Commercial and Industrial Alterations Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.4 Subdivisions Code.

Can complying development under the Subdivisions Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.5 Rural Housing Code.

Can complying development under the Rural Housing Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.6 General Development Code.

Can complying development under the General Development Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.7 Demolition Code.

Can complying development under the Demolition Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.8 Commercial and Industrial (New Buildings and Additions) Code.

Can complying development under the Commercial and Industrial (New Buildings and Additions) Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).
- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*

3.9 Container Recycling Facilities Code

Can complying development under the Container Recycling Facilities Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018).*
- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).

3.10 Fire Safety Code

Can complying development under the Fire Safety Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018)*.

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).

3.11 Greenfield Housing Code

Can complying development under the Greenfield Housing Code be carried out on the subject land?

In part. Complying development cannot be carried out on that part of the land that:

- Is within 100m of land identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018)*.

- Is identified as 'coastal wetlands' on the *Coastal Wetlands and Littoral Rainforests Area Map* (within the meaning of *State Environmental Planning Policy (Coastal Management) 2018*).

3.12 Low Rise Medium Density Housing Code

The Low Rise Medium Density Housing Code does not apply to the Hawkesbury Local Government Area at this time.

4 Repealed

4A Repealed

4B Annual charges under *Local Government Act 1993* for coastal protection services that relate to existing coastal protection works

Has the owner (or any previous owner) of the land consented in writing to the land being subject to annual charges under Section 496B of the *Local Government Act 1993* for coastal protection services that relate to existing coastal protection works (within the meaning of Section 553B of that *Local Government Act 1993*)?

No.

Note: 'Existing coastal protection works' are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of Section 553B of the *Local Government Act 1993*.

5 Mine Subsidence

Is the subject land within a mine subsidence district within the meaning of Section 20 of the *Coal Mine Subsidence Compensation Act 2017*?

No.

Note: Section 5 Mine Subsidence, Schedule 4 Planning Certificates of the *Environmental Planning Assessment Regulation 2000* will be updated shortly to reflect the above.

6 Road widening and road realignment

Is the land affected by road widening or road re-alignment under Division 2 of Part 3 of the *Roads Act 1993*, or any environmental planning instruments, or any resolution of Council?

No.

7 Council and other public authority policies on hazard risk restrictions

Has Council adopted a policy or has any other public authority notified Council for the purpose of planning certificates of a policy that restricts the development of the land because of the likelihood of:

a) Landslip.

No.

b) Bushfire risk.

No.

c) Tidal inundation.

Yes.

d) Subsidence.

No.

e) Acid sulfate soils.

Yes.

f) Any other risk (other than flooding)?

No.

7A Flood Related Development Controls Information

a) Is the land or part of the land subject to flood related development controls 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)?

The land is subject to riverine flood related development controls.

b) Is the land or part of the land subject to flood related development controls for any other purpose not included in a) above?

The land is subject to riverine flood related development controls.

Note: Words and expressions in this section have the same meanings as in the standard instrument set out in the *Standard Instrument (Local Environmental Plans) Order 2006*.

The above responses are provided in relation to the flood related development controls of *Hawkesbury Local Environmental Plan 2012*. Some State or Regional planning instruments may contain flood related development controls which affect the land. These include, but are not necessarily restricted to, *State Environmental Planning Policy (Exempt and Complying Development Code) 2008*, *State Environmental Planning Policy No 30 - Intensive Agriculture*, *State Environmental Planning Policy (Infrastructure) 2007*, *State Environmental Planning Policy No 62 - Sustainable Aquaculture*, *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*, *Sydney Regional Environmental No 9 – Extractive Industry (No 2 – 1995)*, and *Sydney Regional Environmental Plan No 20 – Hawkesbury – Nepean River (No 2 – 1997)*.

8. Land Reserved for Acquisition

Is the land affected by any environmental planning instrument, or proposed environmental planning instrument referred to in section 1 of this certificate, which makes provision for the acquisition of the land by a public authority, as referred to in Section 3.15 of the *Environmental Planning and Assessment Act 1979*?

No.

9 Contributions Plans

The *Hawkesbury Section 94 Contributions Plan 2015* applies to the subject land.

The *Hawkesbury Section 94A Contributions Plan 2015* applies to the subject land.

9A Biodiversity certified land

Is the land biodiversity certified land under Part 8 of the *Biodiversity Conservation Act 2016*?

No.

Note: Biodiversity certified land includes land certified under Part 7AA of the *Threatened Species Conservation Act 1995* that is taken to be certified under Part 8 of the *Biodiversity Conservation Act 2016.*

10 Biodiversity stewardship sites

Has Council been notified that the land is a biodiversity stewardship site under a biodiversity stewardship agreement under Part 5 of the *Biodiversity Conservation Act* 2016?

No.

Note: Biodiversity stewardship agreements include biobanking agreements under Part 7A of the *Threatened Species Conservation Act 1995* that are taken to be biodiversity stewardship agreements under Part 5 of the *Biodiversity Conservation Act 2016.*

10A Native vegetation clearing set asides

Does the land contain a set aside area under section 60ZC of the *Local Land Services Act 2013*?

No.

11 Bush fire prone land

Is the land bush fire prone land (as defined by the *Environmental Planning and Assessment Act 1979)*?

All of the land is bush fire prone.

12 Property Vegetation Plans

Has Council been notified that the land is land to which a property vegetation plan approved under Part 4 of the *Native Vegetation Act 2003* (and that continues in force) applies?

No.

13 Orders under *Trees (Disputes Between Neighbours) Act 2006*

Has Council been notified whether 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?

No.

14 Directions under Part 3A

Is the land subject to an in force direction under Section 75P(2)(c1) of the *Environmental Planning and Assessment Act 1979*?

No.

15 Site compatibility certificates and conditions for seniors housing

15.1 Is the land subject to a current site compatibility certificate (seniors housing), of which Council is aware, issued under *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004*?

No.

15.2 Has Council granted a development consent after 11 October 2007 in respect of the land, setting out any terms of a kind referred to in clause 18(2) of the *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004*?

No.

16 Site compatibility certificates for infrastructure, schools or TAFE establishments

Is the land subject to a valid site compatibility certificate (infrastructure), or site compatibility certificate (schools or TAFE establishments), of which Council is aware?

No.

17 Site compatibility certificates and conditions for affordable rental housing

17.1 Is the land subject to a current site compatibility certificate (affordable rental housing), of which Council is aware?

No.

17.2 Is the land subject to a statement setting out any terms of a kind referred to in clause 17(1) or 38(1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that has been imposed as a condition of consent to a development application?

No.

18 Paper subdivision information

18.1 Is the land subject to a development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot?

No.

18.2 Is the land subject to a subdivision order?

No.

Note: Words and expressions used in this section have the same meaning as they have in Part 16C of the *Environmental Planning and Assessment Regulation 2000*.

19 Site verification certificates for biophysical strategic agricultural lands

Is the land subject to a current site verification certificate (biophysical strategic agricultural land), of which Council is aware?

No.

Note: A site verification certificate sets out the relevant State Government department Secretary's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land - see Division 3 of Part 4AA of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

20 Loose-fill asbestos insulation

Does the land contain any residential premises that is listed on the Loose-Fill Asbestos Insulation Register (within the meaning of Division 1A of Part 8 of the *Home Building Act 1989)*?

No.

21 Affected building notices and building product rectification orders

21.1 Is the land subject to an in force affected building notice (within the meaning of Part 4 of the *Building Products (Safety) Act 2017)*, of which Council is aware?

No.

21.2 (a) Is the land subject to an in force affected building product rectification order (within the meaning of the *Building Products (Safety) Act 2017*) that has not been fully complied with?

No.

(b) Is the land subject to a notice of intention to make a building product rectification order (within the meaning of the *Building Products (Safety) Act 2017)*, of which Council is aware has been given, and that is outstanding?

No.

Additional Matters

Certain prescribed matters under Section 59(2) of the *Contaminated Land Management Act 1997 (CLMA1997)*.

a) Is the land significantly contaminated land within the meaning of the CLMA 1997?

No.

b) Is the land subject to a management order within the meaning of the CLMA 1997?

No.

c) Is the land subject to an approved voluntary management proposal within the meaning of the CLMA 1997?

No.

d) Is the land subject to an ongoing maintenance order within the meaning of the CLMA 1997?

No.

e) Is the land subject to a site audit statement within the meaning of the CLMA 1997?

No.

Information pursuant to Section 10.7(5) of the Act

Applicants are advised that Council does not accept any liability in respect of any advice provided under the heading 'Development Consent'.

Preservation of trees and vegetation

The *Hawkesbury Local Environmental Plan 2012, State Environmental Planning Policy (Vegetation in Non-Urban Areas) 2017* and the *Hawkesbury Development Control Plan 2002* contain provisions which relate to the preservation of trees and vegetation throughout the local government area.

Development Consent

Has a development consent which applies to the subject land been issued within the past five years? If a development consent has been issued within the past five years, reference should be made to Section 4.53 of the *Environmental Planning and Assessment Act 1979* to determine whether or not the consent has lapsed.

No.

Enquiries

For any enquiries please contact Customer Service on (02) 4560 4444.

Chris Carloss | Authorised Officer | Hawkesbury City Council
www.hawkesbury.nsw.gov.au

EIS Appendix 8: Traffic Impact Assessment, Transport and Urban Planning

PROPOSED CONSTRUCTION MATERIALS PROCESSING AND RECYCLING FACILITY

AT

100 FAIREY ROAD SOUTH WINDSOR

SPECIALIST ROAD TRAFFIC AND TRANSPORT ASSESSMENTS

APPENDIX 9

Ref. 18023r2

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Revised September 2019

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CONTENTS

1.0 INTRODUCTION

Transport and Urban Planning has been engaged by Andy's Earthworks Pty Ltd to undertake traffic impact, road access and transport assessments for the subject proposal.

The proposed project is located at 100 Fairey Road South Windsor, described as Lot 4 DP264159 (the site) and located within the Hawkesbury local government area, approximately 45km north-west of Sydney (refer to **Figures 1** and **2** overleaf).

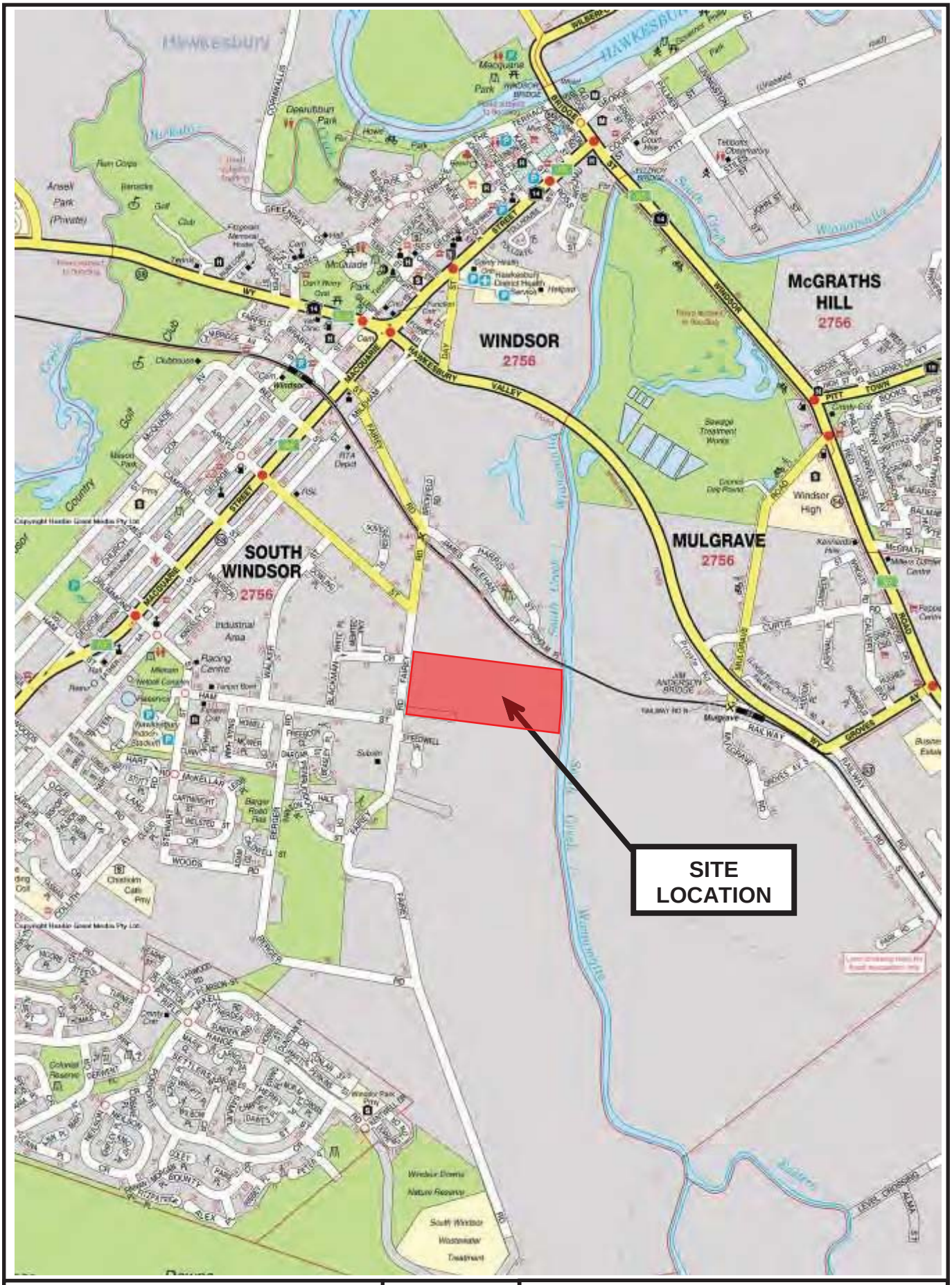
The project is located over the south-western portion of a large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. Andy's Earthworks proposes to establish a construction material crushing and recycling plant which will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ, as shown in the proposal plans.

The project site is located on the eastern fringe of the South Windsor industrial area, with the nearest residence approximately 250 metres to the west of the operations boundary. The nearest residences are on the northern side of the Main Northern railway line (refer to **Figure 1**). The project will involve a Capital Investment Value (CIV) of approximately $500,000 (TBC).

The proposed development is defined as an industrial activity, as it is for the processing of goods (being 95% sandstone and 5% materials from waste) for commercial purposes. A secondary site use would be for a 'resource recovery facility'. The use is defined by the Hawkesbury Local Environment Plan 2012 (Hawkesbury LEP 2012) and constitutes Designated Development under the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation). MacroPlan Holdings Pty Ltd (MacroPlan) has prepared this preliminary environmental assessment (PEA) on behalf of Andy's Earthworks for submission to the Department of Planning and Environment (DP&E). Following consideration of the PEA and consultation with relevant government agencies, it is expected that DP&E will provide Secretary's Environmental Assessment Requirements (SEARs) for the preparation of the Environmental Impact Statement (EIS).

This report addressed The NSW Department of Planning and other government agency requirements for the EIS identified in Director General's Requirements dated 21 May 2010. The report contains an assessment of baseline traffic conditions and assessment of traffic implications of the proposal including consideration of the following issues:

- Traffic generation during operation (volume and frequency), site access points, and hours of traffic movement;
- Traffic generation during construction (volume and frequency), site access points and hours of traffic movement;
- Types of road transport to be employed;
- The capability of proposed routes (incl. road and intersection capacity) to handle the predicted traffic movements associated with the proposal. Any road upgrades that may be required should be noted with a summary of consultations with RTA and Council, where relevant, in relation to those upgrades;
- The cumulative impacts of traffic generated by the proposed development and the adjoining Allied Mills site; and
- The Local Environmental Study (LES) for rezoning of adjoining land and future traffic and access considerations.



TRANSPORT AND URBAN PLANNING

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N

NOT TO SCALE

FIGURE 1

100 FAIREY ROAD,
SOUTH WINDSOR

LOCATION

JOB NO. 18023

12/07/18

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NOT TO SCALE

FIGURE 2

100 FAIREY ROAD,
SOUTH WINDSOR

SUBJECT SITE

JOB NO. 18023 12/07/18

2.0 THE SITE

2.1 Site Description

The subject site (Project Area) is located as shown in **Figures 1** and **2**, being situated on Lot 4 DP264159. The construction materials crushing and recycling plant operations will be located over the south-western part of the site comprising an area 6.71ha on Fairey Road.

2.1.1 Land Use

The Project Area is located on a large rural allotment which is largely unused. The site is improved by two sheds over the south-eastern portion of the Project Area which are used as a research and development facility by Evoqua in accordance with DA0183/10. This research facility is serviced by a gravel track which provides access from Fairey Road along the southern property boundary.

A vacant residential structure of brick construction is located on the north western corner boundary of the site.

The site comprises predominantly grassland, with some trees located around the sheds and the south-western corner of the site.

Land use in the surrounding area consists of industrial operations to both the west and south, including Boral Concrete, Moits trucking operations, screening and plant yard and Australian Security fencing immediately to the south and the following businesses on the western side of Fairey Road, opposite the Project Area:

- Worth Recycling;
- Holcim Australia – Windsor Concrete;
- Snowflake Blast and Powdercoat; and
- Nann's Autohouse

To the north are four large rural allotments which are all vacant with evidence of partial demolition of previous building structures, Further to the north is the Main Northern railway line, with a small residential housing estate beyond.

To the east is South Creek, with large rural allotments located on the eastern side of South Creek.

The nearest residences to the Project Area are located approximately 300m to the north, and approximately 250m in a straight line to the south-east of the site, through the industrial area off Ham Street.

2.1.2 Site Access

Access to the Project Area will be via Fairey Road. Fairey Road is a two lane sealed industrial access road. The site has good access to the arterial road network, with the A2 (Windsor Road) providing connectivity to the east towards Sydney, the B59 (Hawkesbury Valley Road) providing access to the west and the A9 (George Street/The Northern Road) providing access to the south.

Access to the Project Area from Fairey Road will be via a proposed sealed driveway for the first 35m from the Fairey Road frontage into the site, with the remaining driveway length to be constructed of compacted road base. The site access has been designed to accommodate heavy vehicle access and to allow for the queueing of up to 6 heavy vehicles onsite.

3.0 PROPOSED PROJECT

3.1 Overview

Andy's Earthworks proposes to establish a construction materials crushing and recycling plant at the site. The volume of material to be received at the site would be up to 98,000 tonnes annually. Approximately 28,000 tonnes of this material would be processed (including 23,000 tonnes of sandstone and 5,000 tonnes of construction and demolition waste such as concrete, brick and excavated rock).

A description of the operations to be undertaken at the site is provided as follows:

3.2 Site Operations

Site operations works will include:

- Establishment of site office/facilities/weighbridge;
- Haulage of material (sandstone, recycled crushed concrete, brick and excavated rock products) to site, generally from quarries, excavations and demolition sites in Western Sydney;
- Stockpiling of materials on site;
- Crushing, grinding and separating of the materials; and
- Sorting, grading and storage of processed materials.

3.3 Material Source and Management

The operation will utilise sandstone, recycled crushed concrete, brick and excavated rock products, generally from quarries, excavation and demolition sites in Western Sydney, transported to site initially at a rate of up to 93,000 tonnes of sandstone and 5,000 tonnes of waste materials per annum (tpa). Loads transported to the site will be weighed at a weighbridge at the site entrance prior to unloading over the Project Area. Loads will be visually screened for non-conforming wastes. Any waste identified as being other than accepted materials will be rejected and sent back to the supplier in accordance with company policy.

The sandstone, up to 28,000 tonnes, recycled crushed concrete, brick and excavated rock products will be processed through mobile crushing and screening machinery within the Project Area. The crushing facilities will only accept uncontaminated materials, which must be free of general waste, wood, paper and other such materials. Metals in recycled concrete such as rebar will be accepted, as they will be removed with magnets and other sorting devices before being on-sold for recycling elsewhere. The processed materials are then sorted by size and graded. Larger pieces of crushed materials may, on occasion be processed a second time. After crushing has taken place, other particles are filtered out through a variety of methods including hand-picking and water flotation.

3.4 Site Infrastructure

The following equipment and infrastructure will be required on site during the operation of the Project:

- 1 x Excavator
- 1 x Front end loader
- Weighbridge
- 1 x Jaw crusher
- Screening plant
- Site office and staff amenities building

A 2-3 metre high landscape mound (likely stripped topsoil from within the site), including native planting, is proposed along the full length of the Fairey Road frontage to the Project Area, with a 35 metre return adjacent to the site access. The earthen mound is proposed to mitigate potential visual impacts of the proposed operations.

In addition, settlement and filtration ponds are proposed over the rear area of the site to manage potential sediment laden stormwater runoff from the Project Area prior to discharge from the site.

3.5 Hours of Operation

The proposed site hours of operation and car/truck movements proposed are:

Monday – Friday	-	7.00am to 6.00pm;
Saturday	-	7.00am to 1.00pm; and
Sunday	-	Closed

3.6 Staffing

The Project proposes to employ 20-25 full time staff for the operation, including:

- 6 to 8 machinery operations; and
- 2 weighbridge/inspection person at site entry
- 5 materials and safety inspectors
- 10 drivers of materials truck owned by Andy's Earthworks

3.7 Traffic

The operations at the site will commence with a materials receival rate of up to 98,000tpa. Trucks accessing the site will be a combination of semi-trailers, and truck with dog trailers; each with an approximate capacity of 30t.

It is proposed that 10 loaded trucks per day will arrive at the site with a maximum of 20 loaded trucks per day during peak demand periods.

Inbound raw material will arrive from the following and adjoining locations:

- Nepean Region, 30%
- Blacktown Area, 30%
- Macarthur Region, 20%
- Hawkesbury Region, 10%
- Blue Mountains, 10%

It is expected that outbound finished product will be distributed in a similar capacity as above.

3.8 Car Parking

All staff and visitor car parking will be provided on site in designated car parking areas (up to 31 spaces) adjacent to the administration building and removed from site operations and truck manoeuvring areas.

4.0 ADJOINING ROAD NETWORK

4.1 Access Roads

The adjoining regional road network accessing the site consists of Richmond Road to the south and Hawkesbury Valley Way and Windsor Road to the north.

George and Macquarie Street provide a major north-south regional link between Richmond Road, Hawkesbury Valley Way and Windsor Road.

Macquarie Street through South Windsor is an undivided four lane arterial route speed zoned to 60km/h. Argyle Street, from Macquarie Street to Fairey Road is primarily a 13.0 metre wide two lane undivided local industrial access road upon an undulating and straight alignment, speed zoned to 50km/h.

Argyle Street, from Macquarie Street to Mileham Street (150 metres) is residential and accommodates nine residential dwellings from Mileham Street to Fairey Road (1.0km). Argyle Street is adjoined by light industrial uses and the South Windsor RSL Club.

The four way intersection of Argyle Street with Macquarie Street is controlled by traffic signals as shown below.

Fairey Road, from Argyle Street to the site entrance is primarily a two lane undivided industrial access road with an 8.0 metre wide pavement and unsealed 2.0 metre gravel shoulders.

The Fairey Road, Argyle Street tee intersection is shown below.

No street lighting is provided and the road is speed zoned to 60km/h. An at grade level crossing is provided over Fairey Road some 300 metres north of Argyle Street. See below.

The Fairey Road frontage is shown in **Figure 2**.

4.2 Traffic Volumes

4.2.1 Daily Flows

Five day Monday to Friday traffic volumes on the access road to the site as at July 2018 are summarised as follows:

TABLE 4.1

5 DAY AVERAGE VOLUMES – JULY 2018

Location	Volume/Day	Percent Heavy Vehicles
Macquarie Street - (at Argyle Street)	18,000	2%
Argyle Street - (at Macquarie Street)	7,500	3%
Fairey Road - (East of Argyle Street)	3,000	18%
Fairey Road - (West of Argyle Street)	2,700	22%

4.2.2 Peak Hour Flows

Weekday peak hour traffic volumes are summarised in **Figure 3** attached and included as **Appendix 1**. Existing peak volumes at Argyle Street and Fairey Road are represented as follows.

TABLE 4.2

PEAK HOUR VOLUMES - JULY 2018

Time	Argyle Street		2 Way (inc heavy vehicles)	Fairey Road		2 Way (inc heavy vehicles)
	NB	SB		EB	WB	
7.00-8.00AM (veh/hr)	73	46	139 (11)	55	84	139 (17)
8.00-9.00AM (veh/hr)	107	34	141 (19)	63	82	145 (20)
4.00-5.00PM (veh/hr)	202	60	262 (17)	123	172	295 (25)
5.00-6.00PM (veh/hr)	129	58	187 (19)	94	157	251 (21)

4.3 Traffic Conditions and Service Levels

Traffic conditions in Fairey Road and Argyle Street are generally free flowing with minimal delays at the access intersections. The RMS Traffic Generation Guidelines 2002 at Section 4 Table 4.4 indicates that one and two lane urban roads carrying less than 200 vehicles per hour per lane operate at a mid block traffic service level LOS A.

Based on our Table 4.2 peak hour volumes above we would conclude that a peak hour mid block LOS A applies to Fairey Road and Argyle Street.

4.4 Road Safety

A review of the recorded crash history for the site and above access intersection and Fairey Road/Argyle Street (3 years to October 2017) did not reveal any accidents with vehicles entering or exiting the intersection. Sight distances to/from the access intersection exceeds 80 metres north and south which complies with the (minimum) Safe Stopping Sight Distance (SSSD) of 60 metres required in urban environments within 60 km/hr speed zones as recommended by Austroads.

A further review of the PC crash database, as supplied by the RMS October 2014 to October 2017 indicates;

- 17 recorded accidents on Argyle Street including six truck related incidents;

- Nine of the collisions were recorded at Mileham Street and included 5 right angle type collisions;

- 15 recorded accidents at Macquarie Street including three truck related incidents, a further five accidents were recorded on Macquarie Street away from Argyle Street. Six (6) of the recorded accidents at Argyle Street were right angle type and six were right turn/through vehicle type accidents. A further five accidents were rear end type collisions.

- Two accidents were recorded at Fairey Road, none involving a truck.

Comment

Argyle Street is not a high speed environment. The above crash history might suggest improved traffic controls are required at Argyle and Mileham Streets and a review of the traffic signal operations and phasing may be required (by RMS) at Argyle and Macquarie Streets. With respect to the truck related accidents, all occurred in normal business hours 6am to 6pm which reflects the existing high presence of trucks on the route in business hours.

4.5 Amenity

Argyle Street is already an industrial collector route to Fairey Road carrying 141 vehicles per hour 13.5%, heavy vehicles AM and 262 vehicles per hour, 6.5% heavy vehicles PM. See Table 4.2.

These peak hour AM and PM volumes are below the environmental capacity standards suggested by the RMS in Section 4 of the Traffic Generating Developments Guidelines 2012 which indicates:

TABLE 4.3

ENVIRONMENTAL CAPACITY PERFORMANCE STANDARDS ON RESIDENTIAL STREETS

Road Class	Road Type	Maximum Speed (km/hr)	Maximum Peak Hour Volume (veh/hr)
Local	Access Way	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	300 environmental goal
			500 maximum

The existing AM and PM peak hour volumes indicate that Argyle Street (within the residential precinct) currently operates within the 300vph environment goal for a collector route.

Table 4.3 above indicates that the functional classification of a street is important. While two streets may be similar, if one street functions as a collector street, then local access, safety and amenity are not the only issues to be considered. The movement of traffic along the street from adjoining areas also becomes a planning issue. Since Argyle Street is both a residential and industrial access route both traffic movements and planning issues need to be accommodated and balanced.

5.0 TRAFFIC ACCESS AND TRANSPORT ASSESSMENTS

5.1 Traffic Generation

5.1.1 Construction

Construction traffic will predominantly comprise car trips associated with construction worker journeys to and from the site. These will be concentrated around the beginning and end of the construction day (typically 6.00 – 7.00am and 4.00 and 5.00pm). A maximum of 20 workers will be on site during any stage of the construction equating to around 32 trips to and from the site each day assuming a minimum vehicle occupancy of 1.2 persons. However this value may be significantly lower if car pooling as is widely practiced amongst tradespeople is higher than 1.2 persons per vehicle.

Once delivered, construction plant will remain on site throughout the duration of the site preparation period. Following the preparation period a regular pattern of construction traffic will enter and depart the site each day. Typically this will be in the order of 5 deliveries (10 vehicle movements) per day, spread throughout the day. Deliveries will primarily consist of concrete, formwork and reinforcement for the buildings, plant and machinery for the recycling operations.

Construction truck traffic will generally come from the adjoining main road network and local concrete plants.

A summary of construction traffic is shown below.

TABLE 5.1

DAILY AND PEAK HOUR CONSTRUCTION TRAFFIC GENERATION MONDAY – SATURDAY

Vehicles	Daily Veh Two Way	AM Peak Hour		PM Peak	
		Veh In	Veh Out	Veh In	Veh Out
Car/Light Vehicles	32	15	-	-	14
Trucks/Heavy Vehicles	10	1	1	1	2

It is assumed 95% of private vehicles will arrive in the morning peak hour between 6am and 7am. In the evening peak 85% of private vehicles will depart the site between 4pm and 5pm.

The majority of construction materials (60%) are expected to be delivered fairly evenly across the morning period beginning at 7am. The remaining deliveries (40%) will arrive during the afternoon period up until the site shuts down at 6pm.

5.1.2 Operations

Truck Traffic

Based on advice from the proponent and site operators, during the first year of operations (year 2020) recycling would involve 98,000 tonnes of materials per year. Incoming materials for recycling would average 30 tonnes per truck or 3,300 inbound truck movements per year, say 10 trucks per day. Outgoing product will also be 98,000 tonnes per year and average 30 tonnes per truck (semis and truck / trailer combinations) or 10 out truck movements per day. Total incoming product is 20 trips (in and out) and total outgoing product is 20 per day (in and out). Say 40 in total truck trips between 7.00am and 5.00pm daily.

Staff and Visitor Parking

With up to 25 staff employed on site and the poor public transport provision to access the site we would allow 90% of all staff as single person vehicle trips to the site ie. 22 trips in the AM and PM peak arrival and departure hours and up to 50 trips daily including visitor trips at full operations.

At full operations (98,000 tonnes per year) the projected Monday – Friday AM and PM peak hour traffic movements are:

TABLE 5.2

PROJECTED AM AND PM PEAK HOUR TRAFFIC
MONDAY TO SATURDAY

Time	Car In	Trucks In	Cars Out	Trucks Out	Total Traffic
AM Peak	22	2	0	2	**26 veh/hr**
PM Peak	2	2	20	2	**26 veh/hr**

This level of peak hour traffic equates to 1 additional vehicle in or out every 2 minutes to/from Fairey Road.

5.2 Traffic Distribution

Product transportation information provided by the proponent at Section 3.7 of the document, indicates that;

- **Incoming Materials Origin**

100% of all materials to be recycled will arrive via Macquarie Street and Argyle Street to Fairey Road.

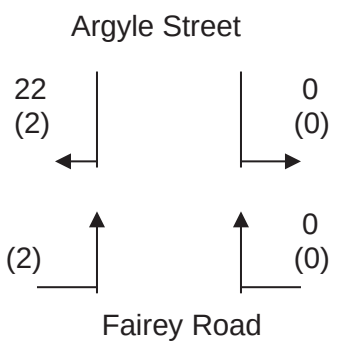
- **End Product Destination**

100% of all end product materials will be transported in larger articulated trucks to destinations located east, south or west of the site i.e. via Argyle Street thence Macquarie Street.

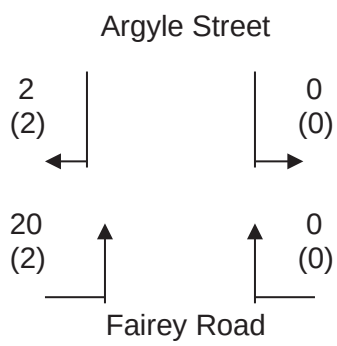
Light vehicle staff and visitor trips will mainly have origins and destinations in the order of 60% eastbound and 40% westbound.

The projected arrivals and departures of the additional AM and PM peak hour traffic post development at the existing Fairey Road and Argyle Street intersection at full operation is shown as follows:

AM PEAK
26 trips (including 4 trucks)



PM PEAK
26 trips (including 4 trucks)



22 Car and light vehicles
(2) Trucks

5.3 Traffic Impacts

5.3.1 Impacts of Construction Traffic

The majority of the construction workforce will be drawn from the adjoining Nepean, Hawkesbury and Blacktown areas 80% and the remainder 20% from the broader Sydney region and they are expected to travel to the site via existing main road network to Macquarie Street thence Argyle Street. For 80% of construction traffic trips in both the morning and afternoon periods will be travelling against the peak direction of flow and are therefore expected to have only minimal impact on the capacity of these routes. Therefore detailed intersection analysis of the construction stage traffic movements has not been undertaken for the construction phase of works.

Work on the construction site will normally commence at 7am and consequently private vehicle trips to the site are not expected to correspond with the normal morning peak hour travel times. In the evening period, most traffic will depart the site around 3-4pm well before the afternoon peak which is normally experienced between 4pm and 5pm.

5.3.2 Impacts of Post Development Traffic

- **Fairey Road and Macquarie Street Access**

The existing access road intersections have been modelled utilising SIDRA programme to assess existing post development performance for Year 2020 with the proposal in full operation. The results show all traffic movements perform well during the peak hour periods, (except the right turn out of the Allied Access in the AM peak) with little or no delays experienced as follows:-

TABLE 5.3

SIDRA OUTPUT SUMMARY – YEAR 2018
EXISTING FAIREY ROAD AND ARGYLE STREET INTERSECTION

Movement	AM Peak			PM Peak		
	Delay (s/veh)	LOS	95% queue length (m)	Delay (s/veh)	LOS	95% queue length (m)
Argyle Street						
Left Turn	5.8	A	0.1	5.8	A	0.2
Right Turn	6.8	A	0.1	9.2	A	0.2
Approach	6.3	A	0.1	7.6	A	0.2
Fairey Road (north)						
Left Turn	5.9	A	0.0	5.6	A	0.5
Through Movement	1.2	A	0.0	1.1	A	0.5
Approach	2.9	A	0.0	3.5	A	0.5
Fairey Road (south)						
Through Movement	1.1	A	0.0	1.1	A	0
Right Turn	6.0	A	0.3	6.1	A	0
Approach	3.5	A	0.3	3.6	A	0
Intersection	**3.9**	**A**	**0.3**	**4.1**	**A**	**0.5**

TABLE 5.4

SIDRA OUTPUT SUMMARY – YEAR 2020
POST DA FAIREY ROAD AND ARGYLE STREET INTERSECTION

Movement	AM Peak			PM Peak		
	Delay (s/veh)	LOS	95% queue length (m)	Delay (s/veh)	LOS	95% queue length (m)
Argyle Street						
Left Turn	5.9	A	0.2	5.9	A	0.4
Right Turn	7.5	A	0.2	9.9	A	0.4
Approach	6.9	A	0.2	8.5	A	0.4
Fairey Road (north)						
Left Turn	6.0	A	0.0	5.7	A	0.0
Through Movement	1.2	A	0.0	1.1	A	0.0
Approach	3.6	A	0.0	3.8	A	0.0
Fairey Road (south)						
Through Movement	1.1	A	0.0	1.1	A	0.0
Right Turn	6.1	A	0.3	6.3	A	0.5
Approach	3.5	A	0.3	3.5	A	0.5
Intersection	**4.3**	**A**	**0.3**	**4.4**	**A**	**0.5**

The post development traffic impacts arising from the proposed additional development traffic at the above intersection is up to 0.4 seconds additional average delay per vehicle and minimal changes to 95% queue lengths and no change to traffic service levels i.e. LOS A.

TABLE 5.5

SIDRA OUTPUT SUMMARY – YEAR 2018
EXISTING MACQUARIE STREET AND ARGYLE STREET INTERSECTION

Movement	AM Peak			PM Peak		
	Delay (s/veh)	LOS	85% queue length (m)	Delay (s/veh)	LOS	85% queue length (m)
Argyle Street (east)						
Left Turn	41.1	C	4.9	32.5	C	5.9
Through	39.9	C	11.4	30.7	C	14.5
Right Turn	53.6	D	11.4	45.5	D	14.5
Approach	46.4	D	11.4	38.9	C	14.5
Argyle Street (west)						
Left	67.5	F	2.1	59.3	F	3.9
Through	147.7	F	9.0	156.2	F	16.1
Right	179.8	F	9.0	240.9	F	16.1
Approach	143.7	F	9.0	171.2	F	16.1
Macquarie Street (north)						
Left Turn	11.9	A	3..6	13.9	A	6.0
Through Movement	44.5	D	35.3	142.4	F	87.3
Right Turn	52.5	D	35.3	167.0	F	87.3
Approach	30.5	C	35.3	116.8	F	87.3
Macquarie Street (south)						
Left Turn	12.8	A	7.4	17.2	B	10.5
Through Movement	23.2	B	27.7	50.3	D	33.6
Right Turn	36.9	C	27.7	87.3	F	33.6
Approach	23.7	B	27.7	51.6	D	33.6
Intersection	**38.1**	**C**	**35.3**	**86.4**	**F**	**87.3**

TABLE 5.6

SIDRA OUTPUT SUMMARY – YEAR 2020
POST DA MACQUARIE STREET AND ARGYLE STREET INTERSECTION

Movement	AM Peak			PM Peak		
	Delay (s/veh)	LOS	85% queue length (m)	Delay (s/veh)	LOS	85% queue length (m)
Argyle Street (east)						
Left Turn	42.1	C	5.4	31.2	C	5.7
Through	45.1	D	13.5	29.4	C	14.9
Right Turn	67.8	E	13.5	42.2	C	14.9
Approach	56.3	D	13.5	36.5	C	14.9
Argyle Street (west)						
Left	65.7	E	2.2	59.1	F	3.6
Through	100.0	F	6.8	117.4	F	13.4
Right	119.3	F	6.8	163.3	F	13.4
Approach	99.3	F	6.8	125.0	F	13.4
Macquarie Street (north)						
Left Turn	12.1	A	3.7	13.9	A	5.9
Through Movement	49.1	D	37.7	171.1	F	96.3
Right Turn	56.8	E	37.7	197.7	F	96.3
Approach	39.7	C	37.7	138.6	F	96.3
Macquarie Street (south)						
Left Turn	12.9	A	7.9	18.7	B	12.4
Through Movement	26.8	B	29.0	78.1	F	44.3
Right Turn	43.8	D	29.0	151.4	F	44.3
Approach	27.5	B	29.0	80.0	F	44.3
Intersection	**40.1**	**C**	**37.7**	**101.0**	**F**	**96.3**

Traditionally the RMS accepts up to a LOS D operation during peak times at signalised intersections. Therefore the existing PM peak signal operation is outside current RMS operational requirements indicating that additional capacity and reduced delay times are currently warranted irrespective of this proposal.

The existing signalised Macquarie Street, Argyle Street intersection operates at a Level of Service LOS C in the AM peak pre and post DA scenario and at Level of Service F in the PM peak in the pre and post DA model.

Average vehicle delays are increased by 2 seconds per vehicle in the AM peak and 15 seconds per vehicle in the PM peak.

The RMS criteria for interpreting intersection Level of Service LOS is:-

LOS	***Give Way and Stop Signs***	***Highest Movement Delay (in seconds)***
A	*Good*	*0-14*
B	*Acceptable delays and spare capacity*	*15-28*
C	*Satisfactory but accident study required*	*29-42*
D	*Near capacity and accident study required*	*43-56*
E	*At capacity and requires other Control Delay Mode*	*57-60*
F	*Unsatisfactory and requires other Control Mode*	*>70*

The resultant AM peak post development traffic impacts arising from the proposal at Year 2020 are minimal and well within existing and RMS accepted intersection performance parameters. Whilst the PM peak operation at the Macquarie and Argyle Street intersection requires RMS action with or without this proposal.

The SIDRA output summary data is attached as **Appendix 2**.

- **Other access intersection**

Future traffic to and from the site will be discouraged from traversing the Fairey Road at the at grade level crossing, north of Argyle Street or entering/exiting directly to Hawkesbury Valley Way.

5.3.3 Impacts on Traffic Safety

Road safety within the vicinity of the site is not expected to be adversely affected by the development. The proposal will result in only a relatively small increase in traffic which will not influence the operation of the major routes or intersections near the site.

The 3 year accident analysis to mid year 2017 indicated relatively few heavy vehicle accidents occurred at either the Macquarie Street, Argyle Street or the Argyle Street/Fairey Road intersections. It is therefore not expected the additional heavy trips generated by the development will result in any adverse impacts at these junctions.

5.4 Future Access

Figures 3A to **3D** overleaf indicate the in/out turning movement for a truck and dog trailer type vehicle at the Macquarie, Argyle Street and Fairey Road intersections.

These turnpath diagrams indicate that the truck and trailer combination does not encroach over the opposing lane in Macquarie Street and Argyle Street, this would be indicative of existing larger truck movements in/out of the industrial precinct accessed via Argyle Street.

At peak time truck movements to/from the site are likely to be less than 4 trucks per hour.

Figure 4 overlays shows diagrammatically the peak hour truck movements to and from the site to Macquarie Street.

5.5 Parking and Access

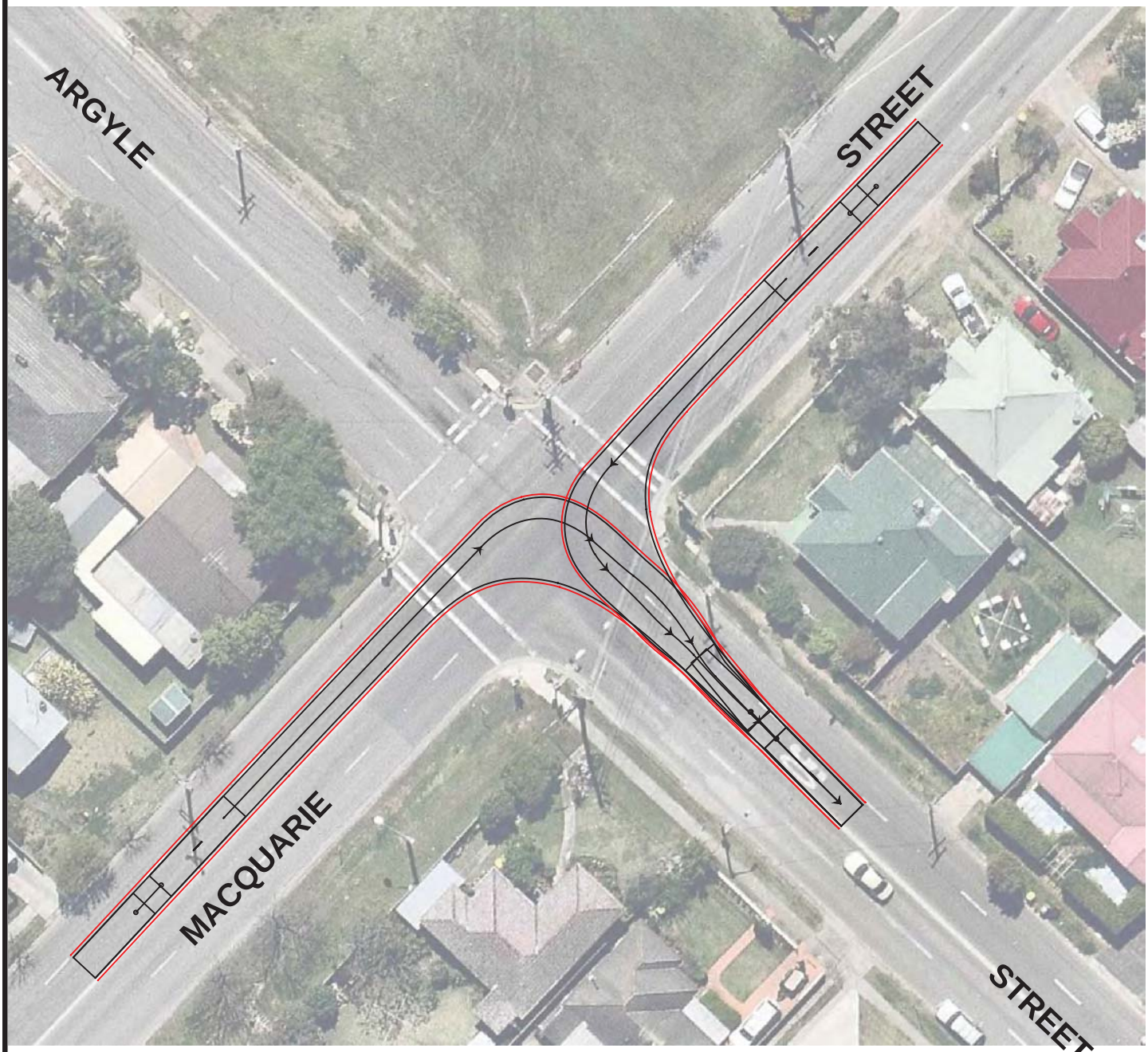
Hawkesbury City Development Control Plan 2002 DCP Part C outlines requirements for the provision of off street parking at developments. However, the DCP does not make recommendations for truck parking for this specific land use. Alternatively, the Australian Standards AS 2890.2-2002 specifies the dimensions for truck bays as 3.5m x 19.0m for articulated trucks. For truck and carparking the following conditions apply:

- *At least one car space must be made available for disabled car parking and then one space in every one hundred should be for disabled car parking.*

- *The size of a 90 degree car parking space should be 2.6m x 5.5m with an aisle width of 6.2m.*

- *Truck bays are to be at least 3.5m x 19, no B-Doubles will access the site.*

The car and truck parking details will comply with the above standards at the time of development application.



TRANSPORT AND URBAN PLANNING

TRAFFIC, TRANSPORT & PROJECT MANAGEMENT CONSULTANTS

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Phone 02 9545 1411 Fax 02 9545 1556
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FIGURE 3A

100 FAIREY ROAD
SOUTH WINDSOR

TURNPATHS - 19m TRUCK & DOG
MACQUARIE ST & ARGYLE ST INTERSECTION

JOB NO.18203 14/05/19

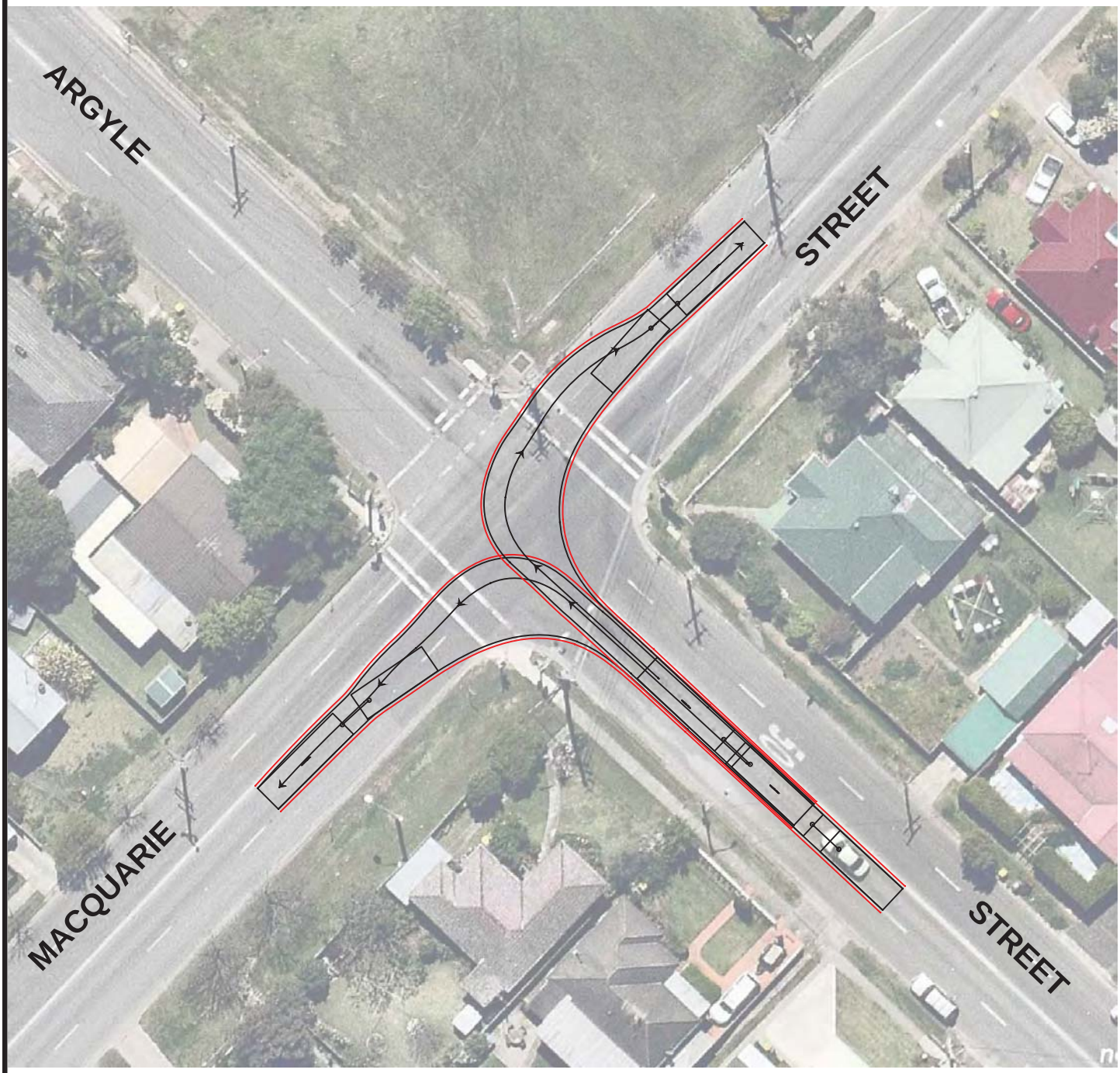

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FIGURE 3B

100 FAIREY ROAD
SOUTH WINDSOR

TURNPATHS - 19m TRUCK & DOG
MACQUARIE ST & ARGYLE ST INTERSECTION

JOB NO.18203 14/05/19

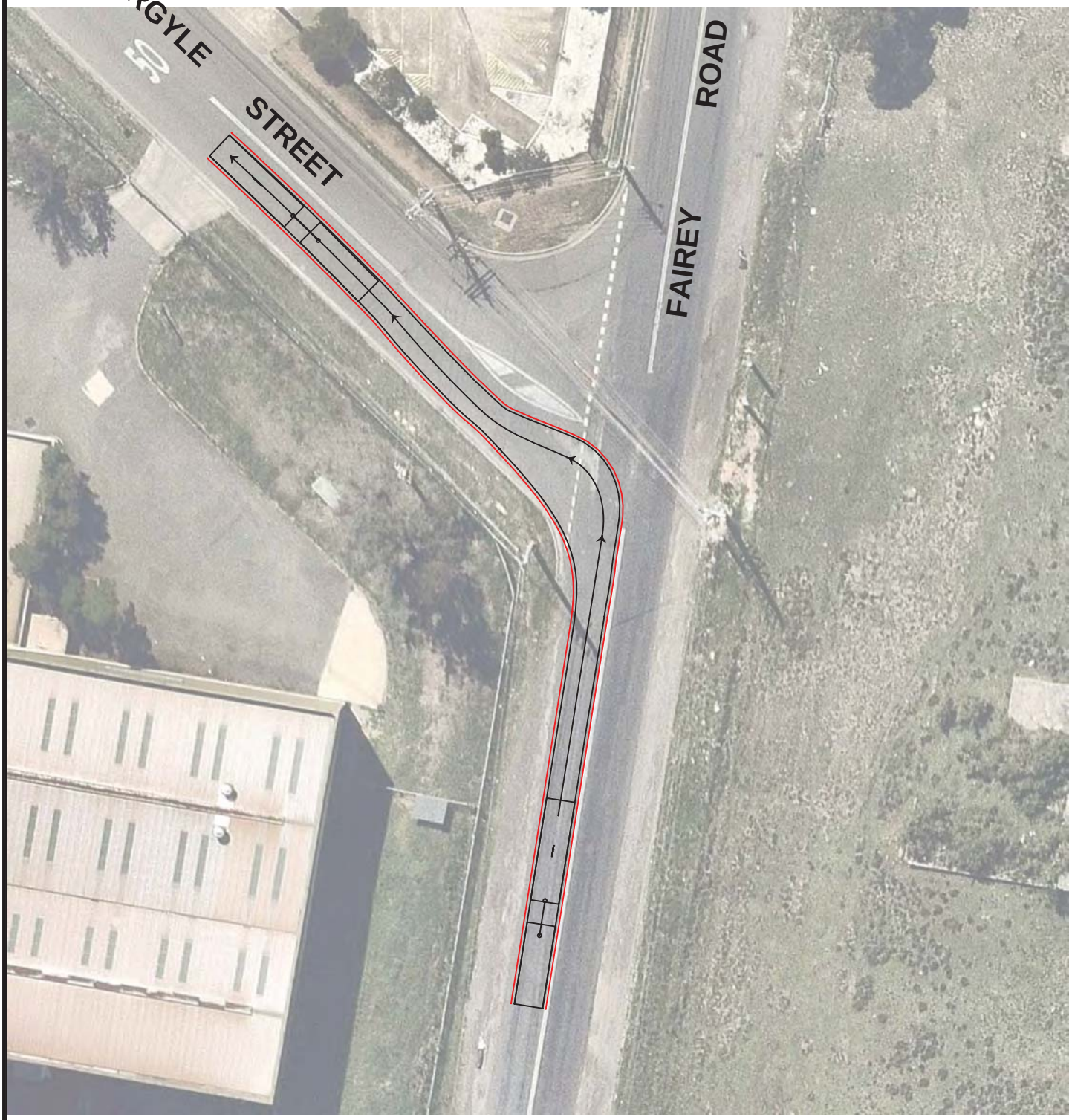

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FIGURE 3C

100 FAIREY ROAD
SOUTH WINDSOR

TURNPATHS - 19m TRUCK & DOG
ARGYLE ST & FAIREY RD INTERSECTION

JOB NO.18203 14/05/19

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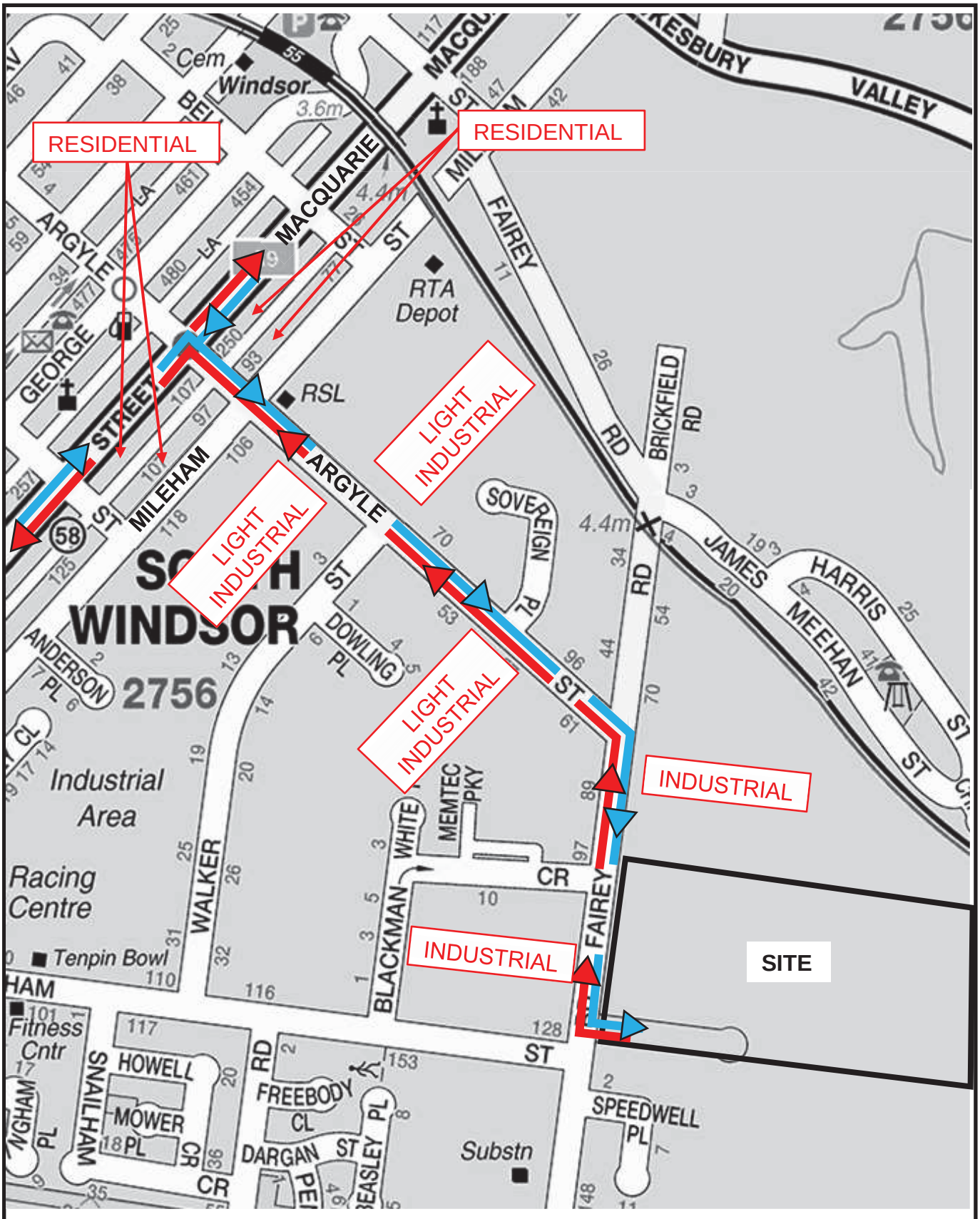
FIGURE 3D

100 FAIREY ROAD
SOUTH WINDSOR

TURNPATHS - 19m TRUCK & DOG
ARGYLE ST & FAIREY RD INTERSECTION

JOB NO.18203 14/05/19



INBOUND TRUCK ROUTE – AM & PM PEAK 2 TRUCKS

OUTBOUND TRUCK ROUTE - AM & PM PEAK 2 TRUCKS

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N

NOT TO SCALE

FIGURE 4

100 FAIREY ROAD,
SOUTH WINDSOR

TRUCK ACCESS ROUTES

JOB NO. 18023 23/09/19

The site will contain parking for the following number of vehicles.

Parking Provisions

Car Parking Spaces	Quantity
Employee Spaces	25
Disabled Spaces	1
Visitor Spaces	5
Total	31
Service Bays (Heavy Freight Vehicles)	20

The final site and access design should adopt the following access considerations.

- Vehicles should enter and leave the site in a forward direction. Ingress and egress to or from a site should be located where they will cause least interference with vehicular and pedestrian movement on public roads.

- The potential for on-street queueing should be eliminated by the provision of sufficient standing area for vehicles entering the car park and loading areas.

- To encourage their utilisation, entrances to parking areas should be located so as to be readily visible and accessible from the frontage road.

- Service vehicle areas should be provided off-street with convenient access. Service areas should operate independently of other areas, and enable vehicles to enter ad leave the site in a forward direction.

- Parking areas shall incorporate rational circulation patterns. All parking bays shall be readily accessible and the provision of adequate space for the manoeuvring of vehicles, particularly rigid and articulated heavy vehicles, shall be considered.

- Car parking spaces for people with disabilities should be clearly marked and the surface should be level.

5.6 Public Transport

Future staff numbers at the proposed facility will be relatively low, never more than 25 on site at a time. Such small numbers are difficult to encourage public transport operators to change or add routes that pass the site at morning and afternoon peak times.

There could, however, be future incentives to encourage car sharing to reduce the number of cars entering the site.

5.6 Driver Code of Conduct

A proposed Driver Code of Conduct for the construction and operational phase of work is suggested as follows:

- Recognise and accept their obligations to maintain and promote safe transport operations;

- Operate their vehicles in a safe and responsible manner to minimise conflict with other road users and pedestrians within the estate and on the wider road network;

- Undertake to comply with all road transport laws, road rules and OH&S legislation including speed limits and seat belt laws and observing fatigue regulations and drug and alcohol laws;

- Observe the nominated truck routes for access to and from the site as may be defined in the development consent for approval of the proposal. This will minimise the impact of transport operations on other road users and on the adjacent local and regional road network;

- Drive in a safe and courteous manner and be considerate of other road users, including cyclists and pedestrians;

- Minimise traffic noise particularly during night time hours and avoid, where practical, the use of engine brakes during these times;

- Conduct regular checks of the vehicle to ensure that the truck and the load is in a safe condition;

- Observe all site access rules and comply with the direction of authorised personnel when within the site;

- Cover bulk loads when travelling to and from the site.

6.0 CONCLUSIONS

The proponent envisages a construction materials processing and recycling facility upon land located on Fairey Road at South Windsor. The proposed development would consists of two stages.

The first stage would involve bulk earthworks, demolition and construction, site access and establishment of the raised ground level for the proposed work areas.

The second stage would involve the construction and operation of the construction materials and concrete recycling facility. Expected capacity would be in the range of 98,000 tonnes per year.

All processes on site would be mechanical with the life of the site operation expected to be 25 – 30 years. The hours of operation are 7.00am - 6.00pm Monday to Friday and 1.00pm Saturday.

It is anticipated that the proposal would generate 25 employment positions with full site operations including:

- Site administration and management;
- Plant operation; and
- Material processing and handling.

The traffic and transport impact of the proposed sandstone and concrete resource recovery and waste management facility has been assessed in accordance with the requirements set out in the NSW EPA advice of 24 November 2017 and NSW Planning and Environment letter dated 15 December 2017. The main findings of these assessments are summarised below;

- The proposal will receive, process and recycle up to 98,000 tonnes of concrete materials at full operation (post Year 2020). All materials will arrive at the site via medium to large articulated trucks. Large semi trailer and truck trailer combinations will remove all recycled materials.

- Under full operating conditions the site is expected to generate 52 vehicle trips (including 4 trucks) in the AM and PM Monday to Friday peak hour. Four additional truck per hour on Argyle Street should not adversely impact upon the existing level of residential amenity between Mileham Street to Macquarie Street.

- The existing signalised intersection of Argyle Street with Macquarie Street may require an RMS operational review based on current accident levels and delay times.

- Existing and post development mid block traffic service levels on Fairey Road and Argyle Street will remain at favourable level of service LoS A performance standards.

- Peak hour articulated truck movements will be less than 4 movements per hour in peak times.

- The existing access intersections with Macquarie Street/Argyle Street and Argyle Street/Fairey Road has been (SIDRA) modelled for projected Year 2020 peak hour traffic flows with the additional traffic generation by the proposal. The post development results indicate there will be no significant change in existing traffic service levels at these intersections, due to this proposal.

- 100% of all end product materials will depart the site viz Fairey Road to Argyle Street then to Macquarie Street and thence the regional main road network.

- Fairey Road and Argyle Street to Macquarie Street are existing, moderate volume truck routes into the existing light industrial precinct during business hours 6am to 6pm.

- The projected additional 2 trucks in and 2 trucks out per hour during peak times should have no adverse impacts upon the amenity or safety of Argyle Street during business hours.

- Incoming materials will arrive via the Macquarie Street and Argyle Street to Fairey Road. Recycled concrete would still be generated without this facility but would go elsewhere.

- During construction the majority of vehicles are expected to arrive and depart the site outside the peak hours on the surrounding road network. Even with the addition of construction based traffic, the volumes on the main routes leading to the site will be well below those experienced during peak hours.

- All proposed internal vehicle movements parking and circulation can be adequately accommodated within the site and are free of conflict and should be designed to comply with Councils DCP 2002 and Australian/NZ Standard 2890.2 at the Development Application stage.

Michael Bridgman
Traffic, Transport and Road Safety Consultant
Transport and Urban Planning Pty Ltd
Ph. 0409 443 655

APPENDIX 1

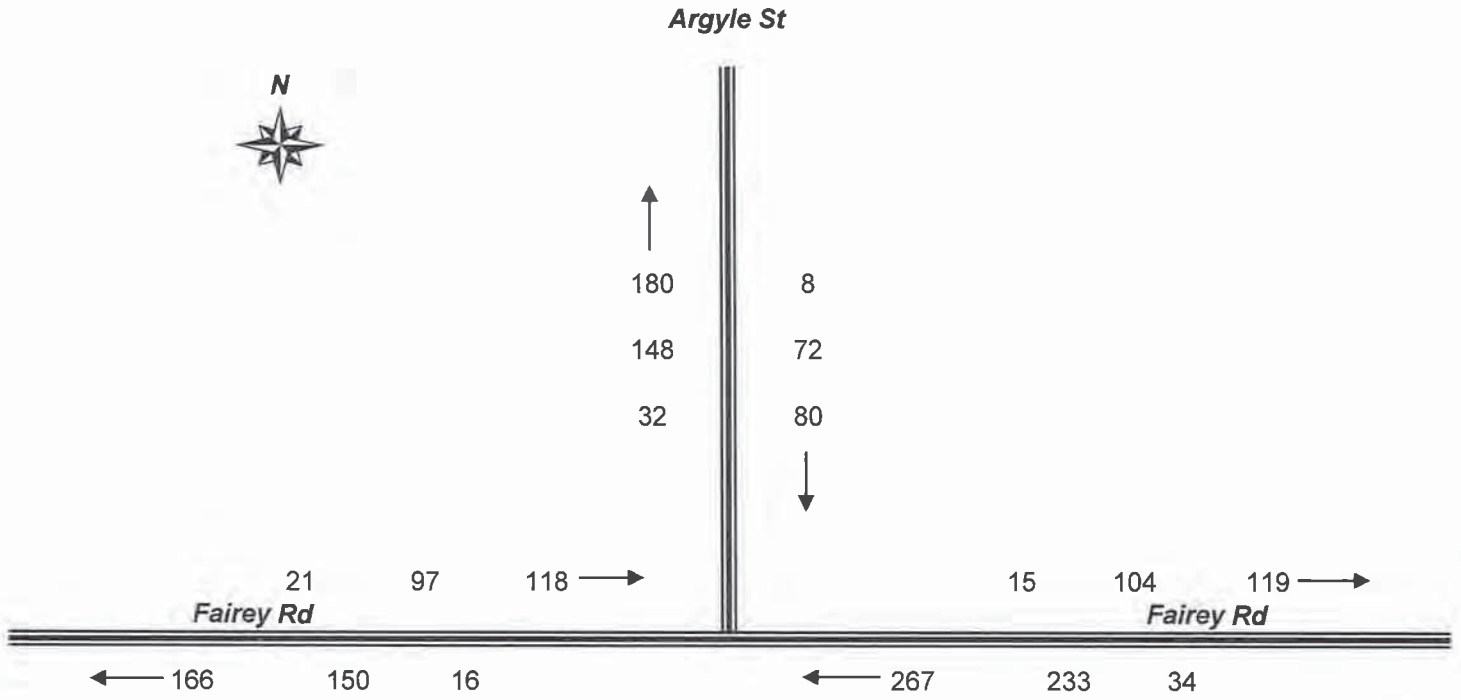
TRAFFIC COUNTS

R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.88196847, Mob. 0418 239019

Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

AM

TOTAL VOLUMES FOR COUNT PERIOD



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob. 0418 239019

Client : TUPA

Job No/Name : 6857 SOUTH WINDSOR Trafic Counts

Day/Date : Wednesday 25th uly 2018

Lights

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	8	4	2	5	8	10	37
0715 - 0730	10	6	4	7	9	16	52
0730 - 0745	3	1	3	7	12	15	41
0745 - 0800	10	2	6	10	12	22	62
0800 - 0815	6	0	5	1	20	16	48
0815 - 0830	6	7	6	2	16	13	50
0830 - 0845	9	5	4	6	18	11	53
0845 - 0900	11	9	1	3	19	16	59
Per End	63	34	31	41	114	119	402

Heavies

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	1	1	0	1	2	1	6
0715 - 0730	2	0	1	0	5	1	9
0730 - 0745	2	1	0	0	3	0	6
0745 - 0800	2	2	0	0	5	3	12
0800 - 0815	1	1	1	0	2	1	6
0815 - 0830	1	3	1	1	2	1	9
0830 - 0845	2	1	0	1	1	3	8
0845 - 0900	0	1	1	1	2	2	7
Per End	11	10	4	4	22	12	63

Combined

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Time Per	T	L	R	L	R	T	TOT
0700 - 0715	9	5	2	6	10	11	43
0715 - 0730	12	6	5	7	14	17	61
0730 - 0745	5	2	3	7	15	15	47
0745 - 0800	12	4	6	10	17	25	74
0800 - 0815	7	1	6	1	22	17	54
0815 - 0830	7	10	7	3	18	14	59
0830 - 0845	11	6	4	7	19	14	61
0845 - 0900	11	10	2	4	21	18	66
Per End	74	44	35	45	136	131	465

Lights

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	31	13	15	29	41	63	192
0715 - 0815	29	9	18	25	53	69	203
0730 - 0830	25	10	20	20	60	66	201
0745 - 0845	31	14	21	19	66	62	213
0800 - 0900	32	21	16	12	73	56	210
PEAK HR	31	14	21	19	66	62	213

Heavies

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	7	4	1	1	15	5	33
0715 - 0815	7	4	2	0	15	5	33
0730 - 0830	6	7	2	1	12	5	33
0745 - 0845	6	7	2	2	10	8	35
0800 - 0900	4	6	3	3	7	7	30
PEAK HR	6	7	2	2	10	8	35

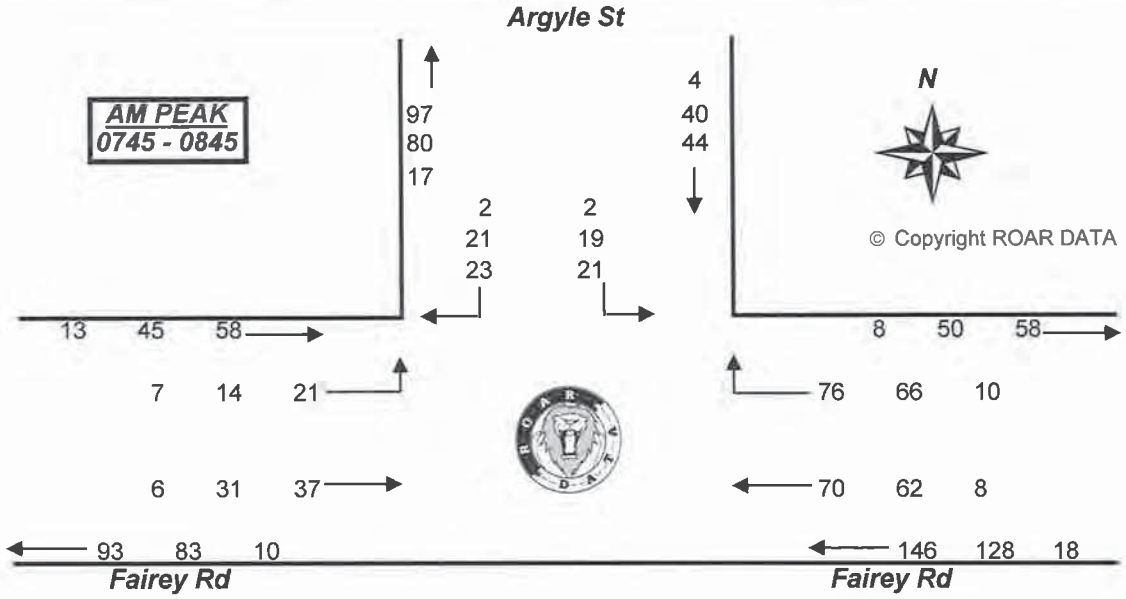
Combined

	WEST		NORTH		EAST		
	Fairey Rd		Argyle St		Fairey Rd		
Peak Per	T	L	R	L	R	T	TOT
0700 - 0800	38	17	16	30	56	68	225
0715 - 0815	36	13	20	25	68	74	236
0730 - 0830	31	17	22	21	72	71	234
0745 - 0845	37	21	23	21	76	70	248
0800 - 0900	36	27	19	15	80	63	240
PEAK HR	37	21	23	21	76	70	248

Peds

	WEST	NORTH	EAST	
Time Per	Fairey Rd	Argyle St	Fairey Rd	TOT
0700 - 0715				0
0715 - 0730		NOT		0
0730 - 0745		REQUIRED		0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
Per End	0	0	0	0

	WEST	NORTH	EAST	
Peak Per	Fairey Rd	Argyle St	Fairey Rd	TOT
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
PEAK HR	0	0	0	0



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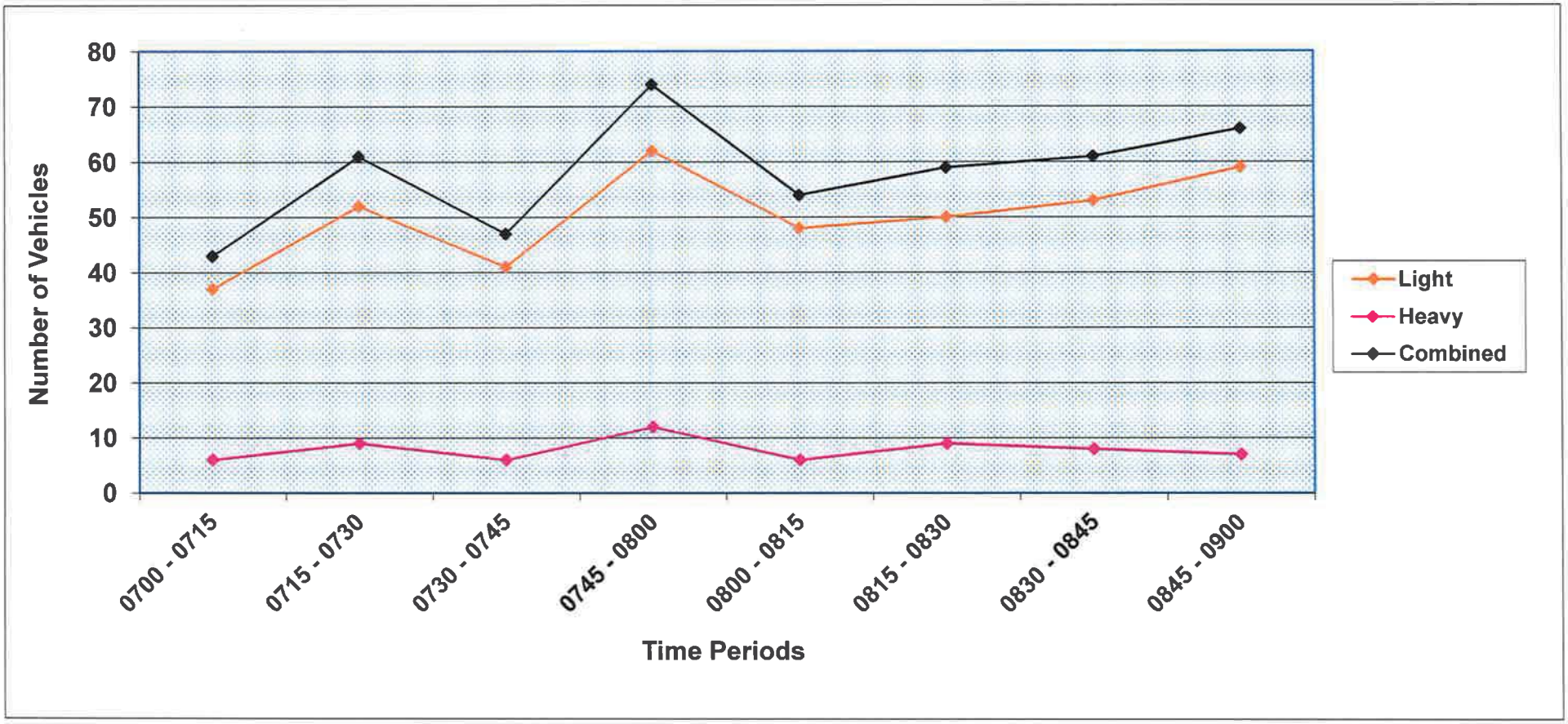
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

AM
Fairey Rd & Argyle St



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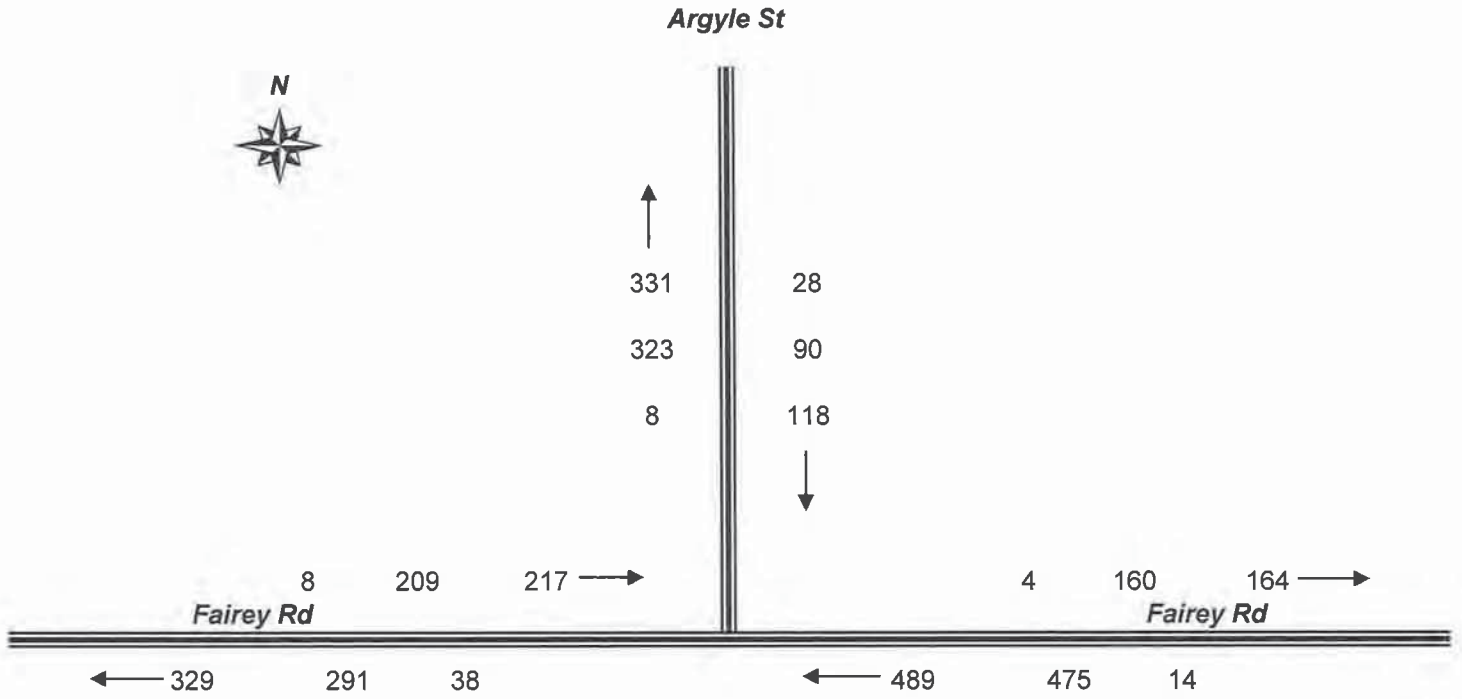
Ph.88196847, Mob. 0418 239019

Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

PM

TOTAL VOLUMES FOR COUNT PERIOD



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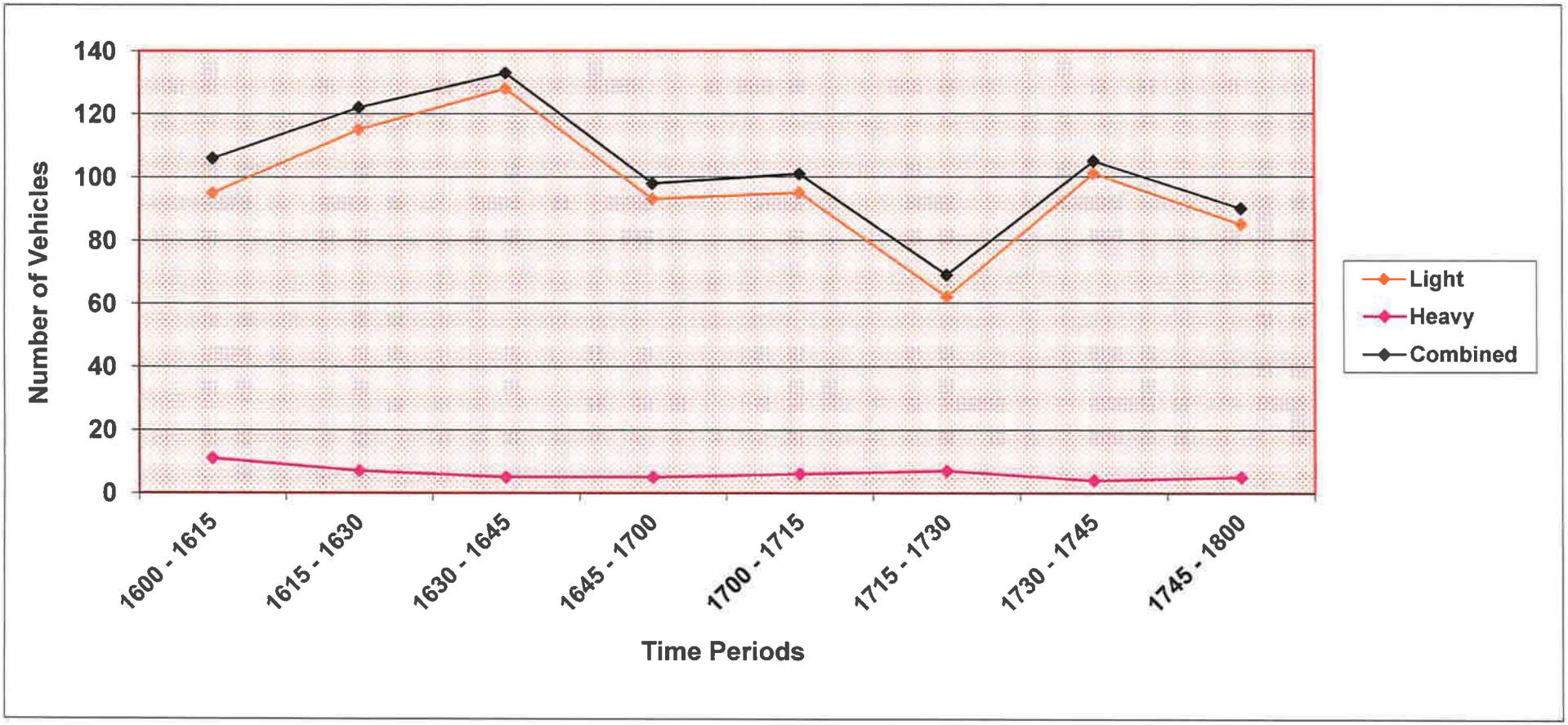
Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

PM
Fairey Rd & Argyle St



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob. 0418 239019

Client : TUPA

Job No/Name : 6857 SOUTH WINDSOR Trafic Counts

Day/Date : Wednesday 25th uly 2018

Lights

Time Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1615	16	25	7	10	21	16	95
1615 - 1630	15	11	2	2	40	45	115
1630 - 1645	13	18	4	11	41	41	128
1645 - 1700	11	11	6	5	31	29	93
1700 - 1715	8	19	5	7	23	33	95
1715 - 1730	10	8	3	3	16	22	62
1730 - 1745	15	6	1	11	22	46	101
1745 - 1800	13	10	3	10	21	28	85
Per End	**101**	**108**	**31**	**59**	**215**	**260**	**774**

Heavies

Time Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1615	1	0	3	0	2	5	11
1615 - 1630	0	0	4	0	1	2	7
1630 - 1645	1	0	3	0	0	1	5
1645 - 1700	0	1	3	0	0	1	5
1700 - 1715	1	1	2	1	0	1	6
1715 - 1730	0	1	5	0	0	1	7
1730 - 1745	0	1	3	0	0	0	4
1745 - 1800	0	1	4	0	0	0	5
Per End	**3**	**5**	**27**	**1**	**3**	**11**	**50**

Combined

Time Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1615	17	25	10	10	23	21	106
1615 - 1630	15	11	6	2	41	47	122
1630 - 1645	14	18	7	11	41	42	133
1645 - 1700	11	12	9	5	31	30	98
1700 - 1715	9	20	7	8	23	34	101
1715 - 1730	10	9	8	3	16	23	69
1730 - 1745	15	7	4	11	22	46	105
1745 - 1800	13	11	7	10	21	28	90
Per End	**104**	**113**	**58**	**60**	**218**	**271**	**824**

Lights

Peak Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1700	55	65	19	28	133	131	431
1615 - 1715	47	59	17	25	135	148	431
1630 - 1730	42	56	18	26	111	125	378
1645 - 1745	44	44	15	26	92	130	351
1700 - 1800	46	43	12	31	82	129	343
PEAK HR	**55**	**65**	**19**	**28**	**133**	**131**	**431**

Heavies

Peak Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1700	2	1	13	0	3	9	28
1615 - 1715	2	2	12	1	1	5	23
1630 - 1730	2	3	13	1	0	4	23
1645 - 1745	1	4	13	1	0	3	22
1700 - 1800	1	4	14	1	0	2	22
PEAK HR	**2**	**1**	**13**	**0**	**3**	**9**	**28**

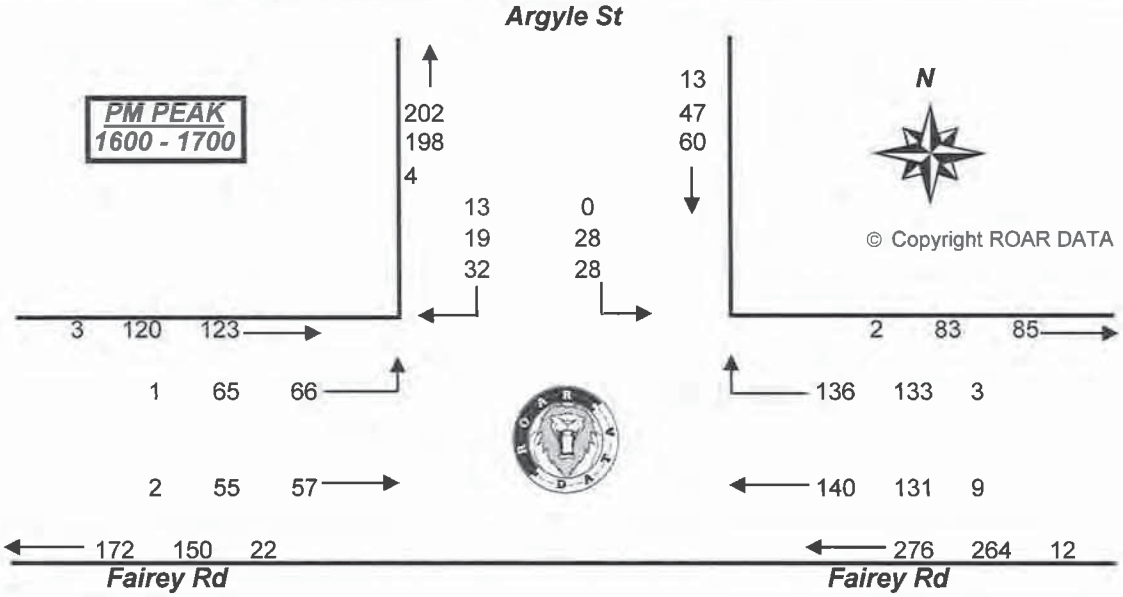
Combined

Peak Per	WEST Fairey Rd T	WEST Fairey Rd L	NORTH Argyle St R	NORTH Argyle St L	EAST Fairey Rd R	EAST Fairey Rd T	TOT
1600 - 1700	57	66	32	28	136	140	459
1615 - 1715	49	61	29	26	136	153	454
1630 - 1730	44	59	31	27	111	129	401
1645 - 1745	45	48	28	27	92	133	373
1700 - 1800	47	47	26	32	82	131	365
PEAK HR	**57**	**66**	**32**	**28**	**136**	**140**	**459**

Peds

Time Per	WEST Fairey Rd	NORTH Argyle St	EAST Fairey Rd	TOT
1600 - 1615				0
1615 - 1630		NOT		0
1630 - 1645		REQUIRED		0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
Per End	**0**	**0**	**0**	**0**

Peak Per	WEST Fairey Rd	NORTH Argyle St	EAST Fairey Rd	TOT
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0
PEAK HR	**0**	**0**	**0**	**0**



R.O.A.R DATA

Reliable, Original & Authentic Results

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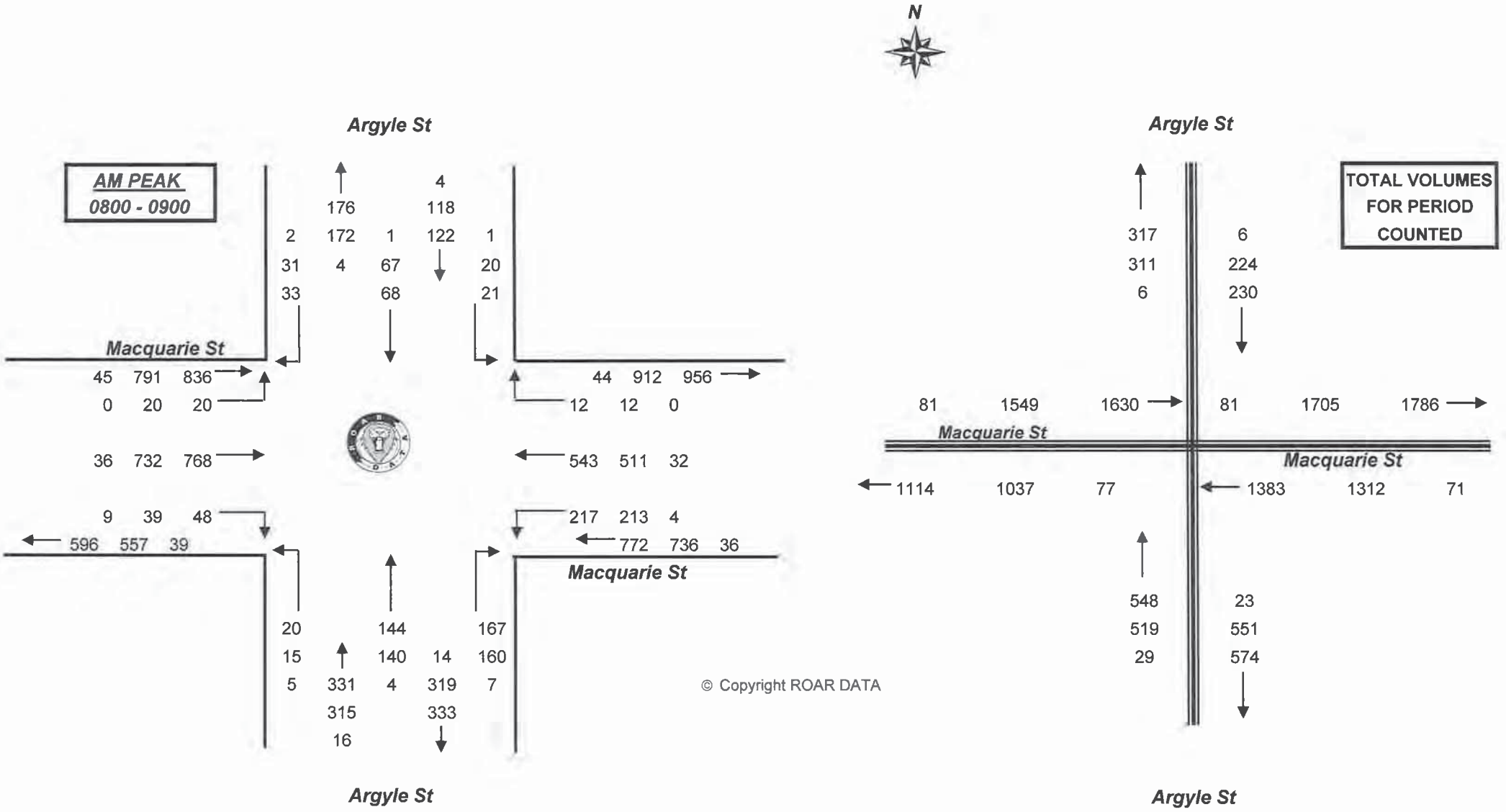
Client : TUPA

Job No/Name : 6857 SOUTH WINDSOR Trafic Counts

Day/Date : Wednesday 25th uly 2018



LANE LEVEL OF SERVICE

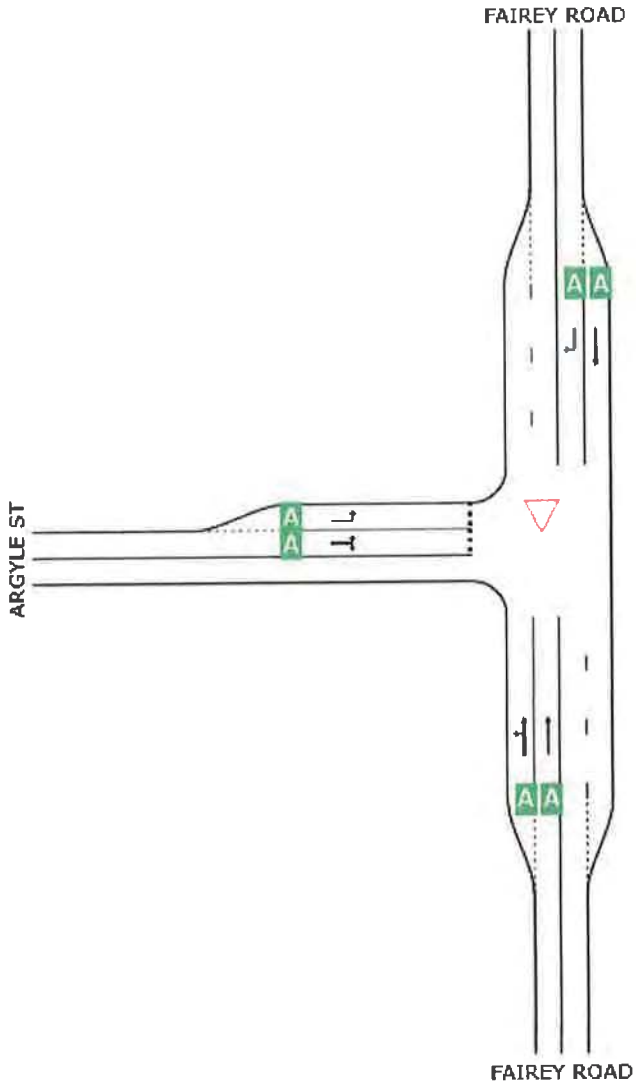
Lane Level of Service

▽ Site: 1 [New Site - 1]

FAIREY RD AM PEAK
Giveway / Yield (Two-Way)

All Movement Classes

	South	North	West	Intersection
LOS	NA	NA	A	NA



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Organisation: TRANSPORT AND URBAN PLANNING PTY LTD | Processed: Monday, 20 August 2018 10:36:34 AM
Project: Not Saved

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob. 0418 239019

Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

Lights

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	3	16	6	20	158	9	3	26	23	28	82	2	**376**
0715 - 0730	4	14	6	21	147	6	5	20	14	43	118	0	**398**
0730 - 0745	3	15	4	3	169	7	3	12	28	32	115	2	**393**
0745 - 0800	3	21	11	6	200	12	6	23	41	29	121	4	**477**
0800 - 0815	4	14	6	2	187	12	2	23	28	64	139	2	**483**
0815 - 0830	7	20	7	3	181	7	2	41	45	64	122	3	**502**
0830 - 0845	8	17	7	6	162	4	2	39	48	55	115	2	**465**
0845 - 0900	1	16	11	9	202	16	9	37	39	30	135	5	**510**
Period End	**33**	**133**	**58**	**70**	**1406**	**73**	**32**	**221**	**266**	**345**	**947**	**20**	**3604**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	0	0	0	0	10	5	1	1	1	0	6	0	**24**
0715 - 0730	0	0	1	0	6	0	3	0	4	1	10	0	**25**
0730 - 0745	0	0	0	0	6	0	0	1	2	0	8	0	**17**
0745 - 0800	0	0	1	0	8	1	0	0	0	2	8	0	**20**
0800 - 0815	0	0	0	0	7	3	1	1	1	0	7	0	**20**
0815 - 0830	0	1	0	0	7	2	1	2	2	3	7	0	**25**
0830 - 0845	1	0	1	0	15	2	1	1	1	0	9	0	**31**
0845 - 0900	0	0	1	0	7	2	2	0	3	1	9	0	**25**
Period End	**1**	**1**	**4**	**0**	**66**	**15**	**9**	**6**	**14**	**7**	**64**	**0**	**187**

Lights

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	13	66	27	50	674	34	17	81	106	132	436	8	**1644**
0715 - 0815	14	64	27	32	703	37	16	78	111	168	493	8	**1751**
0730 - 0830	17	70	28	14	737	38	13	99	142	189	497	11	**1855**
0745 - 0845	22	72	31	17	730	35	12	126	162	212	497	11	**1927**
0800 - 0900	20	67	31	20	732	39	15	140	160	213	511	12	**1960**
PEAK HOUR	20	67	31	20	732	39	15	140	160	213	511	12	**1960**

Heavies

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	0	0	2	0	30	6	4	2	7	3	32	0	**86**
0715 - 0815	0	0	2	0	27	4	4	2	7	3	33	0	**82**
0730 - 0830	0	1	1	0	28	6	2	4	5	5	30	0	**82**
0745 - 0845	1	1	2	0	37	8	3	4	4	5	31	0	**96**
0800 - 0900	1	1	2	0	36	9	5	4	7	4	32	0	**101**
PEAK HOUR	1	1	2	0	36	9	5	4	7	4	32	0	**101**

Combined

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	3	16	6	20	168	14	4	27	24	28	88	2	**400**
0715 - 0730	4	14	7	21	153	6	8	20	18	44	128	0	**423**
0730 - 0745	3	15	4	3	175	7	3	13	30	32	123	2	**410**
0745 - 0800	3	21	12	6	208	13	6	23	41	31	129	4	**497**
0800 - 0815	4	14	6	2	194	15	3	24	29	64	146	2	**503**
0815 - 0830	7	21	7	3	188	9	3	43	47	67	129	3	**527**
0830 - 0845	9	17	8	6	177	6	3	40	49	55	124	2	**496**
0845 - 0900	1	16	12	9	209	18	11	37	42	31	144	5	**535**
Period End	**34**	**134**	**62**	**70**	**1472**	**88**	**41**	**227**	**280**	**352**	**1011**	**20**	**3791**

Peds

	NORTH	WEST	SOUTH	EAST	
	Argyle St	*Macquarie St*	*Argyle St*	*Macquarie St*	
Time Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0715					**0**
0715 - 0730		*NOT*	*REQUIRED*		**0**
0730 - 0745					**0**
0745 - 0800					**0**
0800 - 0815					**0**
0815 - 0830					**0**
0830 - 0845					**0**
0845 - 0900					**0**
Period End	**0**	**0**	**0**	**0**	**0**

Combined

	NORTH			WEST			SOUTH			EAST			
	Argyle St			*Macquarie St*			*Argyle St*			*Macquarie St*			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	13	66	29	50	704	40	21	83	113	135	468	8	**1730**
0715 - 0815	14	64	29	32	730	41	20	80	118	171	526	8	**1833**
0730 - 0830	17	71	29	14	765	44	15	103	147	194	527	11	**1937**
0745 - 0845	23	73	33	17	767	43	15	130	166	217	528	11	**2023**
0800 - 0900	21	68	33	20	768	48	20	144	167	217	543	12	**2061**
PEAK HOUR	21	68	33	20	768	48	20	144	167	217	543	12	**2061**

Peds

	NORTH	WEST	SOUTH	EAST	
	Argyle St	*Macquarie St*	*Argyle St*	*Macquarie St*	
Peak Per	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	TOT
0700 - 0800	0	0	0	0	**0**
0715 - 0815	0	0	0	0	**0**
0730 - 0830	0	0	0	0	**0**
0745 - 0845	0	0	0	0	**0**
0800 - 0900	0	0	0	0	**0**
PEAK HR	0	0	0	0	**0**

R.O.A.R DATA
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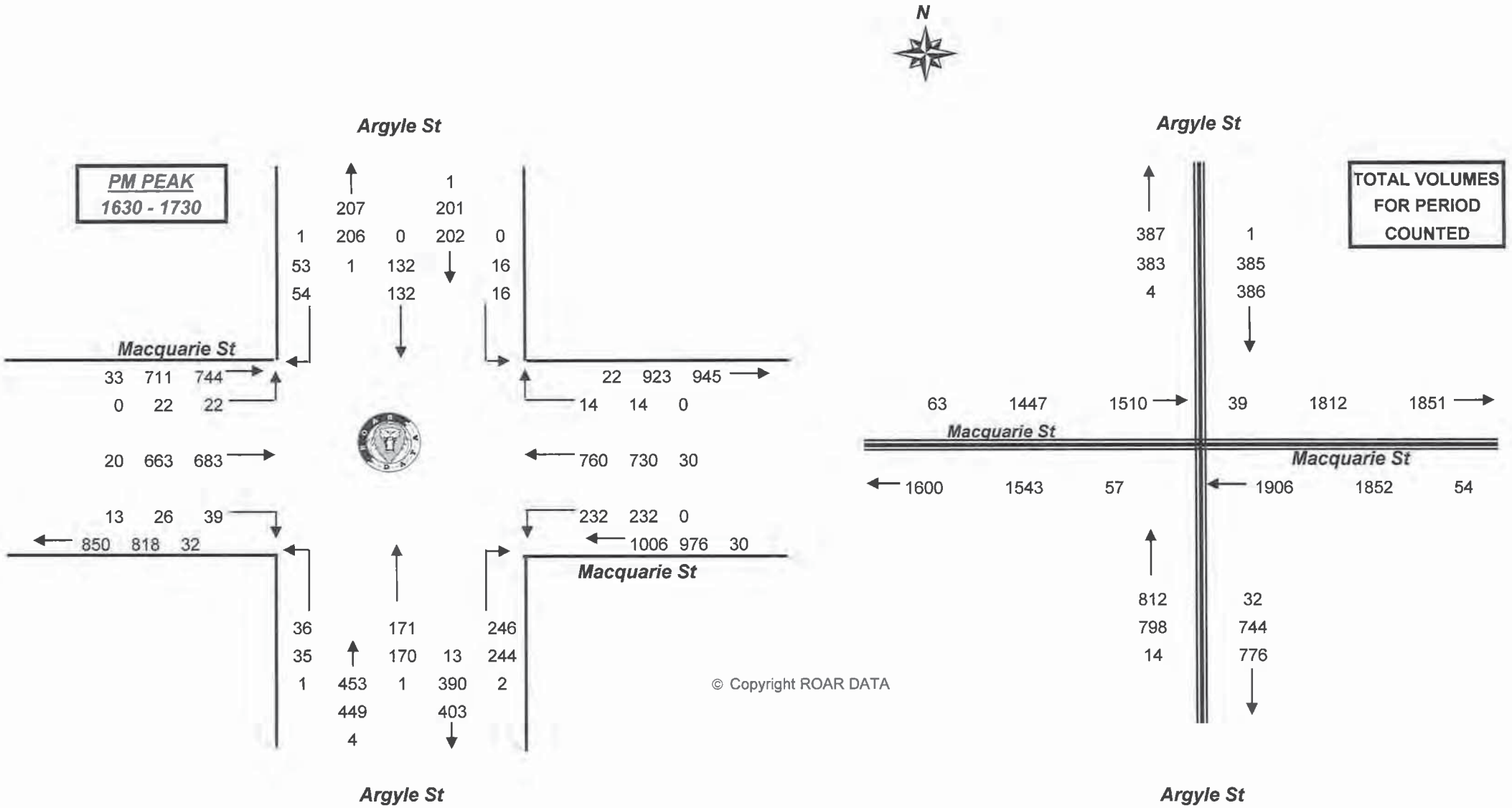
Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Mob. 0418 239019

Client : TUPA
Job No/Name : 6857 SOUTH WINDSOR Trafic Counts
Day/Date : Wednesday 25th uly 2018

Lights

Time Per	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1615	2	39	8	7	143	6	5	57	53	45	149	3	517
1615 - 1630	4	26	9	5	172	6	6	38	52	61	180	3	562
1630 - 1645	6	31	10	6	174	4	6	61	61	48	155	5	567
1645 - 1700	5	35	13	7	160	9	7	39	46	52	171	5	549
1700 - 1715	2	35	17	7	175	7	12	38	57	55	199	4	608
1715 - 1730	3	31	13	2	154	6	10	32	80	77	205	0	613
1730 - 1745	2	26	10	6	188	6	3	25	48	52	167	7	540
1745 - 1800	8	35	15	5	185	7	11	19	32	45	162	2	526
Period End	**32**	**258**	**95**	**45**	**1351**	**51**	**60**	**309**	**429**	**435**	**1388**	**29**	**4482**

Heavies

Time Per	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1615	0	0	0	0	5	5	0	1	1	1	5	0	18
1615 - 1630	0	0	0	0	5	6	2	0	2	0	4	0	19
1630 - 1645	0	0	0	0	7	4	0	0	0	0	6	0	17
1645 - 1700	0	0	0	0	3	3	1	0	1	0	9	0	17
1700 - 1715	0	0	0	0	7	1	0	1	0	0	8	0	17
1715 - 1730	0	0	1	0	3	5	0	0	1	0	7	0	17
1730 - 1745	0	0	0	0	0	3	0	1	0	0	4	0	8
1745 - 1800	0	0	0	0	2	4	0	1	2	0	10	0	19
Period End	**0**	**0**	**1**	**0**	**32**	**31**	**3**	**4**	**7**	**1**	**53**	**0**	**132**

Lights

Peak Time	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1700	17	131	40	25	649	25	24	195	212	206	655	16	2195
1615 - 1715	17	127	49	25	681	26	31	176	216	216	705	17	2286
1630 - 1730	16	132	53	22	663	26	35	170	244	232	730	14	2337
1645 - 1745	12	127	53	22	677	28	32	134	231	236	742	16	2310
1700 - 1800	15	127	55	20	702	26	36	114	217	229	733	13	2287
PEAK HOUR	**16**	**132**	**53**	**22**	**663**	**26**	**35**	**170**	**244**	**232**	**730**	**14**	**2337**

Heavies

Peak Time	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1700	0	0	0	0	20	18	3	1	4	1	24	0	71
1615 - 1715	0	0	0	0	22	14	3	1	3	0	27	0	70
1630 - 1730	0	0	1	0	20	13	1	1	2	0	30	0	68
1645 - 1745	0	0	1	0	13	12	1	2	2	0	28	0	59
1700 - 1800	0	0	1	0	12	13	0	3	3	0	29	0	61
PEAK HOUR	**0**	**0**	**1**	**0**	**20**	**13**	**1**	**1**	**2**	**0**	**30**	**0**	**68**

Combined

Time Per	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1615	2	39	8	7	148	11	5	58	54	46	154	3	535
1615 - 1630	4	26	9	5	177	12	8	38	54	61	184	3	581
1630 - 1645	6	31	10	6	181	8	6	61	61	48	161	5	584
1645 - 1700	5	35	13	7	163	12	8	39	47	52	180	5	566
1700 - 1715	2	35	17	7	182	8	12	39	57	55	207	4	625
1715 - 1730	3	31	14	2	157	11	10	32	81	77	212	0	630
1730 - 1745	2	26	10	6	188	9	3	26	48	52	171	7	548
1745 - 1800	8	35	15	5	187	11	11	20	34	45	172	2	545
Period End	**32**	**258**	**96**	**45**	**1383**	**82**	**63**	**313**	**436**	**436**	**1441**	**29**	**4614**

Peds

Time Per	NORTH Argyle St UNCLASSIFIED	WEST Macquarie St UNCLASSIFIED	SOUTH Argyle St UNCLASSIFIED	EAST Macquarie St UNCLASSIFIED	TOT
1600 - 1615					0
1615 - 1630		*NOT*	*REQUIRED*		0
1630 - 1645					0
1645 - 1700					0
1700 - 1715					0
1715 - 1730					0
1730 - 1745					0
1745 - 1800					0
Period End	**0**	**0**	**0**	**0**	**0**

Combined

Peak Time	NORTH Argyle St L	NORTH Argyle St T	NORTH Argyle St R	WEST Macquarie St L	WEST Macquarie St T	WEST Macquarie St R	SOUTH Argyle St L	SOUTH Argyle St T	SOUTH Argyle St R	EAST Macquarie St L	EAST Macquarie St T	EAST Macquarie St R	TOT
1600 - 1700	17	131	40	25	669	43	27	196	216	207	679	16	2266
1615 - 1715	17	127	49	25	703	40	34	177	219	216	732	17	2356
1630 - 1730	16	132	54	22	683	39	36	171	246	232	760	14	2405
1645 - 1745	12	127	54	22	690	40	33	136	233	236	770	16	2369
1700 - 1800	15	127	56	20	714	39	36	117	220	229	762	13	2348
PEAK HOUR	**16**	**132**	**54**	**22**	**683**	**39**	**36**	**171**	**246**	**232**	**760**	**14**	**2405**

Peds

Peak Per	NORTH Argyle St UNCLASSIFIED	WEST Macquarie St UNCLASSIFIED	SOUTH Argyle St UNCLASSIFIED	EAST Macquarie St UNCLASSIFIED	TOT
1600 - 1700	0	0	0	0	0
1615 - 1715	0	0	0	0	0
1630 - 1730	0	0	0	0	0
1645 - 1745	0	0	0	0	0
1700 - 1800	0	0	0	0	0
PEAK HR	**0**	**0**	**0**	**0**	**0**

APPENDIX 2

SIDRA SUMMARY

MOVEMENT SUMMARY

Site: 1 [New Site - 1]

FAIREY RD AM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: FAIREY ROAD											
1	L2	22	33.3	0.015	5.9	LOS A	0.0	0.0	0.00	0.57	52.2
2	T1	39	16.2	0.022	1.2	LOS A	0.0	0.0	0.00	0.20	59.4
Approach		61	22.4	0.022	2.9	NA	0.0	0.0	0.00	0.33	56.6
North: FAIREY ROAD											
8	T1	82	10.3	0.045	1.1	LOS A	0.0	0.0	0.00	0.20	59.4
9	R2	80	13.2	0.063	6.0	LOS A	0.3	2.0	0.17	0.54	49.3
Approach		162	11.7	0.063	3.5	NA	0.3	2.0	0.08	0.37	53.9
West: ARGYLE ST											
10	L2	22	9.5	0.036	5.8	LOS A	0.1	1.0	0.16	0.56	49.3
12	R2	24	8.7	0.036	6.8	LOS A	0.1	1.0	0.19	0.57	49.0
Approach		46	9.1	0.036	6.3	LOS A	0.1	1.0	0.17	0.56	49.2
All Vehicles		269	13.7	0.063	3.9	NA	0.3	2.0	0.08	0.39	53.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD AM PEAK
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: FAIREY ROAD													
Lane 1	22	33.3	1501	0.015	67[5]	5.9	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	39	16.2	1764	0.022	100	1.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	61	22.4		0.022		2.9	NA	0.0	0.0				
North: FAIREY ROAD													
Lane 1	82	10.3	1828	0.045	100	1.1	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	80	13.2	1264	0.063	100	6.0	LOS A	0.3	2.0	Full	500	0.0	0.0
Approach	162	11.7		0.063		3.5	NA	0.3	2.0				
West: ARGYLE ST													
Lane 1	10	9.5	1314	0.007	20[6]	5.8	LOS A	0.0	0.2	Short	10	0.0	NA
Lane 2	37	9.0	1011	0.036	100	6.5	LOS A	0.1	1.0	Full	500	0.0	0.0
Approach	46	9.1		0.036		6.3	LOS A	0.1	1.0				
Intersection	269	13.7		0.063		3.9	NA	0.3	2.0				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

LANE LEVEL OF SERVICE

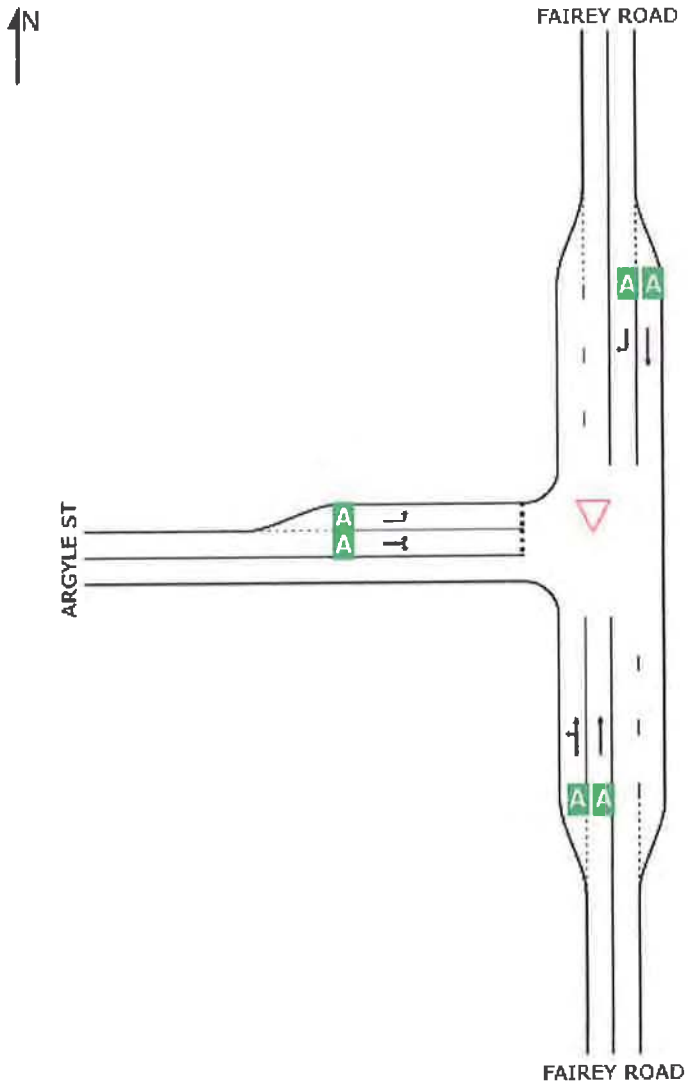
Lane Level of Service

▽ Site: 1 [New Site - 1]

FAIREY RD AM PEAK POST DA
Giveway / Yield (Two-Way)

All Movement Classes

	South	North	West	Intersection
LOS	NA	NA	A	NA



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Organisation: TRANSPORT AND URBAN PLANNING PTY LTD | Processed: Monday, 20 August 2018 10:44:04 AM
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MOVEMENT SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD AM PEAK POST DA
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: FAIREY ROAD											
1	L2	43	41.5	0.030	6.0	LOS A	0.0	0.0	0.00	0.57	51.9
2	T1	43	14.6	0.024	1.2	LOS A	0.0	0.0	0.00	0.20	59.4
Approach		86	28.0	0.030	3.6	NA	0.0	0.0	0.00	0.38	55.4
North: FAIREY ROAD											
8	T1	87	9.6	0.048	1.1	LOS A	0.0	0.0	0.00	0.20	59.4
9	R2	80	13.2	0.065	6.1	LOS A	0.3	2.1	0.21	0.55	49.1
Approach		167	11.3	0.065	3.5	NA	0.3	2.1	0.10	0.36	54.0
West: ARGYLE ST											
10	L2	22	9.5	0.062	5.9	LOS A	0.2	1.9	0.19	0.56	49.2
12	R2	45	27.9	0.062	7.5	LOS A	0.2	1.9	0.31	0.60	48.3
Approach		67	21.9	0.062	6.9	LOS A	0.2	1.9	0.27	0.59	48.6
All Vehicles		321	18.0	0.065	4.3	NA	0.3	2.1	0.11	0.42	53.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD AM PEAK POST DA
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: FAIREY ROAD													
Lane 1	43	41.5	1433	0.030	100	6.0	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	43	14.6	1781	0.024	81[5]	1.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	86	28.0		0.030		3.6	NA	0.0	0.0				
North: FAIREY ROAD													
Lane 1	87	9.6	1835	0.048	100	1.1	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	80	13.2	1226	0.065	100	6.1	LOS A	0.3	2.1	Full	500	0.0	0.0
Approach	167	11.3		0.065		3.5	NA	0.3	2.1				
West: ARGYLE ST													
Lane 1	16	9.5	1296	0.012	20[6]	5.9	LOS A	0.0	0.3	Short	10	0.0	NA
Lane 2	51	25.8	824	0.062	100	7.3	LOS A	0.2	1.9	Full	500	0.0	0.0
Approach	67	21.9		0.062		6.9	LOS A	0.2	1.9				
Intersection	321	18.0		0.065		4.3	NA	0.3	2.1				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

LANE LEVEL OF SERVICE

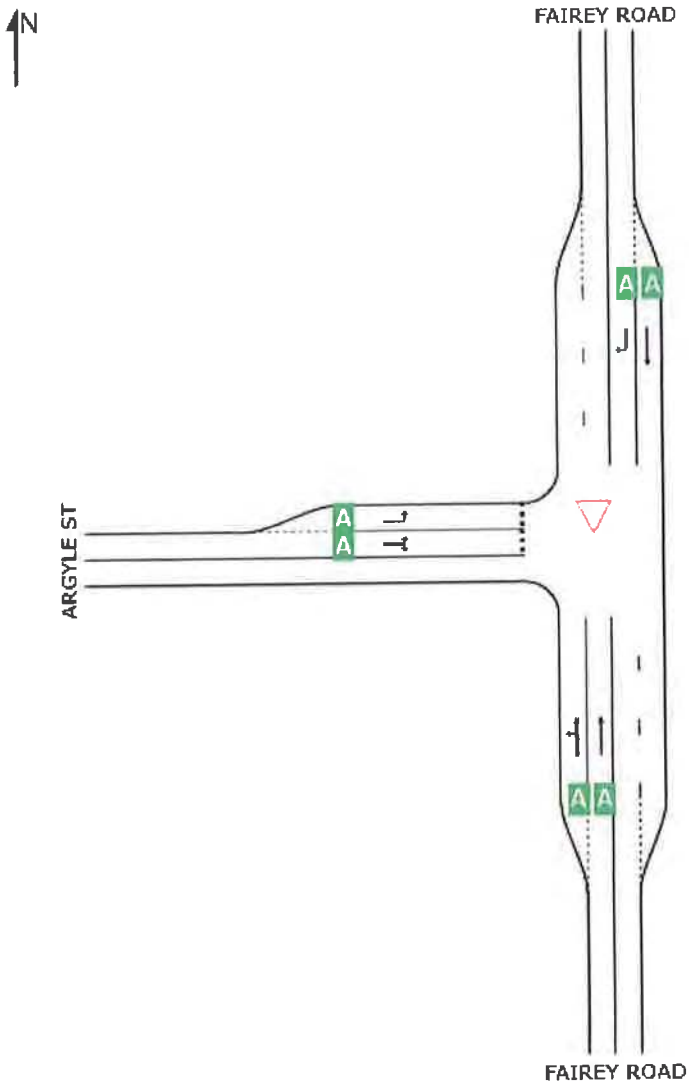
Lane Level of Service

Site: 1 [New Site - 1]

FAIREY RD PM PEAK
Giveway / Yield (Two-Way)

All Movement Classes

	South	North	West	Intersection
LOS	NA	NA	A	NA



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: Not Saved

MOVEMENT SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD PM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: FAIREY ROAD											
1	L2	69	1.5	0.038	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
2	T1	60	3.5	0.031	1.1	LOS A	0.0	0.0	0.00	0.20	59.5
Approach		129	2.4	0.038	3.5	NA	0.0	0.0	0.00	0.40	56.1
North: FAIREY ROAD											
8	T1	147	6.4	0.079	1.1	LOS A	0.0	0.0	0.00	0.20	59.4
9	R2	143	2.2	0.114	6.1	LOS A	0.5	3.4	0.25	0.56	49.2
Approach		291	4.3	0.114	3.6	NA	0.5	3.4	0.12	0.38	53.9
West: ARGYLE ST											
10	L2	29	0.0	0.065	5.8	LOS A	0.2	2.0	0.23	0.57	49.0
12	R2	34	40.6	0.065	9.2	LOS A	0.2	2.0	0.33	0.61	47.5
Approach		63	21.7	0.065	7.6	LOS A	0.2	2.0	0.28	0.59	48.2
All Vehicles		483	6.1	0.114	4.1	NA	0.5	3.4	0.11	0.41	53.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD PM PEAK
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: FAIREY ROAD													
Lane 1	69	1.5	1837	0.038	100	5.6	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	60	3.5	1907	0.031	83[5]	1.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	129	2.4		0.038		3.5	NA	0.0	0.0				
North: FAIREY ROAD													
Lane 1	147	6.4	1872	0.079	100	1.1	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	143	2.2	1259	0.114	100	6.1	LOS A	0.5	3.4	Full	500	0.0	0.0
Approach	291	4.3		0.114		3.6	NA	0.5	3.4				
West: ARGYLE ST													
Lane 1	17	0.0	1335	0.013	20[6]	5.8	LOS A	0.0	0.3	Short	10	0.0	NA
Lane 2	46	29.9	705	0.065	100	8.3	LOS A	0.2	2.0	Full	500	0.0	0.0
Approach	63	21.7		0.065		7.6	LOS A	0.2	2.0				
Intersection	483	6.1		0.114		4.1	NA	0.5	3.4				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

LANE LEVEL OF SERVICE

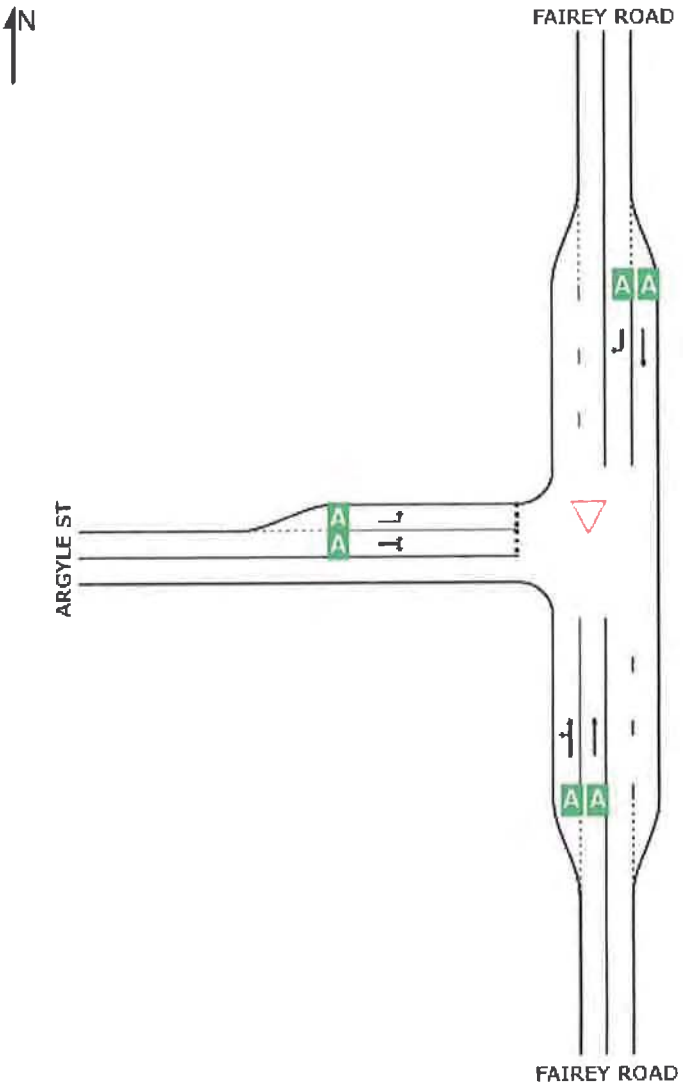
Lane Level of Service

Site: 1 [New Site - 1]

FAIREY RD PM PEAK POST DA
Giveway / Yield (Two-Way)

All Movement Classes

	South	North	West	Intersection
LOS	NA	NA	A	NA



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Organisation: TRANSPORT AND URBAN PLANNING PTY LTD | Processed: Monday, 20 August 2018 10:52:36 AM
Project: Not Saved

MOVEMENT SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD PM PEAK POST DA
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: FAIREY ROAD											
1	L2	91	12.8	0.053	5.7	LOS A	0.0	0.0	0.00	0.57	53.1
2	T1	65	3.2	0.034	1.1	LOS A	0.0	0.0	0.00	0.20	59.5
Approach		156	8.8	0.053	3.8	NA	0.0	0.0	0.00	0.42	55.6
North: FAIREY ROAD											
8	T1	163	9.0	0.089	1.1	LOS A	0.0	0.0	0.00	0.20	59.4
9	R2	143	2.2	0.117	6.3	LOS A	0.5	3.5	0.28	0.57	49.1
Approach		306	5.8	0.117	3.5	NA	0.5	3.5	0.13	0.37	54.1
West: ARGYLE ST											
10	L2	29	0.0	0.100	5.9	LOS A	0.4	3.4	0.21	0.56	49.2
12	R2	55	44.2	0.100	9.9	LOS A	0.4	3.4	0.47	0.71	46.6
Approach		84	28.8	0.100	8.5	LOS A	0.4	3.4	0.38	0.66	47.5
All Vehicles		546	10.2	0.117	4.4	NA	0.5	3.5	0.13	0.43	53.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

▽ Site: 1 [New Site - 1]

FAIREY RD PM PEAK POST DA
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block %
South: FAIREY ROAD													
Lane 1	91	12.8	1702	0.053	100	5.7	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	65	3.2	1910	0.034	64[5]	1.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	156	8.8		0.053		3.8	NA	0.0	0.0				
North: FAIREY ROAD													
Lane 1	163	9.0	1842	0.089	100	1.1	LOS A	0.0	0.0	Short	10	0.0	NA
Lane 2	143	2.2	1220	0.117	100	6.3	LOS A	0.5	3.5	Full	500	0.0	0.0
Approach	306	5.8		0.117		3.5	NA	0.5	3.5				
West: ARGYLE ST													
Lane 1	26	0.0	1316	0.020	20[6]	5.9	LOS A	0.1	0.5	Short	10	0.0	NA
Lane 2	58	41.9	576	0.100	100	9.7	LOS A	0.4	3.4	Full	500	0.0	0.0
Approach	84	28.8		0.100		8.5	LOS A	0.4	3.4				
Intersection	546	10.2		0.117		4.4	NA	0.5	3.5				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects

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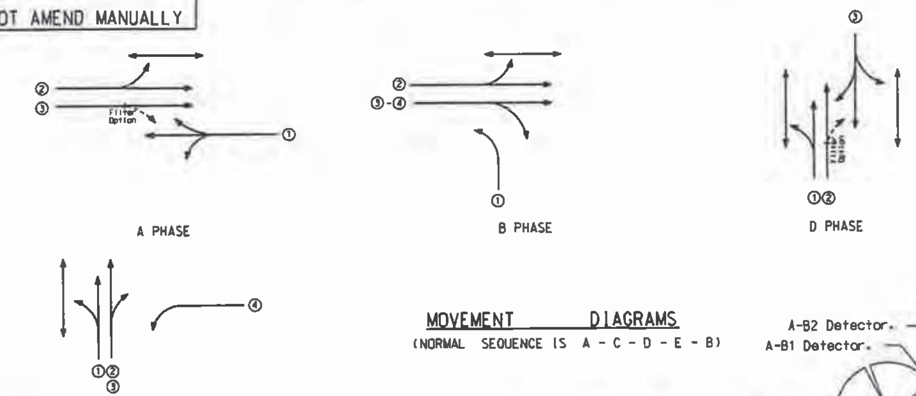
DRAWN BY CADD
DO NOT AMEND MANUALLY



MOVEMENT DIAGRAMS
(NORMAL SEQUENCE IS A - C - D - E - B)

DETECTOR SPECIFICATION

Detector	Specifications				
A	FN	A(L)	A(E3)		
	SG/PS	A	A		
	DS	–	–		
A-B1 Depart. & Approach	FN	B(PR)	B(E3)		
	SG/PS	A	B		
	DS	–	A(NEXT)		
A-B1 Approach	FN	A(L).B(L)	A(E1)		B(E1)
	SG/PS	A/B	A		B
	DS	–	A-B1(PR).B(NEXT)		A(NEXT)
A-B2	FN	A(L)	A(E2)	B(E2)	
	SG/PS	A/B	A	B	
	DS	–	B(NEXT)	A(NEXT)	
C-D-E1 Depart. & Approach	FN	C(PR)	E(PR)	C(E3)	E(E3)
	SG/PS	D	D	C	E
	DS	–	Z+	D(NEXT)	D(NEXT)
C-D-E1 Approach	FN	C(L).D(L)	E(L)	D(E2)	
	SG/PS	C/D/E	C/D/E	D	
	DS	–	Z+	C-D-E1(PR).C(NEXT).E(NEXT)	
cont. C-D-E1 Approach	FN	C(E2)		E(E2)	
	SG/PS	C		E	
	DS	D(NEXT).E(NEXT)		C(NEXT).D(NEXT)	
C-D-E2	FN	D(L)	C(E1)		D(E1)
	SG/PS	C/D/E	C		D
	DS	–	D(NEXT).E(NEXT)		C(NEXT).E(NEXT)
cont. C-D-E2	FN	E(E1)			
	SG/PS	E			
	DS	C(NEXT).D(NEXT)			
D	FN	D(L)	D(E4)		
	SG/PS	D	D		
	DS	–	–		
A-B P.B.	FN	A(PB)		C(L)	
	SG/PS	A/B.A/B(WALK)		A/B.A/B(WALK)	
	DS	–		C.D.E	
C-D-E P.B.	FN	D(PB)	A(L)		
	SG/PS	D(WALK)	C.C(WLK)		
	DS	C.E	A.B		
D P.B.	FN	D(PB)	A(L)		
	SG/PS	D(WALK)	C.D(WLK)		
	DS	–	A.B.C.E		

POSTS

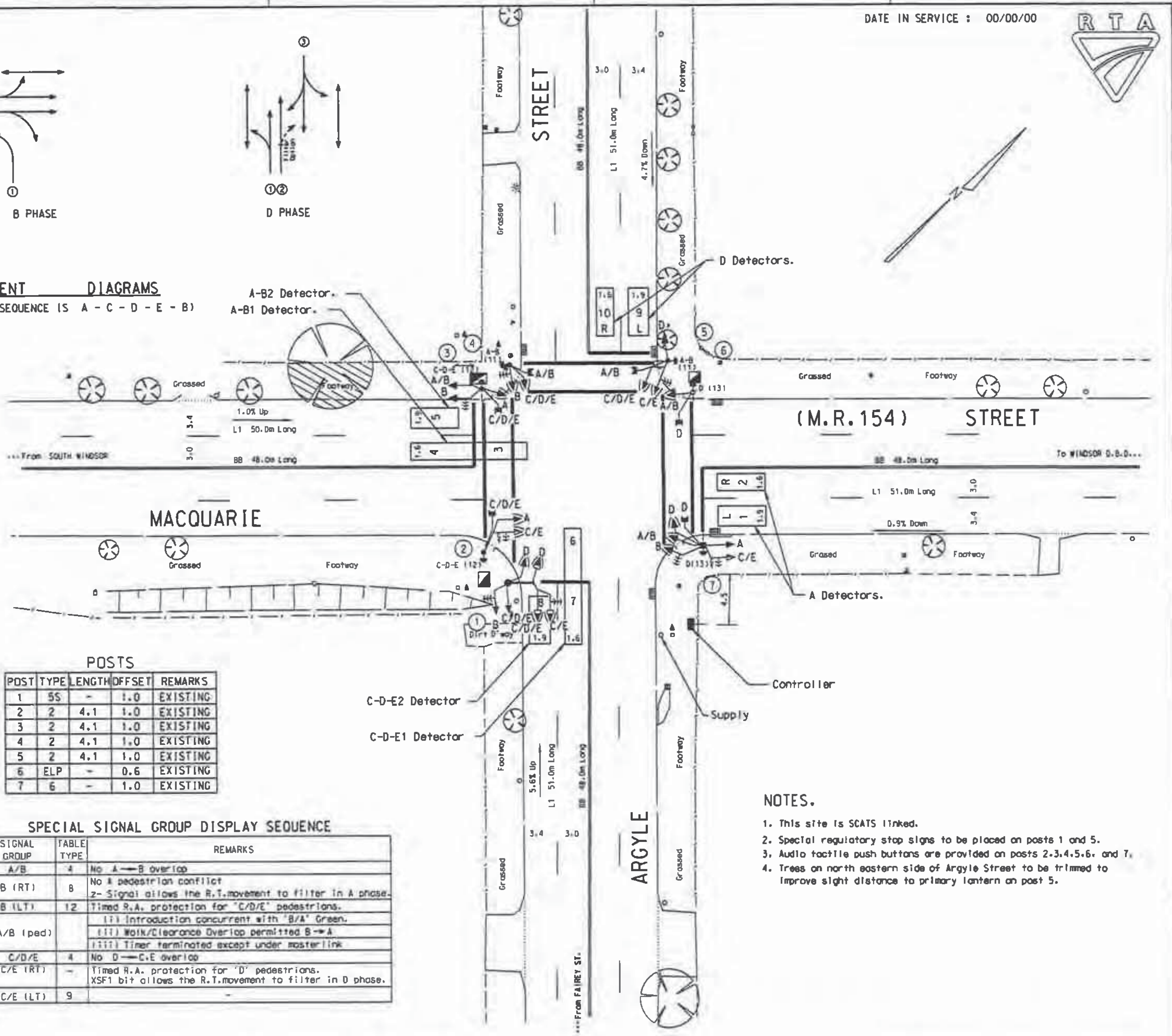
POST	TYPE	LENGTH	OFFSET	REMARKS
1	5S	–	1.0	EXISTING
2	2	4.1	1.0	EXISTING
3	2	4.1	1.0	EXISTING
4	2	4.1	1.0	EXISTING
5	2	4.1	1.0	EXISTING
6	ELP	–	0.6	EXISTING
7	6	–	1.0	EXISTING

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	TABLE TYPE	REMARKS
A/B	4	No A→B overlap
B (RT)	8	No A pedestrian conflict z- Signal allows the R.T.movement to filter in A phase.
B (LT)	12	Timed R.A. protection for "C/D/E" pedestrians.
A/B (ped)		(i) Introduction concurrent with 'B/A' Green. (ii) Walk/Clearance Overlap permitted B→A (iii) Timer terminated except under master link
C/D/E	4	No D→C.E overlap
C/E (RT)	–	Timed R.A. protection for 'D' pedestrians. XSF1 bit allows the R.T.movement to filter in D phase.
C/E (LT)	9	–

DATE IN SERVICE : 00/00/00

RTA



NOTES.

1. This site is SCATS linked.
2. Special regulatory stop signs to be placed on posts 1 and 5.
3. Audio tactile push buttons are provided on posts 2,3,4,5,6, and 7.
4. Trees on north eastern side of Argyle Street to be trimmed to improve sight distance to primary lantern on post 5.

DESIGN LAYOUT

APPROVED
NAME F. D. REID
POSITION MANAGER, PROJECT DESIGN SERVICES
DATE 11.10.89

Roads and Traffic Authority, N.S.W

HAWKSBURY COUNCIL AREA
TRAFFIC SIGNALS AT
MACQUARIE STREET (MR154) AND
ARGYLE STREET, WINDSOR.

DESIGN LAYOUT — TCS No 0646

DESIGN OFFICE PARRAMATTA - PROJECT DESIGN SERVICES
CADD FILE: VV0646_1H.dgn
SCALE (1:200)
FILE 091 TS 160 — SUPERSEDES SHEET/ISSUE 1G
ISSUE H
REGN. 0154.091.VV.0646 — SHEET 1

Document Set ID: 6739515
Version: 1, Version Date: 16/10/2019

LANE LEVEL OF SERVICE

Lane Level of Service

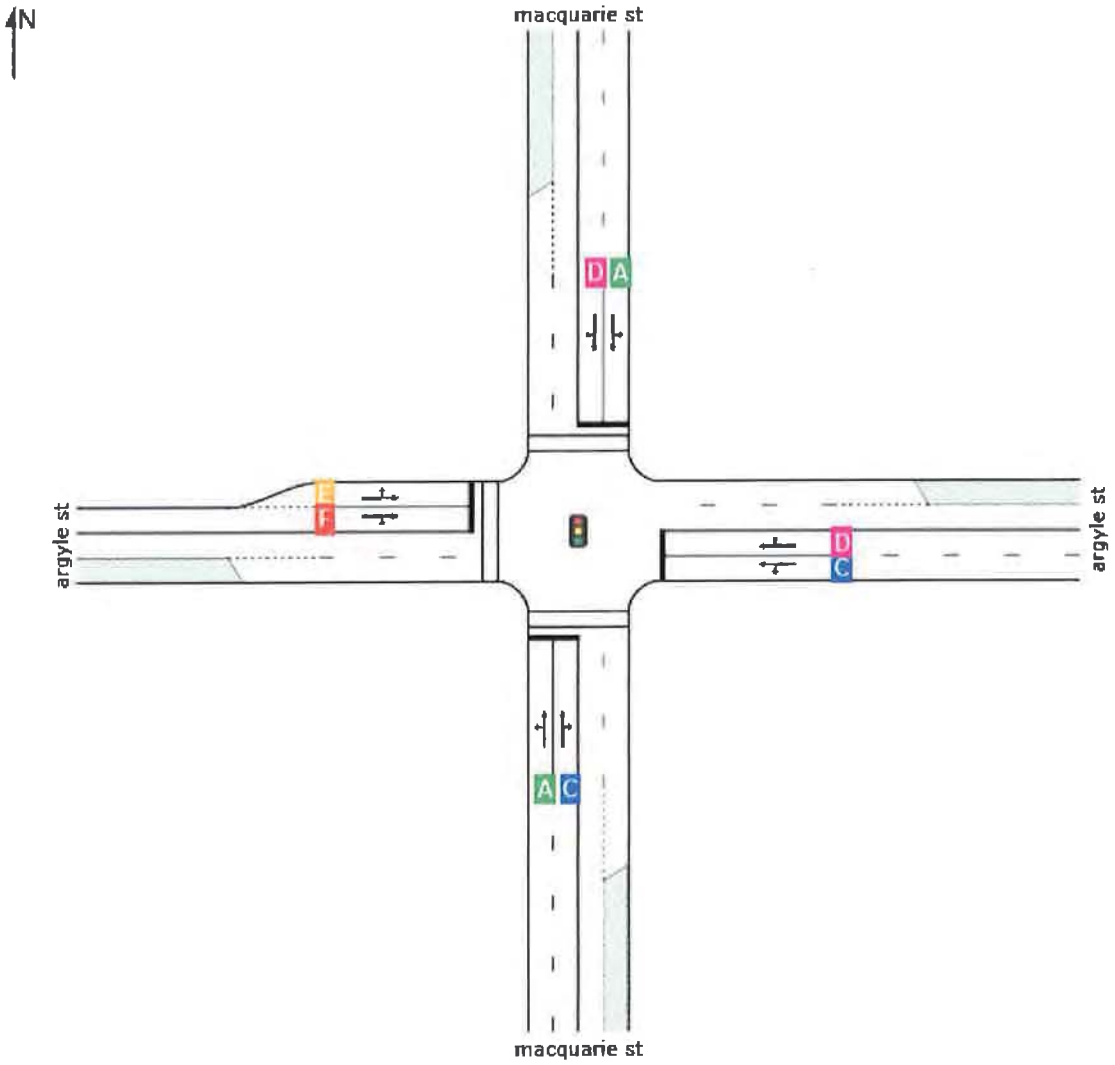
Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	West	Intersection
LOS	B	D	C	F	C



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Organisation: TRANSPORT AND URBAN PLANNING PTY LTD | Processed: Monday, 20 August 2018 3:07:58 PM
Project: Not Saved

MOVEMENT SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: macquarie st											
1	L2	21	0.0	0.296	12.8	LOS A	7.4	53.7	0.40	0.49	47.9
2	T1	960	4.7	0.803	23.2	LOS B	27.7	203.5	0.72	0.75	40.5
3	R2	51	18.8	0.803	36.9	LOS C	27.7	203.5	0.91	0.92	36.3
Approach		1032	5.3	0.803	23.7	LOS B	27.7	203.5	0.72	0.76	40.4
East: argyle st											
4	L2	21	25.0	0.322	41.1	LOS C	4.9	36.0	0.77	0.64	32.8
5	T1	152	2.8	0.872	39.9	LOS C	11.4	82.8	0.84	0.73	31.9
6	R2	176	4.2	0.872	52.6	LOS D	11.4	82.8	1.00	0.92	29.1
Approach		348	4.8	0.872	46.4	LOS D	11.4	82.8	0.92	0.82	30.5
North: macquarie st											
7	L2	228	1.8	0.288	11.9	LOS A	3.6	25.9	0.41	0.64	46.5
8	T1	679	5.9	0.884	44.5	LOS D	35.3	259.2	0.95	0.98	32.7
9	R2	13	0.0	0.884	52.5	LOS D	35.3	259.2	1.00	1.01	31.6
Approach		920	4.8	0.884	36.5	LOS C	35.3	259.2	0.81	0.90	35.3
West: argyle st											
10	L2	22	4.8	0.414	67.5	LOS E	2.1	14.8	0.99	0.73	26.2
11	T1	72	1.5	1.122	149.7	LOS F	9.0	65.0	1.00	1.13	15.9
12	R2	35	6.1	1.122	179.8	LOS F	9.0	65.0	1.00	1.25	14.2
Approach		128	3.3	1.122	143.7	LOS F	9.0	65.0	1.00	1.10	16.5
All Vehicles		2428	4.9	1.122	38.1	LOS C	35.3	259.2	0.80	0.84	34.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	43.4	LOS E	0.0	0.0	0.85	0.85
P3	North Full Crossing	11	52.3	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	11	8.1	LOS A	0.0	0.0	0.37	0.37
All Pedestrians		32	34.6	LOS D			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

LANE SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	85% Back of Queue Veh	85% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: macquarie st													
Lane 1	387	4.4	1308	0.296	37[6]	8.7	LOS A	7.4	53.7	Full	500	0.0	0.0
Lane 2	644	5.8	803	0.803	100	32.7	LOS C	27.7	203.5	Full	500	0.0	0.0
Approach	1032	5.3		0.803		23.7	LOS B	27.7	203.5				
East: argyle st													
Lane 1	126	6.5	391	0.322	37[6]	37.1	LOS C	4.9	36.0	Full	500	0.0	0.0
Lane 2	223	3.9	255	0.872	100	51.6	LOS D	11.4	82.8	Full	500	0.0	0.0
Approach	348	4.8		0.872		46.4	LOS D	11.4	82.8				
North: macquarie st													
Lane 1	288	2.7	999	0.288	33[6]	11.0	LOS A	3.6	25.9	Full	500	0.0	0.0
Lane 2	632	5.8	715	0.884	100	48.2	LOS D	35.3	259.2	Full	500	0.0	0.0
Approach	920	4.8		0.884		36.5	LOS C	35.3	259.2				
West: argyle st													
Lane 1	38	3.4	93	0.414	37[6]	65.5	LOS E	2.1	14.8	Short	40	0.0	NA
Lane 2	90	3.2	80	1.122	100	176.9	LOS F	9.0	65.0	Full	500	0.0	0.0
Approach	128	3.3		1.122		143.7	LOS F	9.0	65.0				
Intersection	2428	4.9		1.122		38.1	LOS C	35.3	259.2				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

LANE LEVEL OF SERVICE

Lane Level of Service

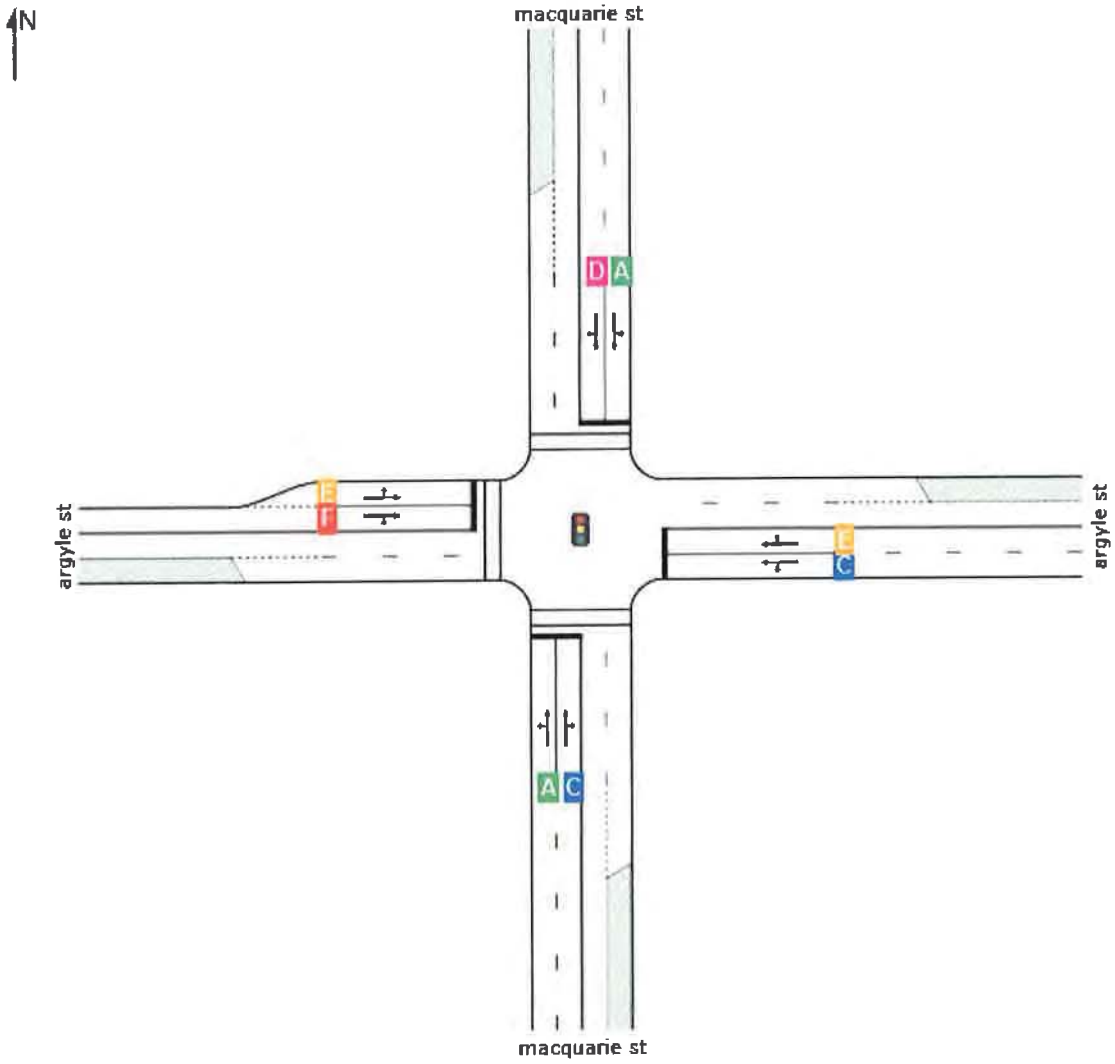
Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	West	Intersection
LOS	B	D	C	F	C



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: macquarie st											
1	L2	21	0.0	0.313	12.9	LOS A	7.9	57.6	0.41	0.49	47.9
2	T1	960	4.7	0.847	26.8	LOS B	29.0	214.5	0.73	0.82	38.9
3	R2	61	24.1	0.847	43.8	LOS D	29.0	214.5	0.95	1.04	34.0
Approach		1042	5.7	0.847	27.5	LOS B	29.0	214.5	0.74	0.82	38.7
East: argyle st											
4	L2	32	33.3	0.357	42.1	LOS C	5.4	41.1	0.79	0.67	32.5
5	T1	152	2.8	0.967	45.1	LOS D	13.5	99.5	0.85	0.79	30.5
6	R2	186	6.8	0.967	67.8	LOS E	13.5	99.5	1.00	1.08	26.0
Approach		369	7.4	0.967	56.3	LOS D	13.5	99.5	0.92	0.93	28.2
North: macquarie st											
7	L2	239	4.0	0.295	12.1	LOS A	3.7	26.6	0.41	0.65	46.2
8	T1	679	5.9	0.905	49.1	LOS D	37.7	276.7	0.96	1.02	31.4
9	R2	13	0.0	0.905	56.8	LOS E	37.7	276.7	1.00	1.05	30.4
Approach		930	5.3	0.905	39.7	LOS C	37.7	276.7	0.82	0.93	34.2
West: argyle st											
10	L2	22	4.8	0.385	65.7	LOS E	2.2	15.8	0.98	0.73	26.6
11	T1	72	1.5	1.044	100.0	LOS F	6.8	49.0	0.99	1.01	20.7
12	R2	35	6.1	1.044	119.3	LOS F	6.8	49.0	1.00	1.11	18.9
Approach		128	3.3	1.044	99.3	LOS F	6.8	49.0	0.99	0.99	20.9
All Vehicles		2470	5.7	1.044	40.1	LOS C	37.7	276.7	0.81	0.89	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	43.4	LOS E	0.0	0.0	0.85	0.85
P3	North Full Crossing	11	52.3	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	11	8.1	LOS A	0.0	0.0	0.37	0.37
All Pedestrians		32	34.6	LOS D			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

LANE SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA am peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows		Cap	Deg. Satn	Lane Util.	Average Delay	Level of Service	85% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: macquarie st													
Lane 1	409	4.4	1308	0.313	37[6]	8.8	LOS A	7.9	57.6	Full	500	0.0	0.0
Lane 2	633	6.6	748	0.847	100	39.6	LOS C	29.0	214.5	Full	500	0.0	0.0
Approach	1042	5.7		0.847		27.5	LOS B	29.0	214.5				
East: argyle st													
Lane 1	137	9.8	384	0.357	37[6]	38.3	LOS C	5.4	41.1	Full	500	0.0	0.0
Lane 2	232	6.0	240	0.967	100	66.9	LOS E	13.5	99.5	Full	500	0.0	0.0
Approach	369	7.4		0.967		56.3	LOS D	13.5	99.5				
North: macquarie st													
Lane 1	289	4.3	980	0.295	33[6]	11.4	LOS A	3.7	26.6	Full	500	0.0	0.0
Lane 2	641	5.8	709	0.905	100	52.5	LOS D	37.7	276.7	Full	500	0.0	0.0
Approach	930	5.3		0.905		39.7	LOS C	37.7	276.7				
West: argyle st													
Lane 1	42	3.2	108	0.385	37[6]	63.5	LOS E	2.2	15.8	Short	40	0.0	NA
Lane 2	87	3.3	83	1.044	100	116.6	LOS F	6.8	49.0	Full	500	0.0	0.0
Approach	128	3.3		1.044		99.3	LOS F	6.8	49.0				
Intersection	2470	5.7		1.044		40.1	LOS C	37.7	276.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

LANE LEVEL OF SERVICE

Lane Level of Service

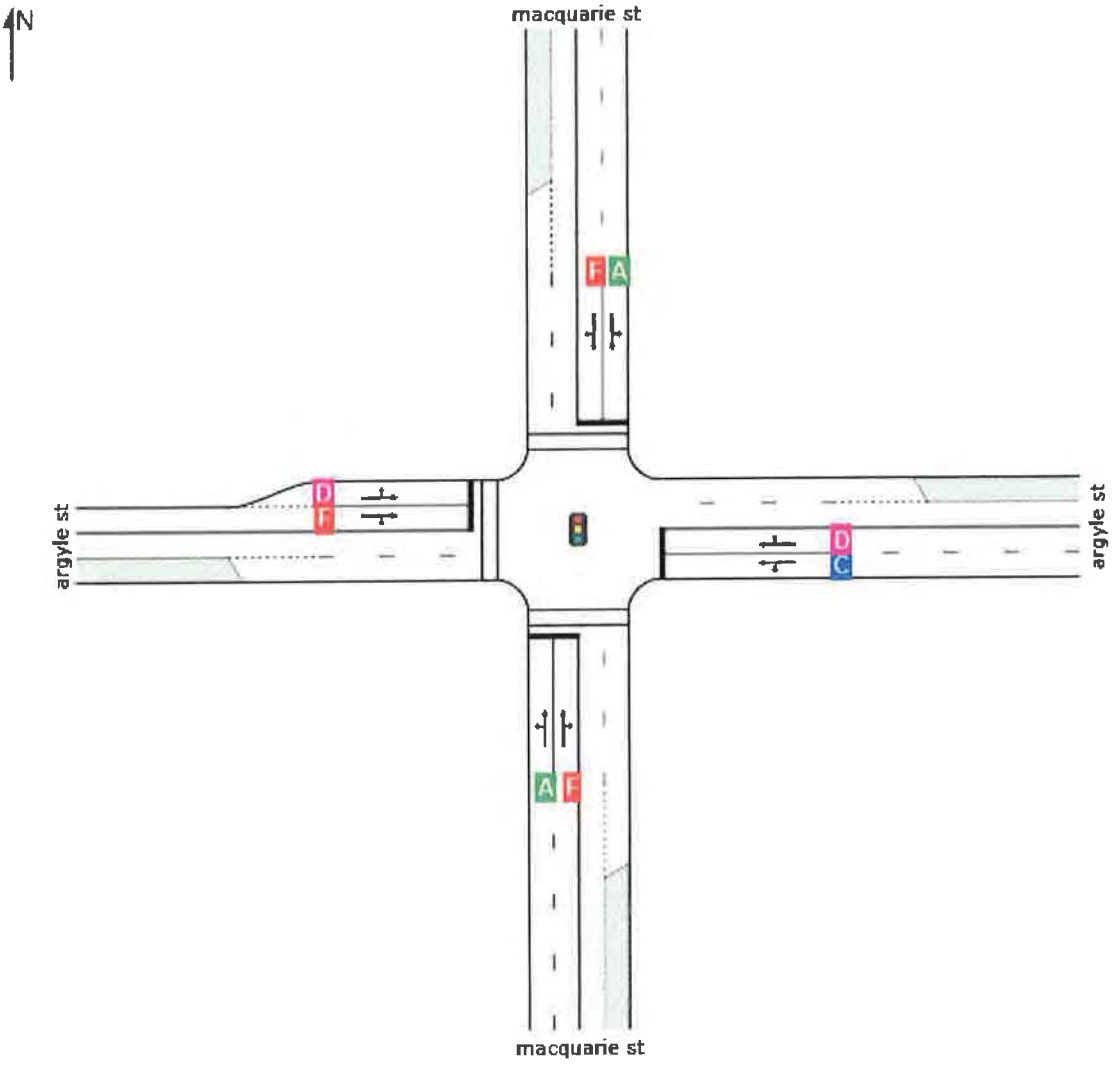
Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	West	Intersection
LOS	D	C	F	F	F



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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LANE SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	85% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: macquarie st													
Lane 1	426	2.8	1178	0.361	37[6]	13.1	LOS A	10.5	75.3	Full	500	0.0	0.0
Lane 2	492	5.5	502	0.980	100	85.0	LOS F	33.6	246.5	Full	500	0.0	0.0
Approach	918	4.2		0.980		51.6	LOS D	33.6	246.5				
East: argyle st													
Lane 1	179	1.0	551	0.325	37[6]	28.9	LOS C	5.9	41.6	Full	500	0.0	0.0
Lane 2	298	0.8	338	0.882	100	44.9	LOS D	14.5	102.1	Full	500	0.0	0.0
Approach	477	0.9		0.882		38.9	LOS C	14.5	102.1				
North: macquarie st													
Lane 1	370	1.3	1024	0.361	33[6]	12.5	LOS A	6.0	42.4	Full	500	0.0	0.0
Lane 2	839	3.9	759	1.106	100	162.7	LOS F	87.3	631.7	Full	500	0.0	36.4
Approach	1209	3.1		1.106		116.8	LOS F	87.3	631.7				
West: argyle st													
Lane 1	78	0.0	177	0.442	37[6]	55.7	LOS D	3.9	27.2	Short	40	0.0	NA
Lane 2	134	0.8	112	1.198	100	238.3	LOS F	16.1	113.2	Full	500	0.0	0.0
Approach	213	0.5		1.198		171.2	LOS F	16.1	113.2				
Intersection	2816	2.9		1.198		86.4	LOS F	87.3	631.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

MOVEMENT SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
existing pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: macquarie st											
1	L2	23	0.0	0.361	17.2	LOS B	10.5	75.3	0.52	0.56	45.3
2	T1	854	2.9	0.980	50.7	LOS D	33.6	246.5	0.77	0.95	31.0
3	R2	41	33.3	0.980	89.3	LOS F	33.6	246.5	1.00	1.30	23.9
Approach		918	4.2	0.980	51.6	LOS D	33.6	246.5	0.78	0.96	30.8
East: argyle st											
4	L2	38	2.8	0.325	32.5	LOS C	5.9	41.6	0.67	0.59	35.6
5	T1	180	0.6	0.882	30.7	LOS C	14.5	102.1	0.74	0.66	34.7
6	R2	259	0.8	0.882	45.5	LOS D	14.5	102.1	1.00	0.92	30.8
Approach		477	0.9	0.882	38.9	LOS C	14.5	102.1	0.87	0.79	32.5
North: macquarie st											
7	L2	244	0.0	0.361	13.9	LOS A	6.0	42.4	0.46	0.65	45.6
8	T1	950	3.9	1.106	142.4	LOS F	87.3	631.7	0.93	1.57	17.2
9	R2	15	0.0	1.106	167.0	LOS F	87.3	631.7	1.00	1.71	15.6
Approach		1209	3.1	1.106	116.8	LOS F	87.3	631.7	0.84	1.39	19.6
West: argyle st											
10	L2	17	0.0	0.442	59.3	LOS E	3.9	27.2	0.95	0.74	28.2
11	T1	139	0.0	1.198	156.2	LOS F	16.1	113.2	0.98	1.16	15.5
12	R2	57	1.9	1.198	240.9	LOS F	16.1	113.2	1.00	1.49	11.3
Approach		213	0.5	1.198	171.2	LOS F	16.1	113.2	0.98	1.21	14.6
All Vehicles		2816	2.9	1.198	86.4	LOS F	87.3	631.7	0.83	1.13	23.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	36.1	LOS D	0.0	0.0	0.78	0.78
P3	North Full Crossing	11	52.3	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	11	11.7	LOS B	0.0	0.0	0.44	0.44
All Pedestrians		32	33.4	LOS D			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

LANE LEVEL OF SERVICE

Lane Level of Service

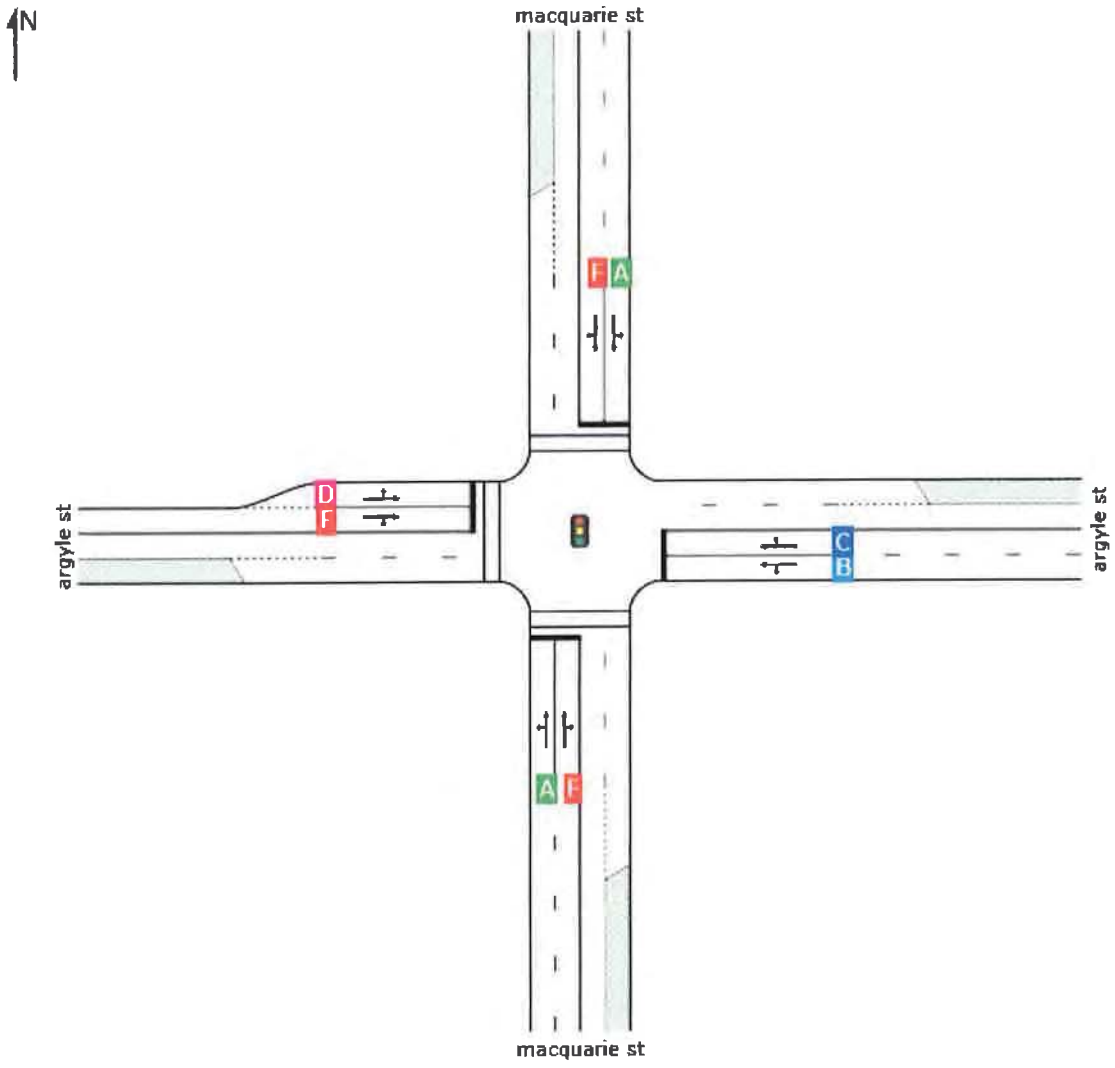
Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

All Movement Classes

	South	East	North	West	Intersection
LOS	F	C	F	F	F



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	85% Back of Queue Vehicles veh	85% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: macquarie st											
1	L2	23	0.0	0.406	18.7	LOS B	12.4	88.7	0.56	0.59	44.5
2	T1	854	2.9	1.100	78.1	LOS F	44.3	327.6	0.77	1.02	23.5
3	R2	52	36.7	1.100	151.4	LOS F	44.3	327.6	1.00	1.47	15.4
Approach		928	4.7	1.100	80.6	LOS F	44.3	327.6	0.78	1.03	23.1
East: argyle st											
4	L2	48	13.0	0.317	31.2	LOS C	5.7	41.5	0.64	0.58	35.9
5	T1	180	0.6	0.858	29.4	LOS C	14.9	106.1	0.73	0.67	35.0
6	R2	269	2.7	0.858	42.2	LOS C	14.9	106.1	0.99	0.90	31.7
Approach		498	3.0	0.858	36.5	LOS C	14.9	106.1	0.86	0.78	33.2
North: macquarie st											
7	L2	255	2.1	0.373	13.9	LOS A	5.9	42.6	0.48	0.66	45.6
8	T1	950	3.9	1.144	171.1	LOS F	96.3	696.7	0.94	1.72	15.1
9	R2	15	0.0	1.144	197.7	LOS F	96.3	696.7	1.00	1.86	13.8
Approach		1219	3.5	1.144	138.6	LOS F	96.3	696.7	0.84	1.50	17.5
West: argyle st											
10	L2	17	0.0	0.408	59.1	LOS E	3.6	25.0	0.95	0.73	28.2
11	T1	139	0.0	1.105	117.4	LOS F	13.4	94.1	0.98	1.08	18.7
12	R2	57	1.9	1.105	163.3	LOS F	13.4	94.1	1.00	1.32	15.2
Approach		213	0.5	1.105	125.0	LOS F	13.4	94.1	0.98	1.12	18.1
All Vehicles		2858	3.6	1.144	101.0	LOS F	96.3	696.7	0.83	1.19	20.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	34.5	LOS D	0.0	0.0	0.76	0.76
P3	North Full Crossing	11	52.3	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	11	12.6	LOS B	0.0	0.0	0.46	0.46
All Pedestrians		32	33.1	LOS D			0.72	0.72

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

LANE SUMMARY

Site: 1 [New Site - 1]

macquarie st and argyle st signals
POST DA pm peak

Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	85% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total veh/h	HV %	veh/h	v/c	%	sec		Veh	Dist m		m	%	%
South: macquarie st													
Lane 1	465	2.8	1146	0.406	37[6]	14.5	LOS A	12.4	88.7	Full	500	0.0	0.0
Lane 2	463	6.7	421	1.100	100	147.1	LOS F	44.3	327.6	Full	500	0.0	0.0
Approach	928	4.7		1.100		80.6	LOS F	44.3	327.6				
East: argyle st													
Lane 1	181	3.9	572	0.317	37[6]	27.7	LOS B	5.7	41.5	Full	500	0.0	0.0
Lane 2	317	2.4	369	0.858	100	41.5	LOS C	14.9	106.1	Full	500	0.0	0.0
Approach	498	3.0		0.858		36.5	LOS C	14.9	106.1				
North: macquarie st													
Lane 1	370	2.7	991	0.373	33[6]	12.5	LOS A	5.9	42.6	Full	500	0.0	0.0
Lane 2	850	3.9	743	1.144	100	193.4	LOS F	96.3	696.7	Full	500	0.0	45.5
Approach	1219	3.5		1.144		138.6	LOS F	96.3	696.7				
West: argyle st													
Lane 1	72	0.0	177	0.408	37[6]	55.6	LOS D	3.6	25.0	Short	40	0.0	NA
Lane 2	141	0.7	127	1.105	100	160.6	LOS F	13.4	94.1	Full	500	0.0	0.0
Approach	213	0.5		1.105		125.0	LOS F	13.4	94.1				
Intersection	2858	3.6		1.144		101.0	LOS F	96.3	696.7				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

EIS Appendix 9: Flora and Fauna Assessment, Anderson Environmental

THREATENED SPECIES TEST OF SIGNIFICANCE REPORT

FOR A PROPOSED DEVELOPMENT AT

100 FAIREY ROAD

SOUTH WINDSOR

HAWKESBURY CITY COUNCIL

LOCAL GOVERNMENT AREA

Job number: 2289

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Version 1

Version	Date drafted	Drafted by
1	28/08/2018	Jason Anderson
Version	**Date reviewed**	**Reviewed by**
1	21/09/2018	Jason Anderson
Approved by		**Date**
Jason Anderson (Director)		21/09/2018

Executive Summary

Introduction

This report describes the results of a Threatened Species Test of Significance Report conducted to inform a development at Lot 4 DP264159 - 100 Fairey Road, South Windsor, in the Hawkesbury City Council Local Government Area (LGA), hereafter referred to as the subject site. The activity is a Part 4 Activity under the EP&A Act (1979).

The Framework for determining whether significant impacts are likely is provided in the **Threatened Species Test of Significance Guidelines** which provides the following (page 1). The assessment followed this guidelines assessment process as outlined below.

Section 7.2 of the BC Act provides that development under the Environmental Planning and Assessment Act 1979 (EP&A) is likely to significantly affect threatened species if:

> *(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or*
>
> *(b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or*
>
> *(c) it is carried out in a declared area of outstanding biodiversity value.*

For an activity under Part 5 of the EP&A Act clause (b) does not apply, so an activity will only be likely to significantly affect a threatened species if:

> *(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or*
>
> *(b) it is carried out in a declared area of outstanding biodiversity value.*

A development application that is likely to significantly affect a threatened species must be accompanied by a biodiversity development assessment report (BDAR). In the case of State significant development or State significant infrastructure an application must be accompanied by a BDAR unless the Secretary of the Department of Planning and Environment and Chief Executive of the Office of Environment and Heritage determine that it is not likely to have any significant impact on biodiversity values.

For an activity under Part 5, an assessment of an activity that is likely to significantly affect a threatened species must be accompanied by a species impact statement or, if the proponent elects to participate in the biodiversity offsets scheme, a BDAR.

The subject site is proposed to be developed as a Concrete Recycling Facility. Andy's Earthworks Pty Ltd is seeking development consent to establish a construction materials crushing and recycling plant.

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

The subject site (proposed development area) is composed of a mixture of cleared mainly exotic grasslands and an occasional overstorey eucalypt. None of the trees would be removed as part of the proposal and would be fenced off at their drip lines to avoid any damage or impacts.

The proposed development does not trigger the Biodiversity Offsets Scheme. This is defined as:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the Biodiversity Offsets Scheme threshold or is likely to significantly affect threatened species based on the test of significance in

section 7.3 of the *Biodiversity Conservation Act 2016*.

Only exotic dominated grassland will be removed. Although some of the land on the property is mapped on the Biodiversity Values Map as containing some Cumberland Plain Woodland this area would not be impacted by the development and is well outside the proposed development area. In addition, this area on the Biodiversity Values Map is only represented by paddock trees with a largely exotic understory near to existing buildings. This area of the site will not be disturbed in any way by the proposal either directly or indirectly.

The land is not mapped on the NSW Native Vegetation Regulatory (NVR) Map and is not declared an Area of Outstanding Biodiversity Value (AOBV).

The NSW Office of Local Government Biodiversity Assessment and Approvals Register Assessment Approvals Navigator determined that a Biodiversity Development Assessment Report (BDAR) was not required.

Methodology

Prior to the site survey a range of secondary resources are often consulted. These generally include:

- Biodiversity Values Mapping (Biodiversity Offsets Scheme Entry Tool);
- Bionet Vegetation Classification (formerly known as the NSW Vegetation Information System Classification Database);
- Threatened Biodiversity Data Collection (formerly known as the Threatened Species Profile Database);
- BioNet Atlas (formerly known as the NSW Wildlife Atlas);
- Directory of Important Wetlands of Australia (DIWA);
- Vegetation Mapping Databases;
- NSW Native Vegetation Regulatory Mapping;
- NSW Office of Environment and Heritage (OEH) database;
- Soils types information databases;
- Commonwealth Protected Matters Search Tool (PMST);
- Aerial Photography;
- Council Local Environment Plans.

Surveys were conducted on the 30/07/2018 by one ecologist from Anderson Environmental. Surveys consisted of a random meander survey throughout the subject site to identify resident fauna, their habitats, present vegetation assemblages and important faunal and floral microhabitat features. Surveys involved random meanders approximately 2 metres apart in a north south direction across the site to assess flora diversity and likely vegetation communities. Fauna surveys consisted of detailed habitat searches of microhabitats (waterbodies, leaf litter, fallen timber, creeklines etc.) as well as a census of habitat trees within the subject site along with detailed habitat assessment.

Results

The results of the background searches and site analysis including field assessments produced the following results.

Resource	Result
NSW Office of Local Government Biodiversity Assessment and Approvals Register Assessment Approvals Navigator	Biodiversity Development Assessment Report (BDAR) not required
Biodiversity Offset Scheme Entry Threshold Tool – Biodiversity Values Map	Analysis of the area to be disturbed indicated that no assessment under the BAM was required as no areas of would be disturbed.
Area of Outstanding Biodiversity Value (Critical Habitat) – Register of Declared Areas of Outstanding Biodiversity Value (included in Biodiversity Values Map)	Not Present
Items of Ecological Significance to be impacted (state or federal listed ecological communities, threatened species or their habitats.	Not Present
5 Part Test – Threatened Species Test of Significance	No significant impacts likely
Area Clearing Threshold – Minimum Lot Size Under Local Environment Plan	Not Triggered
EPBC Act Matters of National Environmental Significance (MNES)	No impacts on any listed matters would occur

The land would have most likely formerly been Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT ID 849) however is now not representative of that community. The vegetation in the study area is represented by a cleared and pasture improved paddock which is no longer represent any native ecological community.

No threatened flora species or populations were identified on the subject site during the surveys and none are considered likely to be present.

Conclusions

The assessment of the potential impacts of this proposal on this site indicated that:

1. The proposal is unlikely to significantly affect any threatened species or ecological communities or their habitats according to the **5-part test** – (Environmental Planning and Assessment Act (1979) (EP&A) provided for under Section 7.2 of the Biodiversity Conservation Act (2016).

2. The proposed development does not exceed the **Biodiversity Offsets Scheme** (BOS) threshold.

3. The proposed development is not being carried out in a declared area of **Outstanding Biodiversity Value** (OBV).

Certification

I certify that this report has been undertaken in accordance with the current legislative requirements and that report was undertaken without bias and the findings would be the same regardless of the client or their objectives and is an entirely independent report based solely on the site conditions and background information available at the time of the assessment.

Yours Sincerely

Jason Anderson

Jason Anderson
B.App.Sc – 1992 (Conservation Technology - University of New England)
BAAS17059 Certified Biodiversity Method Assessor under the Biodiversity Conservation Act 2016 (NSW)
Certified Practicing Ecological Consultant (#5) – Ecological Consultants Association of NSW
21st September 2018

Glossary of Acronyms

AOBV	Area of Outstanding Biodiversity Value
BAR	Biodiversity Assessment Report; includes Biodiversity Development Assessment Reports (BDARs), Biodiversity Certification Assessment Reports (BCARs) and Biodiversity Stewardship Site Assessment Reports (BSSARs)
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BOS	Biodiversity Offsets Scheme
CEEC	Critically endangered ecological community
Chief Executive of OEH	Chief Executive of the Office of Environment and Heritage
Calculator	Biodiversity Assessment Method Calculator
DIWA	Directory of Important Wetlands in Australia
DPE	NSW Department of Planning and Environment
EEC	Endangered ecological community
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (C'th)
Fisheries NSW Policy and Guidelines	*Fisheries NSW Policy and guidelines for fish habitat conservation and management*
LLS	Local Land Services
LLS Act	*Local Land Services Act 2013* (NSW)
the Manual	Biodiversity Assessment Method Operational Manual (this Manual)
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage NSW
PCT	Plant community type
SEPP	State Environmental Planning Policy
the Standard	Native Vegetation Interim Type Standard1
TBDC	Threatened Biodiversity Data Collection
TEC	Collective term for threatened ecological communities (VECs, EECs, CEECs)
VPA	Voluntary planning agreement

1 Sivertsen D 2009, Native Vegetation Interim Type Standard, Department of Environment, Climate Change and Water NSW, Sydney.

Table of Contents

1. INTRODUCTION

1.1 BACKGROUND

Anderson Environmental was engaged to conduct a Threatened Species Test of Significance Report conducted to inform a development at Lot 4 DP264159 - 100 Fairey Road, South Windsor, in the Hawkesbury City Council Local Government Area (LGA), hereafter referred to as the subject site. The activity is a Part 4 Activity under the EP&A Act (1979).

The Project is proposed to be located over the south-western portion of the large mixed rural/industrial allotment of which only a small portion is currently used by Evoqua as a research facility. This facility is located approximately half way along the site's southern boundary. The development of the construction materials crushing and recycling plant will operate within the IN1 zoned portion of the site, whilst the Evoqua operations will be maintained in situ. The project is to be located on the south-west quarter of the site.

1.2 SITE DESCRIPTION

1.2.1 Location

The subject site occurs at number 100 Fairey Road, South Windsor. **Figure 1.1** below shows the location of the subject site and its local context. Only part of this site would however be disturbed as shown in **Figure 1.2.**

1.2.2 Physical Environment

The subject site represents a cleared grazing paddock which has been pasture improved and grazed for many years. Cattle still currently graze the property and it is dominated by introduced pasture grass species.

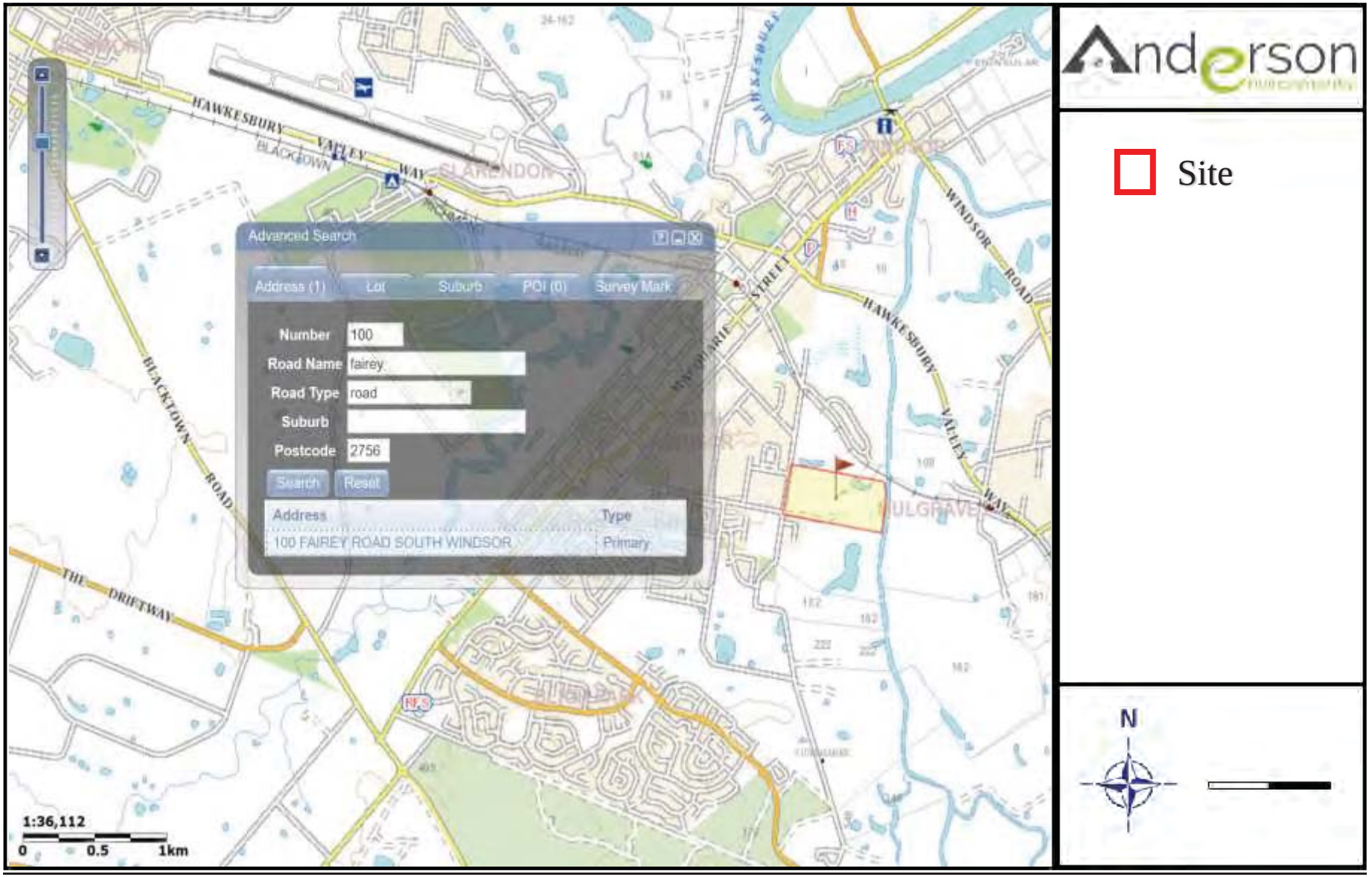

Figure 1.1: Location of the subject site showing local context (Source: Six Maps)

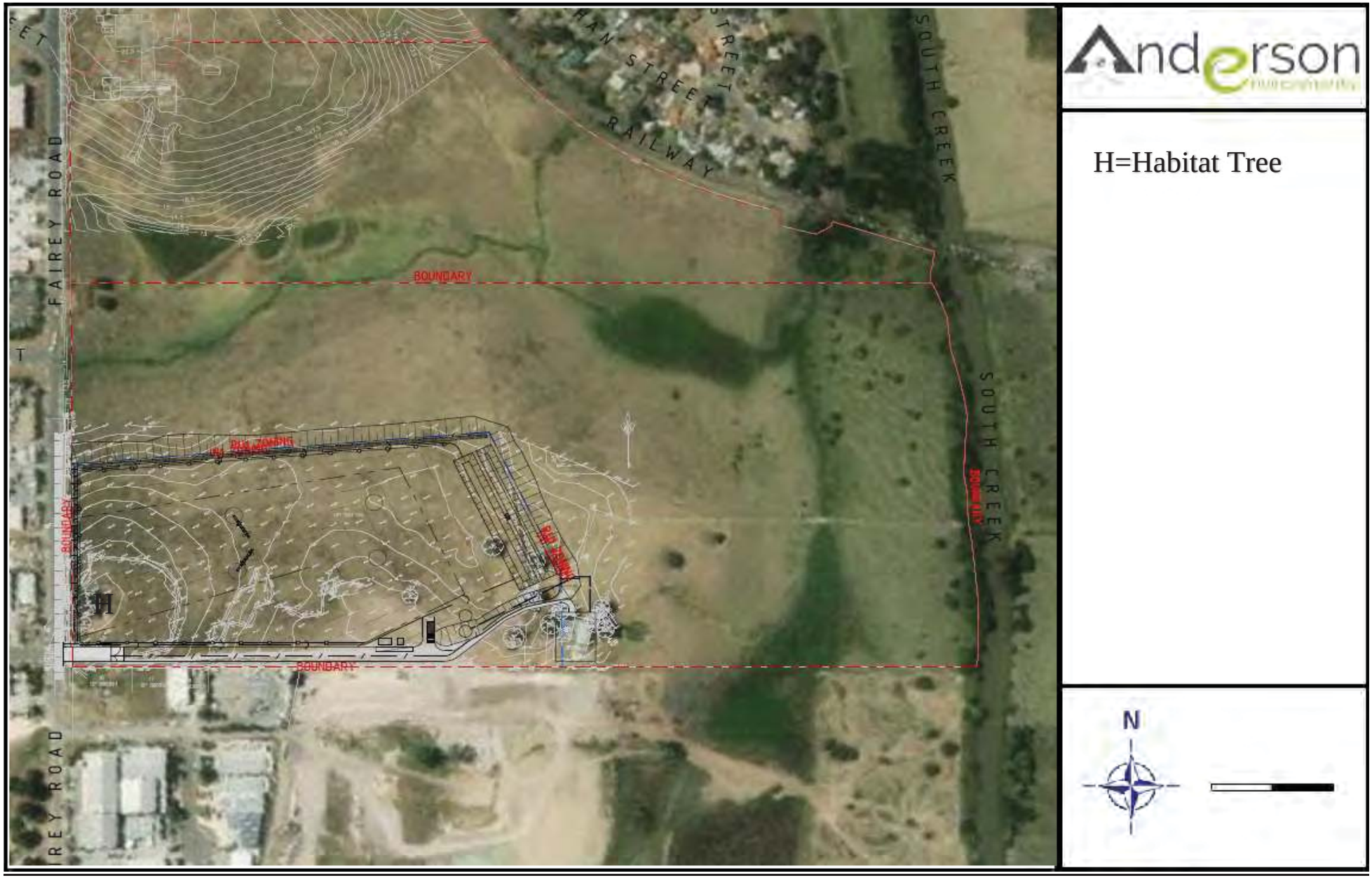

Figure 1.2: Location Development Area

1.3 LEGISLATIVE REQUIREMENTS

This threatened species test of significance report was undertaken with reference to the;

- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act - 1979);
- Threatened Species Test of Significance Guidelines (2018);
- NSW Biodiversity Conservation Act (2016);
- Biodiversity Assessment Method Operational Manual – Stage 1 (2018);
- Biodiversity Assessment Method (BAM) – (2017);
- Biodiversity Conservation Regulation (2017);
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- State Environmental Planning Policy (SEPP):

The site was also assessed in relation to the 'improve or maintain principals' adopted by most local councils.

1.4 LIMITATIONS

No survey can detect all species at any one point in time however allowances were made for species which may occur based on known current research and habitat preferences. The survey recorded species as they were encountered, and the survey aimed to detect threatened species or Threatened Ecological Communities (TECs) as listed under state and federal legislation. The survey focussed on the identification of the vegetation communities and any threatened flora or potential habitat for threatened flora. No attempt was made to record every single species on the site and not all specimens are visible in all seasons. Surveys for fauna entailed detailed habitat searches.

The use of this report is for the client only and is based on an assessment of the site at the point in time of assessment. The report is not to be reproduced or released to any other party, in whole or in part, without the express written consent of Anderson Environmental Pty Ltd. Any use, which a Third Party makes of this report, or any reliance on discussions based on it, is the responsibility of such Third Parties. Anderson Environmental accepts no responsibility for damages, if any, suffered by any Third Party because of decisions made or actions taken based on this report. The material in this report reflects the judgement of Anderson Environmental Pty Ltd in light of background information and site conditions at the time of assessment and we take no responsibility for any database inaccuracies or other inaccuracies in background information.

This report has been undertaken with the government resources available at the time of assessment and writing and under the current accompanying legislation. Anderson Environmental accepts no responsibility for any omissions or inaccuracies due to changes to the legislative framework following submission of this report.

All figures in this report are to be considered indicative only. Anderson Environmental accepts no responsibility for decisions taken on the ground based on these figures.

2. METHODOLOGY

The project was assessed according to the threatened species test of significance. This is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the Environmental Planning and Assessment Act 1979. The test of significance is set out in s.7.3 of the Biodiversity Conservation Act 2016. If the activity is likely to have a significant impact, or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS).

Local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the Biodiversity Offsets Scheme threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*.

The proposal was assessed against the following factors to determine whether it required assessment under the Biodiversity Offsets Scheme (BOS). If the project is in adherence to these factors then it does not trigger the Biodiversity Offsets Scheme (BOS) and a Threatened Species Test of Significance is required.

1.) The proposal is unlikely to significantly affect any threatened species or ecological communities or their habitats according to the 5-part test – (Environmental Planning and Assessment Act (1979) (EP&A) provided for under Section 7.2 of the Biodiversity Conservation Act (2016).
2.) The proposed development does not exceed the Biodiversity Offsets Scheme (BOS) threshold.
3.) The proposed development is not being carried out in a declared area of Outstanding Biodiversity Value (OBV).

2.1 FIELD METHODOLOGY

The assessment of the subject site was carried out between 9:00 and 4:00 on 30/07/2018 by Bo Davidson (M. Environment 2013). Bo Davidson has over four years' experience as a consulting ecologist and has conducted numerous projects in the Greater Sydney, New England and South Coast regions.

Weather conditions were predominantly fine and sunny during the survey, see **Table 2.1** below. Rainfall did not occur on the subject site during survey.

Table 2.1: Weather conditions on date of survey

Date	Minimum temperature (*C)	Maximum temperature (*C)	Rainfall (mm)
20/03/2018	11.0	19.0	0.0

Source: Australian Bureau of Meteorology, Richmond RAAF weather station

2.2 DESKTOP STUDY

Prior to the commencement of field surveys an extensive desktop study was conducted.

The desktop study consulted a variety of secondary sources, comprising:

- The NSW Office of Environment (OEH) Bionet Atlas database;
- The federal Protected Matters Search Tool (PMST);
- Vegetation mapping from the NSW Office of Environment and Heritage (OEH) and the NSW National Parks and Wildlife Service (NPWS);
- Present and past aerial imagery of the subject site and local area through Google Earth;
- Relevant State Environmental Planning Policies (SEPPs); and
- The NSW threatened species committee determinations for threatened species and Threatened Ecological Communities (TECs).

This background research was used to inform the following field surveys. It assisted in the identification of areas of potential TECs in the study area, potential microhabitats (creeklines, waterbodies etc.) as well as threatened species known to occur in the local area which could be present within the study area.

2.3 FLORA

2.3.1 Methodology

The survey involved targeted random meanders across the site area approximately 5 metres apart in a north south direction thus forming parallel line transects to enable a sound census of the flora species present and to fully evaluate the potential fauna habitat.

This survey included targeted searches for endangered species, populations and communities known to occur within the LGA and within 10km, as identified in the desktop study. Landscape features were also recorded for greater ecological context.

2.3.2 Taxonomy and References

Taxonomy is from Harden (1990 – 1993, 2000 and 2002) and from any recent updates from the Royal Botanic Gardens (RBG), Sydney. The Royal Botanic Gardens' PlantNet website (plantnet.rbgsyd.nsw.gov.au) incorporating Flora Online is the major source for updated taxonomy. The main references utilised for this assessment include; NSW National Parks and Wildlife Service (NPWS) (1997), Robinson, L (1997), Fairley, A and Moore, P (1995), Threatened Species Profiles compiled by NSW NPWS and from field and research experience.

2.4 FAUNA

2.4.1 Methodology

The methodology for the survey involved searching subject site for any evidence of threatened fauna species or potential habitat in terms of sheltering/foraging/breeding for any threatened fauna. The methodology for these surveys encompassed the following.

- Opportunistic Observations – Opportunistic observations of fauna species through visual sighting or auditory confirmation, while searching for potential habitat was conducted throughout the survey areas;
- Habitat Analysis – Assessments of potential habitat for threatened species was undertaken. This included an assessment of the condition of the habitat once found; and
- Searches for Indirect Evidence of Fauna Species – This included searching for glider chews, scratches on eucalypts, diggings, borrowings, scats, tracks, searches for owl pellets, owl whitewash, and identification of any specific habitat components for threatened fauna. Logs were turned over in search of reptiles then replaced in their original positions. Similarly, thick understory and dense thickets were also investigated for ground dwelling fauna and small bush birds.

Areas or items of significant fauna habitat value (rock outcrops, caves and crevices, waterbodies and creeklines, habitat-bearing trees etc.) were noted, locations recorded using a GPS device and representative photos taken where relevant. For habitat-bearing trees the following additional data was collected:

- Tree species;
- Height in meters;
- Diameter at Breast Height (DBH) in millimetres;
- Number of hollows present;
- Size class of hollows (S=5-15cm, M=15-25cm and L=25+cm); and
- Other notable observations (presence of fauna or signs of inhabitation etc.).

2.4.2 Taxonomy and References

Taxonomy is from the following sources; Mammals (Churchill, 2009 and Strahan, 1995), Reptiles and Amphibians (Cogger, 1994), and Birds (Simpson and Day 1993). The main references utilised for this assessment include; Strahan, R (1995), Cogger, H (1994), Simpson and Day (1993), State Forests of NSW (1995), Robinson M (1995), Threatened Species Profiles compiled by NSW NPWS and from field and research experience of the authors.

3. RESULTS

3.1 ELIGIBILITY ASSESSMENT

To qualify as requiring assessment through the BAM, the proposed development must satisfy at least one of the following criteria:

- the clearing area is within the bounds of the **relevant clearing threshold** (see Table 3.1 below); and
- the development is not located in an area identified on the "**Biodiversity Values Map**" and
- the development is not to be carried out in a declared area of **Outstanding Biodiversity Value** and
- the development is not **"likely to significantly affect threatened species"** using the test of significance in the BC Act

The results of the background searches and site analysis including field assessments produced the following results.

Resource	Result
NSW Office of Local Government Biodiversity Assessment and Approvals Register Assessment Approvals Navigator	Biodiversity Development Assessment Report (BDAR) not required
Biodiversity Offset Scheme Entry Threshold Tool – Biodiversity Values Map	Analysis of the area to be disturbed indicated that no assessment under the BAM was required as no areas of would be disturbed.
Area of Outstanding Biodiversity Value (Critical Habitat) – Register of Declared Areas of Outstanding Biodiversity Value (included in Biodiversity Values Map)	Not Present
Items of Ecological Significance to be impacted (state or federal listed ecological communities, threatened species or their habitats.	Not Present
5 Part Test – Threatened Species Test of Significance	No significant impacts likely (see section 4.2)
Area Clearing Threshold – Minimum Lot Size Under Local Environment Plan	Not Triggered
EPBC Act Matters of National Environmental Significance (MNES)	No impacts on any listed matters would occur

Table 3.1: BAM clearing to minimum lot size thresholds

Minimum lot size associated with the property*	Proposed native vegetation clearing area limit
<1ha	0.25ha or more
>1ha to <40ha	0.5ha or more
>40ha to <1 000ha	1ha or more
>1 000ha	2ha or more

**Refers to the minimum lot size for the zonation of the site under the relevant LEP*

3.2 FLORA RESULTS

The assessment detected no listed threatened species, communities or critical habitat listed under the Biodiversity Conservation Act (2016) or the Environment Protection and Biodiversity Conservation Act (1999). The full list of flora recorded is provided in Appendix 3. A complete list of potential species which could occur in the City of Hawkesbury LGA are provided in Appendix 4 along with an analysis of their potential to occur. Searches of the BioNet Wildlife Atlas were also undertaken to determine species records occurring within a 10km grid of the study site. It should however be remembered that records of occurrence are often a reflection

of amount of surveys undertaken in the local area and as such habitat analysis of the actual site is often a more accurate predictor of potential occurrence. As such the list in Appendix 4 considers a broader range of potential species which are known to occur with this City of Hawkesbury LGA.

Note: *the Threatened Species Conservation Act (1995) was repealed by Sch 10 to the Biodiversity Conservation Act 2016 No 63 with effect from 25.8.2017.*

The site is characterised by cleared farmland which is heavily grazed and pasture improved and based on aerial photographs has been for many decades. The main species occupying the area to be disturbed represent exotic pasture grasses and typical paddock weeds. There are only 4 overstorey eucalypts present and these would all be retained by exclusion zones around their driplines. As such there would be no impact on these few trees. The few remaining overstorey species comprised 1 *Eucalyptus tereticornis* and 2 *Eucalyptus crebra*. The only habitat tree present was the *Eucalyptus tereticornis* on the western side as shown in Figure 1.2. Although it is a large tree it contained only 1 small visible hollow.

The subject site and surrounding lands are located within the Cumberland Plain subregion of the Sydney Basin Interim Biogeographic Regionalisation (IBRA) bioregion. The subject site is wholly located within the Cumberland Plain Mitchell Landscape. No important wetlands (mapped under the Directory of Important Wetlands in Australia (DIWA)) are located within the subject site however there are wetlands to the north and east of the proposed development area. These would not however be impacted either directly or indirectly by the proposal as there is a large buffer present.

No significant karsts, caves, crevices, cliffs or other area of geological significance are present within the site.

The subject site is on lands mapped as potential Acid Sulphate Soil (ASS) prone under the City of Hawkesbury Council LEP. The results of the Acid Sulfate soil testing however indicated that this limitation was not present.

The allotment is located within a highly cleared landscape to the east of the industrial area in South Windsor. There are no corridors or other significant landscape features which would be impacted by the proposal.

The vegetation on the site would have probably once comprised the PCT 'Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion'. It is however no longer representative of this community and is only represented by a pasture improved grazing paddock.

3.2.1.1.1 Threatened Flora

Numerous threatened fauna species were identified as present in the local area (10km radius from the subject site), from the BioNet Atlas (shown below). None of these species were shown to occur on the site.

Plantae **Flora**		Allocasuarina glareicola		E1,P	E	1	

Casuarinaceae							
Fabaceae (Faboideae)		Dillwynia tenuifolia		V,P		70	
		Pultenaea parviflora		E1,P	V	33	
Fabaceae (Mimosoideae)	Bynoe's Wattle	Acacia bynoeana		E1,P	V	5	
		Acacia gordonii		E1,P	E	2	
	Downy Wattle	Acacia pubescens		V,P	V	26	
Myrtaceae	Deane's Paperbark	Melaleuca deanei		V,P	V	1	
		Micromyrtus minutiflora		E1,P	V	4	
Proteaceae	Juniper-leaved Grevillea	Grevillea juniperina subsp. juniperina		V,P		32	
	Hairy Geebung	^^Persoonia hirsuta		E1,P,3	E	7	
	Nodding Geebung	Persoonia nutans		E1,P	E	63	
Thymelaeaceae		Pimelea curviflora var. curviflora		V,P	V	1	

3.3 FAUNA RESULTS

The assessment detected no listed threatened species, communities or critical habitat listed under the Biodiversity Conservation Act (2016) or the Environment Protection and Biodiversity Conservation Act (1999). A full species list of fauna encountered during survey is provided in Appendix 3. A complete list of potential species which could occur in the City of Hawkesbury LGA are provided in Appendix 4 along with an analysis of their potential to occur. Searches of the BioNet Wildlife Atlas were also undertaken to determine species records occurring within a 10km grid of the study site. It should however be remembered that records of occurrence are often a reflection of amount of surveys undertaken in the local area and as such habitat analysis of the actual site is often a more accurate predictor of potential occurrence. As such the list in Appendix 4 considers a broader range of potential species which are known to occur with this City of Hawkesbury LGA.

Note: *the Threatened Species Conservation Act (1995) was repealed by Sch 10 to the Biodiversity Conservation Act 2016 No 63 with effect from 25.8.2017.*

The site contained only 1 habitat tree with only 1 small hollow. This and all other eucalypts will be retained as part of the proposed development and only grazing paddock as shown in photograph 3.1 below would be disturbed.

Photograph 3.1: Typical habitat on site showing grazed pasture improved paddock

The subject site does not contain many large trees capable of supporting significant hollows. Two habitat trees observed during surveys, one of which was located outside of the subject site boundaries, in a large tree along the Windsor Road easement. The details of the habitat trees documented are provided in **Table 3.2** below.

Table 3.2: Details of habitat-bearing trees on the subject site

Tree Number	Scientific Name	Common Name	Height (m)	DBH (mm)*	Number of Hollows	Hollow Class**	Notes
H1	*Eucalyptus tereticornis*	Forest Red Gum	18	1300	1	S	Located mid height
H2	*Pinus pinaster*	Maritime Pine	14	750	1	N/A	Long fissure in dead header

**Diameter at Breast Height (140cm)*
***S=5-15cm, M=16-25cm, L=26cm+*

3.3.1.1.1 Amphibians

The subject site lacks significant amphibian habitat within the area to be disturbed in the form of vegetation creeklines and waterbodies. No amphibian species were heard calling during surveys. The wetland areas to the north and east are considered to be the only significant amphibian habitat features on the subject site. These have however been disturbed due to grazing.

All threatened amphibian species known to occur in the City of Hawkesbury Council LGA are assessed in Appendix 4.

3.3.1.1.2 Birds

The subject site provides foraging, breeding and roosting resources for a variety of native bird species. Numerous common woodland and water birds were observed within the subject site including the Australian Raven (*Corvus coronoides*, Magpie Lark (*Grallina cyanoleuca*), and Noisy Miner (*Manorina melanocephala*).

All threatened bird species known to occur in the Hawkesbury LGA are assessed in Appendix 4.

3.3.1.1.3 Invertebrates

Two threatened invertebrates are considered to have potential to occur on the subject site, the Cumberland Plain Land Snail (*Meridolum corneovirens*), listed as endangered under the BC Act and the Dural Woodland Land Snail (*Pommerhelix duralensis*), listed as endangered under the BC Act and EPBC Act. The subject site contains very poor quality potential habitat for these species due to the historical and existing grazing. Inspections during the site survey did not detect the presence of any living snails or deceased shells. Generally, the area to be disturbed by the proposal is considered to have negligible habitat for this species.

An assessment of the potential impact of the proposed development all threatened invertebrate species known to occur in the City of Hawkesbury Council LGA is provided in the threatened species assessment tables in Appendix 4.

3.3.1.1.4 Mammals

The subject site contains one habitat tree with a small hollow. Generally, the other trees provide some foraging, refuge and breeding habitat for native mammals in the form of isolated trees. A single mammal species was inferred to be present on the subject site from the presence of scat, the European Rabbit (*Oryctolagus cuniculus*).

The habitat tree provides potential roosting and breeding resources for tree-dwelling microchiropteran bats. This tree would however be retained as part of the proposal thereby not impacting the potential habitat of this species group. The remaining native and exotic vegetation on the subject site is considered to provide marginal foraging and refuge habitat for native mammals and is not limited in the locality.

An assessment of the potential impact of the proposed development all threatened mammal species known to occur in the City of Hawkesbury Council LGA is provided in the threatened species assessment tables in Appendix 4.

3.3.1.1.5 Reptiles

The subject site contains very poor foraging, refuge and breeding habitat for native reptiles due to the disturbance which has occurred due to the grazing pressures and pasture improvement. No reptile species were encountered during surveys; however, native skinks and snakes would utilise the resources of the subject site.

An assessment of the potential impact of the proposed development all threatened reptile species known to occur in the City of Hawkesbury Council LGA is provided in the threatened species assessment tables in Appendix 4.

3.3.1.2 Threatened Fauna

Numerous threatened fauna species were identified as present in the local area (10km radius from the subject site), from the BioNet Atlas (shown below). None of these species were shown to occur on the site.

	Common name	Scientific name	Map [Clear all]	NSW status	Comm. status	No. of records	
Animalia Amphibia Hylidae	Green and Golden Bell Frog	Litoria aurea	☐	E1,P	V	1	
Aves Anatidae	Blue-billed Duck	Oxyura australis	☐	V,P		2	
	Freckled Duck	Stictonetta naevosa	☐	V,P		10	
Apodidae	Fork-tailed Swift	Apus pacificus	☐	P	C,J,K	1	
	White-throated Needletail	Hirundapus caudacutus	☐	P	C,J,K	5	
Ciconiidae	Black-necked Stork	Ephippiorhynchus asiaticus	☐	E1,P		6	
Ardeidae	Cattle Egret	Ardea ibis	☐	P	C,J	62	
	Australasian Bittern	Botaurus poiciloptilus	☐	E1,P	E	7	
	Black Bittern	Ixobrychus flavicollis	☐	V,P		1	

Threskiornithidae	Glossy Ibis	Plegadis falcinellus		P	C	29	
Accipitridae	Spotted Harrier	Circus assimilis		V,P		7	
	White-bellied Sea-Eagle	Haliaeetus leucogaster		V,P	C	7	
	Little Eagle	Hieraaetus morphnoides		V,P		7	
	Square-tailed Kite	^^Lophoictinia isura		V,P,3		5	
Falconidae	Black Falcon	Falco subniger		V,P		11	
Charadriidae	Pacific Golden Plover	Pluvialis fulva		P	C,J,K	13	
	Grey Plover	Pluvialis squatarola		P	C,J,K	1	
Rostratulidae	Australian Painted Snipe	Rostratula australis		E1,P	E	12	
Scolopacidae	Common Sandpiper	Actitis hypoleucos		P	C,J,K	2	
	Sharp-tailed Sandpiper	Calidris acuminata		P	C,J,K	428	
	Curlew Sandpiper	Calidris ferruginea		E1,P	CE,C,J,K	21	
	Pectoral Sandpiper	Calidris melanotos		P	J,K	36	
	Red-necked Stint	Calidris ruficollis		P	C,J,K	14	
	Long-toed Stint	Calidris subminuta		P	C,J,K	2	
	Latham's Snipe	Gallinago hardwickii		P	C,J,K	151	
	Bar-tailed Godwit	Limosa lapponica		P	C,J,K	1	
	Black-tailed Godwit	Limosa		V,P	C,J,K	4	
	Little Curlew	Numenius minutus		P	C,J,K	5	
	Ruff	Philomachus pugnax		P	C,J,K	8	
	Wood Sandpiper	Tringa glareola		P	C,J,K	17	
	Common Greenshank	Tringa nebularia		P	C,J,K	6	
	Marsh Sandpiper	Tringa stagnatilis		P	C,J,K	20	
	Buff-breasted Sandpiper	Tryngites subruficollis		P	J,K	3	
Glareolidae	Oriental Pratincole	Glareola maldivarum		P	C,J,K	2	

Laridae	White-winged Black Tern	Chlidonias leucopterus	☐	P	C,J,K	2	
	Gull-billed Tern	Gelochelidon nilotica	☐	P	C	4	
	Caspian Tern	Hydroprogne caspia	☐	P	C,J	2	
Cacatuidae	Gang-gang Cockatoo	^^Callocephalon fimbriatum	☐	V,P,3		1	
	Major Mitchell's Cockatoo	^Lophochroa leadbeateri	☐	V,P,2		1	
Psittacidae	Little Lorikeet	Glossopsitta pusilla	☐	V,P		3	
	Swift Parrot	^^Lathamus discolor	☐	E1,P,3	CE	2	
	Superb Parrot	^^Polytelis swainsonii	☐	V,P,3	V	1	
Strigidae	Barking Owl	^^Ninox connivens	☐	V,P,3		1	
	Powerful Owl	^^Ninox strenua	☐	V,P,3		1	
Meropidae	Rainbow Bee-eater	Merops ornatus	☐	P	J	1	
Acanthizidae	Speckled Warbler	Chthonicola sagittata	☐	V,P		8	
Meliphagidae	Regent Honeyeater	Anthochaera phrygia	☐	E4A,P	CE	1	
	Painted Honeyeater	Grantiella picta	☐	V,P	V	1	
	Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis	☐	V,P		3	
Neosittidae	Varied Sittella	Daphoenositta chrysoptera	☐	V,P		34	
Artamidae	Dusky Woodswallow	Artamus cyanopterus	☐	V,P		37	
Petroicidae	Scarlet Robin	Petroica boodang	☐	V,P		2	
Hirundinidae	Barn Swallow	Hirundo rustica	☐	P	C,J,K	7	
Estrildidae	Star Finch	Neochmia ruficauda	☐	E4,P	E	1	
Motacillidae	Yellow Wagtail	Motacilla flava	☐	P	C,J,K	1	
Mammalia **Phascolarctidae**	Koala	Phascolarctos cinereus	☐	V,P	V	1	
Petauridae	Yellow-bellied Glider	Petaurus australis	☐	V,P		1	
Pteropodidae	Grey-headed Flying-fox	Pteropus poliocephalus	☐	V,P	V	11	
Molossidae	Eastern Freetail-bat	Mormopterus norfolkensis	☐	V,P		8	

Vespertilionidae	Eastern False Pipistrelle	Falsistrellus tasmaniensis	☐	V,P		2	
	Little Bentwing-bat	Miniopterus australis	☐	V,P		1	
	Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	☐	V,P		9	
	Southern Myotis	Myotis macropus	☐	V,P		8	
	Greater Broad-nosed Bat	Scoteanax rueppellii	☐	V,P		7	
Gastropoda **Camaenidae**	Cumberland Plain Land Snail	Meridolum corneovirens	☐	E1		38	

4. IMPACT ASSESSMENT

4.1 INTRODUCTION

All developments have an impact on the floral and faunal diversity of a subject site. These consist of:

- Primary impacts such as the clearing of vegetation, waterbodies and other habitat features; and
- secondary impacts through mechanisms such as increased surface and sediment runoff, introduction of exotic species and diseases, increased disturbances through greater pedestrian and traffic utilisation, increased noise and light pollution and introduction of exotic domestic herbivores (sheep, cattle etc.) and predators (cats and dogs).

These impacts are associated with all phases of a development, from initial land clearing through to occupancy by new landowners/tenants. Although all proposed developments have impacts on floral and faunal values, a biodiversity sensitive approach can lead to a substantial decrease the in potential impacts of any development. In addition, a variety of techniques and technologies are available to reduce the potential impacts of a proposed development throughout all stages.

This section provides an assessment of the impacts of the proposed development in its current form (as shown in the site plan in Appendix 5) and makes suggestions for an alternative approach to reduce potential impacts or provide suitable compensation for these impacts (where appropriate).

The proposed development would remove almost all of the paddock area for the hard stand surface but will keep all of the trees present which will be fenced off to protect them.

4.1.1 Avoiding and minimising impacts on biodiversity values

When assessing the biodiversity impact of a proposed development the consideration of three approaches provides a comprehensive raft of potential options. These three approaches are listed in a descending order of best biodiversity outcomes:

- **Avoid:** modify the proposed development so no significant impact on resident biodiversity values would occur. This is typically impractical but can help guide mitigation measures;
- **Mitigate:** modify the proposed development to reduce the significant impacts on biodiversity values to the maximum extent possible. This is typically achieved through modification of proposed dwelling envelopes to avoid removing vegetation etc.; and
- **Compensate:** include measures in the proposed development to compensate for the biodiversity values lost. This can be achieved through an on-site offset (such as the proposed association lot) which reserves a portion of the subject site in perpetuity for conservation and rehabilitation purposes. It can also be achieved through an off-site offset under the NSW Biobanking scheme. This allows for the proponent of a proposed development to purchase biodiversity credits of an equal value to the credit value of the biodiversity assets present on a subject site. These credits will then be used to preserve an area of equivalent biodiversity value off-site.

Table 3.10 below details recommended avoidance and mitigation measures for all stages of the proposed development.

Table 3.10: Recommended avoidance and mitigation measures for current and projected impacts on the subject site

Impact	Action	Outcome	Timing	Responsibility
Sediment and contaminant exposure caused by development construction	Sediment fencing is to be installed below all areas of exposed soil during works.	Prevention of migration of unconsolidated soil into areas of retained native vegetation	Prior to any soil disturbance works. Maintained and repaired as required. Retained until soil is stabilised by another mechanism	Contractors responsible for works
Sediment, weed and contaminant migration from development area offsite downslope of the development area	Any impact on adjacent vegetation can be mitigated through the use of appropriate stormwater infrastructure that will maximise uptake of stormwater in the subject site (semi-permeable surfaces, vegetated roadside swales etc.)	Minimisation of contaminated stormwater entering areas of retained native vegetation on adjacent lands	Planning stage/during development	Proponent/development planner
Greater pedestrian and vehicle traffic increasing the level of disturbance, affecting the quality of usable habitat and leading to potential collisions with resident native fauna	The surrounding environment is already heavily urbanised. The proposed development is not considered likely to significant exacerbate this impact in the locality	Minimal disturbance to the habitat utility of nearby native vegetation for native fauna. Prevention of vehicle collisions with native fauna	During and following development	Proponent/development planner
Increased noise and light pollution during development	Unlikely to be a significant impact as the local area already has industrial development	Minimal disturbance to sensitive fauna using habitat on adjacent lands	During all development works	Contractors responsible for works
Increased population of exotic predators (dogs and cats). This could increase predation pressure on resident native fauna	The surrounding environment is already heavily urbanised. The proposed development is not considered likely to significant	Minimisation of increased predation pressure from additional domestic exotic predators	Following development	Proponent/development planner

Impact	Action	Outcome	Timing	Responsibility
	exacerbate this impact in the locality Education of future residents as to the potential impact these predators can have and recommendations on how to mitigate this impact (not allowing pets to roam at night, containment of pets within backyards etc.).			
Injury/death of native fauna during removal of habitat trees and dilapidated dwelling	No trees are to be removed and trees are to be protected by fencing during and after development	Prevention of unintended injury to native trees	During development	Proponent/development planner

4.2 ASSESSMENT OF IMPACTS

4.2.1 Biodiversity Conservation Act (2016) – 5-Part Test of Significance

Threatened species impact assessment is an integral part of environmental impact assessment. The objective of section 7.3 of the Biodiversity Conservation Act 2016 (BC Act), the test of significance, is to provide standardised and transparent consideration of threatened species and ecological communities, and their habitats, through the development assessment process. \

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

No threatened species or good quality habitat for threatened species was detected on the proposed development area or its surrounds. As such there would be no adverse effect on the life cycle of any threatened species such that a viable local population would likely be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not Applicable – No Endangered Ecological Community was found to be present.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The habitat present for threatened species and listed ecological communities is considered largely negligible. As such no habitat would be removed, modified, fragmented or isolated such that the long-term survival of any species or ecological community in the locality would be significantly impacted.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

No areas of outstanding biodiversity value would be impacted either directly or indirectly.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposed development would remove only modified and grazed paddock vegetation and as such would not increase the likely impact of any key threatening process. The area is used for agriculture and the surrounding areas are used for the same purpose along with industrial development.

4.2.2 Environment Protection and Biodiversity Conservation Act 1999

No entities identified in the locality which would or could be affected by the proposed development are also listed as Matters of National Environmental Significant (MNES) under the federal EPBC Act. \

Referral to the federal Minister of the Environment for an assessment of this impact is not considered necessary as part of the development application.

4 CONCLUSIONS

This assessment indicated that the proposal does not require a Biodiversity Development Assessment Report (BDAR) under the Biodiversity Assessment Methodology (BAM). The proposal would remove disturbed and grazed paddock vegetation and there would be no significant impact likely on any State or Federally listed species.

No further ecological assessment is deemed to be required.

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6 APPENDIX 1: DISCLAIMER AND LIMITATION OF LIABILITY

The use of this report is for the client only and is based on an assessment of the site at the point in time of assessment. The material in this report reflects the judgement of Anderson Environmental Pty Ltd in light of background information and site conditions at the time of assessment and we take no responsibility for any database inaccuracies or other inaccuracies in background and or other information. The report is not to be reproduced or released to any other party, in whole or in part, without the express written consent of Anderson Environmental Pty Ltd. This report is Copyright protected and is not to be reproduced in part or whole or used by a third party without the express written permission of Anderson Environmental Pty Ltd. If you are not the client who commissioned this report or a local government authority for which approval is being sought as part of the formal DA process and are in possession of this report you are in breach of the law and we reserve the right to recover damages from any individuals, companies or other parties as a result of such breaches. Any use, which a third party makes of this report, or any reliance or discussions based on it, is the responsibility of such Third Parties and as outlined above is in breach of the law. Anderson Environmental and its staff accepts no responsibility for damages, if any, suffered by any third party because of decisions made or actions taken based on this report and reserves the right to recover damages from the third party from breaches as outlined above.

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7 APPENDIX 2: BIODIVERSITY VALUES MAP REPORT FOR THE SUBJECT SITE

Figure A2.1: Biodiversity Values Map report for the subject site

8 APPENDIX 3: SPECIES LISTS

Table A3.1: Flora species list

Family	Scientific name	Common Name	NSW status	Federal status	Exotic
Asteraceae	*Celmisia semicordata*	Mountain Daisy			*
	Cirsium vulgare	Spear Thistle			*
	Conyza bonariensis	Flaxleaf Fleabane			*
	Dimorphotheca ecklonis	Cape Daisy			*
	Euryops chrysanthemoides	African Bush Daisy			*
	Hypochaeris radicata	Catsear			*
	Taraxacum officinale	Dandelion			*
Convolvulaceae	*Dichondra repens*	Kidney Weed			
Geraniaceae	*Geranium molle*	Dovesfoot Geranium			*
	Geranium spp.	Geranium			*
Malvaceae	*Hibiscus rosa-sinensis*	Chinese Hibiscus			*
	Sida rhombifolia	Paddys Lucerne			*
	Eucalyptus tereticornis	Forest Red Gum			
Plantaginaceae	*Plantago lanceolata*	Lambs Tongues			*
Poaceae	*Bouteloua dactyloides*	Buffalo Grass			*
	Cynodon dactylon	Couch Grass			
	Dactylis glomerata	Cocksfoot			*
	Eragrostis curvula	African Love Grass			*
	Megathyrsus maximus	Guinea grass			*
	Microlaena stipoides	Weeping Grass			
	Oplismenus aemulus	Australian Basket Grass			
	Paspalum dilatatum	Paspalum			*
	Pennisetum clandestinum	Kikuyu Grass			*
	Setaria parviflora	Pale Pigeon Grass			*
Verbenaceae	*Verbena bonariensis*	Purpletop			*
	Verbena rigida var. rigida	Veined Verbena			*

BC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2=Endangered Population

EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct

Table A3.2: Fauna species list

Order	Common name	Scientific name	NSW status	Federal status	Exotic	Mode of detection
Aves	Australian Raven	*Corvus coronoides*				Heard
	Black Swan	*Cygnus atratus*				Heard
	Black-shouldered Kite	*Elanus axillaris*				Seen
	Dusky Moorhen	*Gallinula tenebrosa*				Heard
	Magpie Lark	*Grallina cyanoleuca*				Heard
	Masked Lapwing	*Vanellus miles*				Heard
	Musk Lorikeet	*Glossopsitta concinna*				Heard
	Noisy Miner	*Manorina melanocephala*				Seen/heard
	Rainbow Lorikeet	*Trichoglossus moluccanus*				Heard
	Red Wattlebird	*Anthochaera carunculata*				Heard
	Red-rumped Parrot	*Psephotus haematonotus*				Heard
	Short-billed Corella	*Cacatua sanguinea*				Heard
	Superb Fairy-wren	*Malurus cyaneus*				Heard
	Suphur-crested Cockatoo	*Cacatua galerita*				Heard
Mammalia	European Rabbit	*Oryctolagus cuniculus*			*	Scat/scratchings

BC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2= Endangered Population

EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct, B=Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II (Bonn Convention), C=China-Australia Migratory Bird Agreement (CAMBA), J=Japan-Australia Migratory Bird Agreement (JAMBA), R=Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA

9 APPENDIX 4: THREATENED FLORA AND FAUNA SPECIES ASSESSMENT TABLES

Table A7.1: Flora Species

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Acacia baueri subsp. aspera	Occurs in low, damp heathlands, often on exposed rocky outcrops over a wide range of climatic and topographical conditions. Appears to prefer open conditions; rarely observed where there is any shrub or tree canopy development; and many of the observations of this species have been made following fire, suggesting the species prefers early successional habitats	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Bynoe's Wattle *(Acacia bynoeana)*	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Flockton Wattle (*Acacia flocktoniae*)	The Flockton Wattle is found only in the Southern Blue Mountains (at Mt Victoria, Megalong Valley and Yerranderie). Grows in dry sclerophyll forest on sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Acacia gordonii	Grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Acacia meiantha	Grows in dry sclerophyll forest or woodland, in sandy to clayey soil	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Acacia pendula population in the Hunter catchment	Within the Hunter catchment the species typically occurs on heavy soils, sometimes on the margins of small floodplains, but also in more undulating locations	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Downy Wattle *(Acacia pubescens)*	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Acrophyllum australe	Grows in sheltered gullies beneath waterfalls and drip zones of rock overhangs and cliff faces, usually with a south-east to south-west aspect. Typically found in areas where there is a more or less constant supply of water. Usually grows in shale interbeds at the base of small cliffs, in crevices on the sandstone rock face or on talus slopes. The rock overhangs are of Hawkesbury or Narrabeen Sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Allocasuarina glareicola	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Ancistrachne maidenii	Habitat requirements appear to be specific, with populations occurring in distinct bands in areas associated with a transitional geology between Hawkesbury and Watagan soil landscapes	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Asterolasia elegans	Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*)	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Thick-leaf Star-hair *(Astrotricha crassifolia)*	Occurs in dry sclerophyll woodland on sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Baeckea kandos	Known from several locations in Wollemi National Park, immediately south of Dunns Swamp. Occurs in heathland on skeletal, infertile sandstone-derived soils, normally in association with pagodas	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Deane's Boronia (*Boronia deanei*)	Grows in wet heath, often at the margins of open forest adjoining swamps or along streams. Also found in drier open forest on poorly drained peat soils over granite or sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Small Pale Grass-lily (*Caesia parviflora var. minor)*	Found in damp places in open forest on sandstone	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Netted Bottle Brush *(Callistemon linearifolius)*	Grows in dry sclerophyll forest on the coast and adjacent ranges.	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Megalong Valley Bottlebrush (*Callistemon megalongensis*)	Occurs in shrubby swamp habitat and swampy woodland. Associated species include *Callistemon citrinus, Leptospermum morrisonii, L. juniperinum, L. polygalifolium, L. obovatum, Empodisma minus* and *Grevillea asplenifolia* with occasional emergent *Melaleuca linearifolia* and *Eucalyptus camphora*	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Calomnion complanatum	*C. complanatum* grows on the trunks of tree ferns, and occasionally on sandstone rock. Records are from moist, shaded gullies within closed forests in mountainous areas with relatively high rainfall. At both Mount Wilson and Cambewarra Mountain, the closed forests are associated with basalt soils, overlying shales and/or sandstone. The closed forest on Cambewarra Mountain is quite diverse, with many genera and many species of rainforest trees, vines and ferns. The closed forest at Mount Wilson is dominated by Coachwood (*Ceratopetalum apetalum*) and Sassafras (*Doryphora sassafras*). The Rocky Creek Canyon site is cut into sandstone with underlying shales on the Newnes Plateau	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Klaphake's Sedge (*Carex klaphakei*)	Grows with other native sedges and rushes in swamps on sandstone at altitudes of greater than 600 m	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Dwarf Kerrawang (*Commersonia prostrata*)	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*E. haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Cymbidium canaliculatum population in the Hunter Catchment	Typically grows in the hollows, fissures, trunks and forks of trees in dry sclerophyll forest or woodland, where its host trees typically occur on Permian Sediments of the Hunter Valley floor. It usually occurs singly or as a single clump, which can form large colonies on trees, between two and six metres from the ground	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
White-flowered Wax Plant (*Cynanchum elegans*)	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree (*Leptospermum laevigatum*), Coastal Banksia (*Banksia integrifolia*subsp. *Integrifolia*) coastal scrub; Forest Red Gum (*Eucalyptus* tereticornis) *aligned* open forest and woodland; Spotted Gum (*Corymbia maculata*) aligned open forest and woodland; and Bracelet Honeymyrtle (*Melaleuca armillaris*) scrub to open scrub	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Darwinia biflora	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	Occurs around rock platforms and in rocky heath associated with friable sandstone shallow soils. Associated species include *Allocasuarina nana, A. distyla, Banksia ericifolia* and *Caustis flexuosa*	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Darwinia peduncularis	Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Spider Orchid (*Dendrobium melaleucaphilum*)	Grows frequently on *Melaleuca styphelioides*, less commonly on rainforest trees or on rocks in coastal districts	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Dillwynia tenuifolia	In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	V		Yes	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Dillwynia tenuifolia Sieber ex D.C. in the Baulkham Hills local government area	The endangered population includes all locations for the species within the Baulkham Hills local government area. Only two confirmed locations are known, both near the junction of Wisemans Ferry and Sackville Roads	E2		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Epacris hamiltonii	Has a very specific habitat, being found on or adjacent to Narrabeen sandstone cliffs alongside perennial creeks, often below plateau hanging swamps. The soil generally has a spongy/peat-like consistency, with a very high moisture content. Sites are found at the sheltered base of cliffs adjacent to wet gully or swamp vegetation, usually where a perennial or virtually perennial source of water, such as cliff seepages, is present	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Epacris purpurascens var. purpurascens	Found in a range of habitat types, most of which have a strong shale soil influence.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Sparse Heath (*Epacris sparsa*)	Grows in Riparian Sandstone Scrub, where it is found on the base of cliffs or rock faces, on rock ledges or among rocks in the riparian flood zone. Grows in small pockets of damp clay soil, chiefly on south-west facing slopes	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Camden White Gum (*Eucalyptus benthamii*)	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Eucalyptus camaldulensis population in the Hunter catchment	May occur with *Eucalyptus tereticornis*, *Eucalyptus melliodora*, *Casuarina cunninghamiana* subsp. *Cunninghamiana* and *Angophora floribunda* Most of the occurrences are on private land and there are no known occurrences in conservation reserves	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Capertee Stringybark (*Eucalyptus cannonii*)	The Capertee Stringybark is predominantly restricted to the central tablelands and slopes of NSW between the Golden Highway in the north, and the Mitchell Highway in the south. The species' distribution is bounded from east of Bathurst, to Wallerwang near Lithgow, north along the western edge of Wollemi National Park and north-west to Mudgee	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eucalyptus copulans	Due to the low number of records, the habitat requirements of this species are poorly known, but it is assumed that it occurred in the swampy areas adjacent to Jamison Creek around Wentworth Falls	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Broken Back Ironbark (*Eucalyptus fracta*)	Confined largely to State Forest. Locally common but restricted to the northern Broken Back Range near Cessnock, NSW. The dominant tree in a narrow band along the upper edge of a sandstone escarpment. Occurs in dry eucalypt woodland in shallow soils	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Slaty Red Gum (*Eucalyptus glaucina*)	Found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. Grows in grassy woodland and dry eucalypt forest. Grows on deep, moderately fertile and well-watered soils	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Silver-leafed Gum (*Eucalyptus pulverulenta*)	Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*)	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pokolbin Mallee (*Eucalyptus pumila*)	The single known population occupies north-west-facing slopes derived from sandstone. Present as a mid-canopy species to a height of 6 m within dry sclerophyll woodland which has a canopy comprising *Eucalyptus fibrosa, Callitris endlicheri* and, to a lesser extent, *Corymbia maculata*	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eucalyptus sp. Cattai	Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. The sites at which it occurs are generally flat and on ridge tops. Associated soils are laterised clays overlying sandstone	E4A	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Eucalyptus sp. Howes Swamp Creek	The lower Mellong Ck area where this species occurs, is part of a large wetland complex comprising eight swamps, each approximately one square kilometre in area. These swamps dry out on the surface after less than three months of drought. This swamp complex is unique within the Sydney Basin. The area where this species is found has a sheltered south facing aspect on alluvium adjacent to permanent water bodies	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Euphrasia bowdeniae	Confined to wet or damp vertical sandstone rock faces on major cliff-lines facing south or east, growing in small pockets of damp, sandy soil on ledges or at the cliff base. May also occur in damp sites at the top of cliffs. The rock faces receive seepage moisture and support a range of heath plants, particularly epacrids and ferns. Sites are associated with the Hassans Walls soil landscape with steep Narrabeen Sandstone cliffs colluvial talus slopes developed over Illawarra Coal Measures. Altitude varies between 600-750 m	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Tangled Bedstraw (*Galium australe*)	In NSW (and ACT Territory in Jervis Bay), Tangled Bedstraw has been recorded in Turpentine forest and coastal Acacia shrubland	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Bauer's Midge Orchid *(Genoplesium baueri)*	Grows in dry sclerophyll forest and moss gardens over sandstone.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Superb Midge Orchid (*Genoplesium superbum*)	The Superb Midge Orchid occurs predominantly in wet heathland on shallow soils above a sandstone cap but has also been found in open woodland interspersed with heath and dry open shrubby woodland	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Narrow-leaf Finger Fern (*Grammitis stenophylla*)	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Evan's Grevillea (*Grevillea evansiana*)	Grows in dry sclerophyll forest or woodland, occasionally in swampy heath, in sandy soils, usually over Hawkesbury sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Juniper-leaved Grevillea (*Grevillea juniperina subsp. juniperina*)	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Small-flower Grevillea *(Grevillea parviflora subsp. parviflora)*	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils edrived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Grevillea parviflora subsp. supplicans	Occurs in heathy woodland associations on skeletal sandy soils over massive sandstones. Local observations (by Douglas) do not support the description by Olde & Marriott (1995) of its habitat as "wet heath", rather that this taxon is strongly associated with clay-capped ridged of the Lucas Heights and Faulconbridge soil landscapes, but that it is quite restricted within these areas, suggesting it has a preference for yellow clays with periodically impeded drainage	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Gyrostemon thesioides	Grows on hillsides and riverbanks and may be restricted to fine sandy soils	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Square Raspwort (*Haloragis exalata subsp. exalata*)	Square Raspwort appears to require protected and shaded damp situations in riparian habitats	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Haloragoden dron lucasii	Associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Hibbertia fumana	Although originally collected by R. Brown, Caley and Sieber from sites as diverse as 'near South Head' and 'western Sydney', the only known extant population is in the Moorebank area (which could be the 'in occidental Sydney' or 'near Sydney' of either author). Currently only known from a single population at Moorebank but potentially elsewhere in greater Sydney. Generally found in areas of woodland with a more open understorey, in a long intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest at the Moorebank Site	E4A		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Spreading Guinea Flower (*Hibbertia procumbens*)	Majority of known populations occur within *Banksia ericifolia, Angophora hispida–Allocasuarina distyla* scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Hibbertia puberula	Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Hibbertia sp. Bankstown	Soil at the site is a sandy (Tertiary) alluvium with a high silt content.	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Julian's Hibbertia (*Hibbertia spanantha*)	Endemic to NSW where it is restricted to three locations. Grows in forest with canopy species including Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Hibbertia superans	Flowering time is July to December. The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Hypsela sessiliflora	Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone	E1	X	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Fletcher's Drumsticks (*Isopogon fletcheri*)	Restricted to moist sheltered cliffs within the spay zone of a waterfall. Grows in dry sclerophyll forest and heath on sandstone and is confined to sheltered moist positions	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Kennedia retrorsa	Found in a variety of habitats from mountainsides to riparian zones, from sheltered forest to steep, exposed rocky ridgelines	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Keraudrenia corollata var. denticulata in the Hawkesbury local government area	Occurs in tall open forest with *Eucalyptus deanei*, *Tristaniopsis laurina*, *Backhousia myrtifolia*, *Commersonia fraseri*, *Rulingia dasyphylla* and *Hibiscus heterophyllus*. All locations for this species within the Hawkesbury local government area are associated with the endangered Sydney Coastal River-flat Forest. Occurs on sandy soil on sandstone banks, edge of floodplains or on road verges. Soils are low in nutrients and well drained	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Cambage Kunzea (*Kunzea cambagei*)	Cambage Kunzea is restricted to damp, sandy soils in wet heath or mallee open scrub at higher altitudes on sandstone outcrops or Silurian group sediments	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Kunzea rupestris	Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Lasiopetalum joyceae	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River Grows in heath on sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Bristly Shield Fern (*Lastreopsis hispida*)	Grows in moist humus-rich soils in wet forest and rainforest gullies. At Mt Wilson, associated species include *Ceratopetalum apetalum, Elaeocarpus holopetalus, Fieldia australis, Cyathea australis, Blechnum nudum, B. patersonii* and *Leptopteris fraseri*	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Leionema lachnaeoides	Populations occur on exposed sandstone cliff tops and terraces, at 960 - 1000m altitude and with aspects from south-east to south-west. Habitat vegetation is montane heath and commonly includes *Eucalyptus stricta, Allocasuarina nana, Dillwynia retorta, Epacris microphylla* and *Caustis flexuosa*	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Leionema lamprophyllum subsp. obovatum population in the Hunter Catchment	*Leionema lamprophyllum* subsp. *Obovatum* occurs in dry eucalypt forest on exposed rocky terrain	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Rylstone Bell (*Leionema sympetalum*)	Restricted to exposed rocky sandstone formations known as pagodas. The species occurs in dry sclerophyll forest and probably also occurs in open or closed heathland communities	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Leptospermum deanei	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g.*Tristaniopsis laurina, Baechea myrtifolia*; Woodland - e.g. *Eucalyptus haemstoma*; and Open Forest - e.g.*Angophora costata, Leptospermum trinervium, Banksia ericifolia*	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Evan's Sedge (*Lepidosperma evansianum*)	Currently known from 3 locations (at Blackheath and Wentworth Falls). All known sites occur within Blue Mountains National Park, although they are near the boundary of the reserve. It grows on wet sandstone cliff faces in the Blue Mountains in New South Wales	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Woronora Beard-heath *(Leucopogon exolasius)*	The plant occurs in woodland on sandstone. Found along the upper Georges River area and in Heathcote National Park.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Leucopogon fletcheri subsp. fletcheri	Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
(*Marsdenia viridiflora subsp. viridiflora*) population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Grows in vine thickets and open shale woodland	E2		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Biconvex Paperbark (*Melaleuca biconvexa*)	Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Deane's Paperbark *(Melaleuca deanei)*	The species grows in heath on sandstone.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Grove's Paperbark (*Melaleuca groveana*)	Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcopping granite, rhyolite and sandtone on rocky outcrops and cliffs. It also occurs in dry srubby open forest and woodlands	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Micromyrtus blakelyi	Typically occurs within heathlands in shallow sandy soil in cracks and depressions of sandstone rock platforms	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Micromyrtus minutiflora	Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Olearia cordata	Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Milky Silkpod (*Parsonsia dorrigoensis*)	Found in subtropical and warm-temperature rainforest, on rainforest margins, and in moist eucalypt forest up to 800 m, on brown clay soils	V	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Tall Knotweed (*Persicaria elatior*)	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Needle Geebung (*Persoonia acerosa*)	The Needle Geebung occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Bargo Geebung *(Persoonia bargoensis)*	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well-drained, loamy, gravelly soils of the Wianamatta Shale and Hawkesbury Sandstone.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Mittagong Geebung (*Persoonia glaucescens*)	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Persoonia hindii	Restricted to the Newnes Plateau in the Blue Mountains, north of Lithgow. Occurs in dry sclerophyll forests and woodlands on sandy soils	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Hairy Geebung *(Persoonia hirsuta)*	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Clandulla Geebung (*Persoonia marginata*)	The Clandulla Geebung occurs between Kandos and Clarence in the western Blue Mountains. Grows in dry sclerophyll forest and woodland communities on sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Persoonia mollis subsp. maxima	Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Nodding Geebung *(Persoonia nutans)*	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Dwarf Mountain Pine (*Pherosphaera fitzgeraldii*)	Found within the spray zone or associated drip lines and seepage areas of waterfalls on steep, sandstone cliffs and ledges, at altitudes between 680 and 1000 metres above sea level. The sites face south-east to south-west, and being on near-vertical to vertical slopes or under overhangs, are heavily shaded. The degree of shading from other plants varies from none on exposed cliffs and ledges to up to 70% from nearby rainforest plants on larger, lower ledges and overhang caves	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Philotheca ericifolia	Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops. Associated species include *Melaleuca uncinata, Eucalyptus crebra, E. rossii, E. punctata, Corymbia trachyphloia, Acacia triptera, A. burrowii, Beyeria viscosa, Philotheca australis, Leucopogon muticus* and *Calytrix tetragona*		V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Austral Pillwort (*Pilularia novae-hollandiae*)	Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most of the records in the Albury-Urana area were from table drains on the sides of roads	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pimelea curviflora var. curviflora	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Spiked Rice-flower *(Pimelea spicata*)	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Brown Pomaderris (*Pomaderris brunnea*)	Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Slaty Leek Orchid (*Prasophyllum fuscum*)	Grows in moist heath, often along seepage lines. The known population grows in moist sandy soil over sandstone amongst sedges and grasses in an area that appears to be regularly slashed by the local council	E4A	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Singleton Mint Bush (*Prostanthera cineolifera*)	Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Wollemi Mint Bush (*Prostanthera cryptandroides subsp. cryptandroides*)	At Glen Davis, occurs in open forest dominated by Eucalyptus fibrosa. Other eucalypt species may be present as sub-dominants. In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Musty Leek Orchid (*Prasophyllum pallens*)	*P. pallens* grows in dense low heath, often along seepage lines, in moist to wet shallow sandy soils over sandstone, mostly at altitudes greater than 900 m above sea level	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Seaforth Mintbush *(Prostanthera marifolia)*	Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	E4A	CE	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Illawarra Greenhood (*Pterostylis gibbosa*)	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum (*Eucalyptus tereticornis*), Woollybutt (*E. longifolia*) and White Feather Honey-myrtle (*Melaleuca decora*). Near Nowra, the species grows in an open forest of Spotted Gum (*Corymbia maculate*), Forest Red Gum and Grey Ironbark (*E. paniculata*). In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark (*E. crebra*), Forest Red Gum and Black Cypress Pine (*Callitris endlicheri*)	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Sydney Plains Greenhood *(Pterostylis saxicola)*	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Smooth Bush-pea (*Pultenaea glabra*)	Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pultenaea parviflora	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Matted Bush-pea (*Pultenaea pedunculata*)	The Matted Bush-pea occurs in a range of habitats. NSW populations are generally among woodland vegetation but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pultenaea sp. Olinda	Known only from a small area at Currant Mountain Gap east of Rylstone within the Rylstone Local Government Area. The majority of known individuals occur within Wollemi National Park. Has been found only in a very limited area of pagoda rock formation east of Rylstone	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pultenaea villifera Sieber ex DC. population in the Blue Mountains local government area	The population of *P. villifera* in the Blue Mountains Local Government Area is disjunct from other known populations and occurs only at a few small sites in the Springwood-Woodford Area. One of these populations occurs within Blue Mountains National Park. Grows in dry sclerophyll forest and woodlands on sandy soil and appears to favour sheltered spots	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Eastern Australia Underground Orchid (*Rhizanthella slateri*)	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed	V	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Heath Wrinklewort (*Rutidosis heterogama*)	Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Rainforest Cassia (*Senna acclinis*)	Grows on the margins of subtropical, littoral and dry rainforests	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Magenta Lilly Pilly *(Syzygium paniculatum)*	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Tetratheca glandulosa	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Black-eyed Susan (*Tetratheca juncea)*	It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Austral Toadflax (*Thesium australe*)	Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation. Also known from at least two atypical ridgetop locations. The canopy typically *includes Syncarpia glomulifera subsp.glomulifera* (Turpentine), *Angophora costata* (Smooth-barked Apple), *Eucalyptus agglomerate* (Blue-leaved Stringybark) and *Allocasuarina torulosa* (Forest Oak)	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Velleia perfoliata	Found in shallow depressions on Hawkesbury sandstone shelves, on rocky hill sides, under cliffs or on rocky/sandy soils along tracks and trails. Occurs on fairly shallow soils of sandy loam texture. Often found growing on moss and lichen mats formed on rock	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Veronica blakelyi	Restricted to the western Blue Mountains, near Clarence, near Mt Horrible, on Nullo Mountain and in the Coricudgy Range. Over this range, occurrences are patchy and generally small in in size. Occurs in eucalypt forest, often in moist and sheltered areas. Associated canopy species include *Eucalyptus dives*, *E. dalrympleana*, E. rossii and *E. pauciflora*	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Tadgell's Bluebell (*Wahlenbergia multicaulis*) in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	In Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite). However, the sites in Hornsby LGA are on the 'Hawkesbury' soil landscape	E2	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. Status**	Detected within 10 km	Potential Habitat to be Disturbed	Potential impacts
Xanthosia scopulicola	Grows in cracks and crevices of sandstone cliff faces or on rocky outcrops above the cliffs	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Zieria involucrata	Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation. Also known from at least two atypical ridgetop locations. The canopy typically includes *Syncarpia glomulifera subsp.glomulifera* (Turpentine), *Angophora costata* (Smooth-barked Apple), *Eucalyptus agglomerate* (Blue-leaved Stringybark) and *Allocasuarina torulosa* (Forest Oak)	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Velvet Zieria (*Zieria murphyi*)	The Velvet Zieria is found in sheltered positions in moist gullies in moist eucalypt forest with sandy soil	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

**BC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2=Endangered Population*
***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct*

Table A7.2: Fauna Species

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Common Sandpiper (*Actitis hypoleucos*)	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Regent Honeyeater *(Anthochaera Phrygia)*	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	E4A	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Fork-tailed Swift *(Apus pacificus)*	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. Occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea.	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Cattle Egret *(Ardea ibis)*	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures.	-	C,J	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Australasian Bittern *(Botaurus poiciloptilus)*	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.) Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Bush Stone-curlew *(Burhinus grallarius)*	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Sharp-tailed Sandpiper (*Calidris acuminata*)	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage	-	B, C, J, R	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Curlew Sandpiper *(Calidris ferruginea)*	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	E1	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pectoral Sandpiper (*Calidris melanotos*)	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Red-necked Stint (*Calidris ruficollis*)	It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint has been recorded in all coastal regions, and found inland in all states when conditions are suitable. The Red-necked Stint probably travels in flocks and has been observed to feed in dense flocks	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Long-toed Stint (*Calidris subminuta*)	In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has also been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy frindges of drying ephemeral lakes and swamps. The Long-toed Stint also frequents permanent wetlands such as reserviors and artificial lakes. They are uncommon, but not unknown, at tidal estuaries, saline lakes, saltponds and bore swamps		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Gang-gang Cockatoo *(Callocephalon fimbriatum)*	Generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Glossy Black-Cockatoo *(Calyptorhynchus lathami)*	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Pygmy-possum *(Cercartetus nanus)*	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Large-eared Pied Bat *(Chalinolobus dwyeri)*	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
White-winged Black Tern (*Chlidonias leucopterus*)	In Australia, and elsewhere in their non-breeding range, the species mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. White-winged Black Terns frequent tidal wetlands, such as harbours, bays, estuaries and lagoons, and their associated tidal sandflats and mudflats. Terrestrial wetlands, including swamps, lakes, billabongs, rivers, floodplains, reservoirs, saltworks, sewage ponds and outfalls are also inhabited. Wetlands may be open, or with floating emergent or marginal vegetation. They rarely occur on inland wetlands in Australia. The species is usually only recorded offshore when on passage. Most breeding is on vegetated, freshwater inland wetlands, though a single breeding report in New Zealand was at the edge of a coastal estuarine lagoon		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Speckled Warbler *(Chthonicola sagittata)*	The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Spotted Harrier *(Circus assimilis)*	Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Brown Treecreeper (eastern subspecies) *(Climacteris picumnus victoriae)*	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Spotted-tailed Quoll *(Dasyurus maculatus)*	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	V	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Black-necked Stork *(Ephippiorhynchus asiaticus)*	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey.	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
White-fronted Chat *(Epthianura albifrons)*	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Blue Mountains Water Skink (*Eulamprus leuraensis*)	The Blue Mountains Water Skink occurs at high elevations between 560 m and 1060 m. Recent genetic research indicates that individual populations are genetically distinct especially between Newnes Plateau and Blue Mountains populations. It is restricted to an isolated and naturally fragmented habitat of sedge and shrub swamps that have boggy soils and appear to be permanently wet. The vegetation in these swamps typically takes the form of a sedgeland interspersed with shrubs, but may occur as a dense shrub thicket	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Black Falcon *(Falco subniger)*	Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Latham's Snipe *(Gallinago hardwickii)*	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Gull-billed Tern (*Gelochelidon nilotica*)	This species breeds in colonies on lakes, marshes and coasts. It nests in a ground scrape and lays two to five eggs. While widely distributed in freshwater areas in Eurasia, it is associated almost solely with saltwater, coastal areas in North America		C	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Oriental Pratincole (*Glareola maldivarum*)	In non-breeding grounds in Australia, the Oriental Pratincole usually inhabits open plains, floodplains or short grassland (including farmland or airstrips), often with extensive bare areas. They often occur near terrestrial wetlands, such as billabongs, lakes or creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms, especially around the margins. The species also occurs along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Little Lorikeet *(Glossopsitta pusilla)*	Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Painted Honeyeater *(Grantiella picta)*	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or eucalypts are occasionally eaten.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
White-bellied Sea-Eagle *(Haliaeetus leucogaster)*	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea).	-	C	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Giant Burrowing Frog *(Heleioporus australiacus)*	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Little Eagle *(Hieraaetus morphnoides)*	Occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Barn Swallow (*Hirundo rustica*)	When breeding in Europe and north Africa, the Barn Swallow utilises open country with water or low moist green vegetation, such as pastures and farm crops, near margins of wetlands and human settlements. The species usually avoids densely populated areas. The Barn Swallow occurs from sea level up to about 3000 m above sea level. The bird prefers areas with a good supply of accessible artificial structures, such as barns, sheds and bridges for nesting and plenty of overhead wires or bare branches and twigs for perching, sunning and preening		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
White-throated Needletail *(Hirundapus caudacutus)*	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Pale-headed Snake (*Hoplocephalus bitorquatus*)	The Pale-headed Snake is a highly cryptic species that can spend weeks at a time hidden in tree hollows. Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Broad-headed Snake *(Hoplocephalus bungaroides)*	Nocturnal, Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Stephens' Banded Snake (*Hoplocephalus stephensii*)	Rainforest and eucalypt forests and rocky areas up to 950 m in altitude. Stephens' Banded Snake is nocturnal, and shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Caspian Tern (*Hydroprogne caspia*)	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs		C,J	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Comb-crested Jacana *(Irediparra gallinacean)*	Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation. Forage on floating vegetation, walking with a characteristic bob and flick.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Southern Brown Bandicoot (*Isoodon obesulus obesulus*)	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils	E!	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Black Bittern *(Ixobrychus flavicollis)*	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Golden-tipped Bat *(Kerivoula papuensis)*	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests. Bats will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests modified with an access hole on the underside. Bats may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes.	V		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Swift Parrot *(Lathamus discolor)*	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Broad-billed Sandpiper *(Limicola falcinellus)*	Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches.	V	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Bar-tailed Godwit (*Limosa lapponica*)	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Black-tailed Godwit *(Limosa limosa)*	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.	V	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Green and Golden Bell Frog *(Litoria aurea)*	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Booroolong Frog (*Litoria booroolongensis*)	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Littlejohn's Tree Frog (*Litoria littlejohni*)	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Square-tailed Kite *(Lophoictinia isura)*	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Parma Wallaby (*Macropus parma*)	Once occurred from north-eastern NSW to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to the Queensland border. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*)	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Black-chinned Honeyeater (eastern subspecies) *(Melithreptus gularis gularis)*	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*).	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Cumberland Plain Land Snail (*Meridolum corneovirens*)	Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities	E1	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Rainbow Bee-eater *(Merops ornatus)*	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches.	-	J	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Little Bentwing-bat *(Miniopterus australis)*	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Bentwing-bat *(Miniopterus schreibersii oceanensis)*	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Stuttering Frog (*Mixophyes balbus*)	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Giant Barred Frog (*Mixophyes iteratus*)	Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, Giant Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Freetail-bat *(Mormopterus norfolkensis)*	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Yellow Wagtail (*Motacilla flava*)	This insectivorous bird inhabits open country near water, such as wet meadows. It nests in tussocks, laying 4-8 speckled eggs		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Southern Myotis *(Myotis macropus)*	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Star Finch (*Neochmia ruficauda*)	The Star Finch occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns	E4A	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Turquoise Parrot *(Neophema pulchella)*	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Barking Owl *(Ninox connivens)*	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Powerful Owl *(Ninox strenua)*	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Little Curlew (*Numenius minutus*)	The Little Curlew is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Sooty Tern (*Onychoprion fuscata*)	The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Olive Whistler (*Pachycephala olivacea*)	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Osprey *(Pandion cristatus)*	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Bathurst Copper Butterfly (*Paralucia spinifera*)	Occurs on the Central Tablelands of NSW in an area approximately bounded by Oberon, Hartley and Bathurst. The butterfly is found at 35 locations, all within the Greater Lithgow, Bathurst Regional and Oberon local government areas. It is possible that additional locations will be identified, and these may lie outside the currently known distribution. Occurs above 850 m elevation, at sites with a south-west to north-west aspect, usually where direct sunlight reaches the habitat, and with extremes of cold such as regular winter snowfalls or heavy frosts. Geology, soils and dominant vegetation canopy species vary between habitat locations. However vegetation structure is consistent, commonly open woodland or open forest with a sparse understorey that is dominated by the shrub, Blackthorn *Bursaria spinosa* subsp. *lasiophylla*	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Giant Dragonfly (*Petalura gigantea*)	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Coffs Harbour to Nadgee in the south. Live in permanent swamps and bogs with some free water and open vegetation	E1		No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Greater Glider (*Petauroides volans*)	The greater glider chooses habitat based on several factors. A large factor determining habitat choice is the presence of specific species of eucalypt. Distribution levels are higher in regions of montane forest containing manna gum (*E. viminalis*) and mountain gum (*E. dalrympleana, E. obliqua*). Furthermore, the presence of *E. cypellocarpa* appears to improve the quality of habitat for the greater glider in forests dominated by *E. obliqua*. Another factor determining population density is elevation. Optimal levels are 845m above sea level. Within a forest of suitable habitat, they prefer overstorey basal areas in old-growth tree stands		V	No	No suitable habitat present on the subject site for this species	This species was not detected on the subject site during surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species
Yellow-bellied Glider *(Petaurus australis)*	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Squirrel Glider (*Petaurus norfolcensis*)	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Brush-tailed Rock Wallaby (*Petrogale penicillata*)	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north	E1	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Scarlet Robin *(Petroica boodang)*	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Flame Robin (*Petroica phoenicea*)	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Pink Robin (*Petroica rodinogaster)*	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Brush-tailed Phascogale (*Phascogale tapoatafa*)	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occassional records west ot the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Koala *(Phascolarctos cinereus)*	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Ruff (*Philomachus pugnax*)	In Australia the Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges. It is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. They are occasionally seen on sheltered coasts, in harbours, estuaries, seashores and are known to visit sewage farms and saltworks. They are sometimes found on wetlands surrounded by dense vegetation including grass, sedges, saltmarsh and reeds. They have been observed on sand spits and other sandy habitats including shingles. The Ruff forages on exposed mudflats, in shallow water and occasionally on dry mud. They have been observed foraging in dry waterside plants and in swampy areas next to aeration tanks in sewage farms. They prefer to roost amongst shorter vegetation		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Glossy Ibis *(Plegadis falcinellus)*	The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons	-	C	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Pacific Golden Plover (*Pluvialis fulva*)	Within Australia, the Pacific Golden Plover is widespread in coastal regions, though there are also a number of inland records (in all states), sometimes far inland and usually along major river systems, especially the Murray and Darling Rivers and their tributaries. Most Pacific Golden Plovers occur along the east coast, and are especially widespread along the Queensland and NSW coastlines	-	C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Grey Plover (*Pluvialis squatarola*)	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes. On their breeding grounds they inhabit tundra		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Superb Parrot (*Polytelis swainsonii*)	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Dural Woodland Snail (*Pommerhelix duralensis*)	The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris	-	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
New Holland Mouse (*Pseudomys novaehollandiae*)	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes	-	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Red-Crowned Toadlet *(Pseudophryne australis)*	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Grey-headed Flying-fox *(Pteropus poliocephalus)*	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	V	V	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Superb Fruit-Dove *(Ptilinopus superbus)*	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Australian Painted Snipe *(Rostratula australis)*	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	E1	E	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Yellow-bellied Sheathtail-bat *(Saccolaimus flaviventris)*	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Greater Broad-nosed Bat *(Scoteanax rueppellii)*	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Diamond Firetail *(Stagonopleura guttata)*	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Freckled Duck *(Stictonetta naevosa)*	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Red-legged Pademelon (*Thylogale stigmatica*)	Patchily distributed along coastal and subcoastal eastern Australia from Cape York to the Hunter Valley in NSW. Southern range records are from the Watagan Mountains and the Wyong district. There are unconfirmed records from the western New England Tablelands (e.g. west of Emmaville). This species is also found in New Guinea. Inhabits forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Wood Sandpiper *(Tringa glareola)*	The Wood Sandpiper is seen singly, in pairs, or small flocks; occasionally in flocks of hundreds. They associate freely with other waders and often feed in scattered groups	-	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Marsh Sandpiper (*Tringa stagnatilis*)	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats		C,J,K	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Common Greenshank *(Tringa nebularia)*	The species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions.	-	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Grass Owl (*Tyto longimembris*)	Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains	V		No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Masked Owl *(Tyto novaehollandiae)*	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Pairs have a large home-range of 500 to 1000 hectares.	V,3	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Sooty Owl *(Tyto tenebricosa)*	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) or Sugar Glider (*Petaurus breviceps*).	V,3	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.

Species	Expected habitat from OEH.	NSW status*	Comm. status**	Detected within 10km	Potential Habitat to be Disturbed	Potential impacts
Rosenberg's Goanna *(Varanus rosenbergi)*	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	V	-	No	No suitable habitat present on the subject site for this species	This species was not detected during the site surveys. The habitat on site does not represent its preferred habitat and the proposal is unlikely to significantly impact any important habitat for this species.
Eastern Cave Bat (*Vespadelus troughtoni*)	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals					

**BC Act Status: V=Vulnerable, E1=Endangered, E4A=Critically Endangered, E4=Presumed Extinct, E2, Endangered Population*

***EPBC Act Status: V=Vulnerable, E=Endangered, CE=Critically Endangered, X=Extinct, B=Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II (Bonn Convention), C=China-Australia Migratory Bird Agreement (CAMBA), J=Japan-Australia Migratory Bird Agreement (JAMBA), R=Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)*

10 APPENDIX 5: SITE PLAN

ATTACHMENTS

EIS Attachment 1: Secretary's Environmental Assessment Requirements (SEARs)

NSW GOVERNMENT | Planning & Environment

Industry Assessments
Contact: Bianca Thornton
Phone: (02) 8217 2040
Email: bianca.thornton@planning.nsw.gov.au

Mr Scot Brown
MacroPlan Dimasi
Level 52, 19 Martin Place
SYDNEY NSW 2000

EF17/12889
SEAR 1188

Dear Mr Brown

Concrete Recycling Facility (Crushing, grinding or separating works)
100 Fairey Road, South Windsor (Lot 4 DP 264159)
Secretary's Environmental Assessment Requirements (SEAR) 1188

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.

These SEARs have been issued on the basis that the throughput of waste to be processed at the site remains under 100,000 tonnes per annum.

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 and a copy of their requirements is attached.

The Department has also consulted with the Roads and Maritime Services as required by Schedule 3 of *State Environmental Planning Policy (Infrastructure) 2007* and attaches their requirements.

The Department has also consulted with the Office of Environment and Heritage, the Department of Primary Industries, WaterNSW and Rural Fire Service. Attached are the additional requirements for the EIS that have been received to date.

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 Bianca Thornton, Planning Services, at the Department on the details above.

Yours sincerely

C. Ritchie

15/12/17.

Chris Ritchie
Director
Industry Assessments
as delegate of the Secretary

Environmental Assessment Requirements

Section 78A (8) of the *Environmental Planning and Assessment Act 1979.*

Designated Development

SEAR Number	1188
Proposal	Construction and operation of a crushing and recycling plant, capable of processing no more than 100,000 tonnes per annum of construction and demolition waste.
Location	100 Fairey Road, South Windsor (Lot 4 DP 264159), in the Hawkesbury local government area
Applicant	Andy's Earthworks Pty Ltd
Date of Issue	December 2017
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. • **waste management** – including: – a description of the waste streams that would be accepted at the site including the type, classification, maximum daily, weekly and annual throughputs and the maximum size and heights for stockpiles; – details of the source of the waste streams to justify the need for the proposed processing capacity; – a description of waste processing operations, including a description of the technology to be installed, resource outputs, and the quality control measures that would be implemented; – details of how waste would be stored and handled on site, and transported to and from the site including details of how the receipt of non-conforming waste would be dealt with; 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: – the Environmental Impact Statement must include 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). • **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 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 and monitoring measures. • **soil and water** – including: – a description of local soils, topography, drainage and landscapes; – the details of stormwater, leachate and wastewater management; – the details of sediment and erosion controls; – a detailed site water balance; – the details of water usage including water supply and licences; – an assessment of impacts to surface and groundwater resources, flooding impacts and impacts to groundwater dependant ecosystems; – measures that would be implemented to ensure that the development is consistent with the Hawkesbury Floodplain Risk Management Study and Plan; – an assessment in accordance with ASSMAC Guidelines for the presence and extent of acid sulfate soils (ASS) and potential acid sulfate soils (PASS) on the site; and – a description and appraisal of impact mitigation and monitoring measures. • **traffic and transport** – including: – details of road transport routes and access to the 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. • **biodiversity** – including: – accurate predictions of any vegetation clearing on site or for any road upgrades; – a detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements; – details of weed management during construction and operation in accordance with existing State, regional or local weed management plans or strategies; and – a detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts. • **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 (Vegetation in Non-Rural Areas) 2017*; • *State Environmental Planning Policy No 19–Bushland in Urban Areas*;

	• *State Environmental Planning Policy No 33–Hazardous and Offensive Development*; • *State Environmental Planning Policy No 44–Koala Habitat Protection*; • *State Environmental Planning Policy No 55–Remediation of Land*; • *Sydney Regional Environmental Plan No 20–Hawkesbury-Nepean River*; • *Hawkesbury Local Environmental Plan 2012*; 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; • Department of Primary Industries; • Roads and Maritime Services; • WaterNSW; • Rural Fire Service; • Hawkesbury City 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 78A (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.

Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

Attention: Bianca Thornton

Notice Number	1559070
File Number	EF17/13167
Date	24-Nov-2017

RE: 100 Fairey Road, South Windsor – SEARs 1188

I refer to your request for the Environment Protection Authority's (EPA) requirements for the environmental assessment (EA) in regard to the above proposal received by EPA on 13 November 2017.

The EPA understands that Andy's Earthworks Pty Ltd ('the Applicant') is seeking development consent to establish a construction materials crushing and recycling plant at 100 Fairey Road, South Windsor ('the Premises').

The EPA has considered the details of the proposal as provided in the Preliminary Environmental Assessment ('PEA') 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:

1. **Waste Management** – 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. 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 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 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 [We note that the application is for '*less than 100,000 tonnes annually*'. However, section 3 of the PEA states that the amount of waste transported to the site will be '*initially at a rate of up to 150,000 tonnes per annum'*. If the facility proposes to receive more than 100,000 tonnes per year, the application must be for state significant development not designated development];
   - a description of waste processing procedures for each waste type;
   - 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;
   - a detailed site plan(s) identifying areas for haulage, waste receival, processing, storage (for each waste type) and quarantine; infrastructure for environmental controls including dust, noise, stormwater, wheelwash and weighbridge; site boundaries; stormwater drainage areas and

unused stabilised areas [we note that although a reference is made to a site layout, no plan was included with the PEA];

- 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;
- a description of procedures for dealing with non-conforming waste (i.e. waste not permitted to be received at the Premises).

2. **Water Management** – 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 all waste any contaminated water (being any water that has come into contact with waste).

   The PEA refers to settlement and filtration ponds to be constructed on the Premises. The EPA does not consider settlement ponds appropriate for the treatment of contaminated water.

   The EPA notes that even where all waste storage and processing is conducted within an enclosed building, waste may be tracked onto 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 to the offsite stormwater system.

   The EIS must address potential impact on South Creek, its tributaries and wetlands which run through the Premises and any flood zones. Please refer to Attachment A for detail of what is to be included in the water impact assessment.

3. **Air Quality** – the EIS should identify all potential air emission from the Premises. This includes but is not limited to coarse particulates, PM10, PM2.5 and odour. The proponent must 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.

4. **Noise** - the proponent must demonstrate effective controls to manage noise impacts at all receptors. Please refer to Attachment A for detail of what is to be included in the noise impact assessment.

5. **Fit and proper person** – the EPA understands that the Applicant has been prosecuted previously for waste related offences under the Protection of the Environment Operations Act 1997 ('the Act'). In accordance with section 45 of the 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.

6. **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 Applicant does not own the land. The EPA requires evidence that the Applicant is the lawful occupier of the Premises, such as a lease agreement with the land owner.

7. **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 the fuel storage on the Premises. Any fuel storage areas must be undercover and bunded.

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 will 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

.....

Deanne Pitts

Acting Unit Head

Waste & Resource Recovery

(by Delegation)

ATTACHMENT A: EIS REQUIREMENTS FOR

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.

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. This description should include the following parameters: coarse particulates; PM10 and PM2.5; and any other potential pollutants identified in the assessment process.

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) *and Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC, 2007).

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 *Noise Policy for Industry 2017.*
- 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 in accordance with the Noise Policy for Industry (2017) :
  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)'
  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
  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 the Noise Policy for Industry (2017) .

- 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

NSW RURAL FIRE SERVICE

NSW Department of Planning & Environment
Industry Assessments
320 Pitt Street
GPO Box 39 SYDNEY NSW 2001

Your reference: SEAR 1188
Our reference: D17/4164

Attention: Bianca Thornton

Dear Madam,

Request for Input: Concrete Recycling Plant, 100 Fairey Road South Windsor (Lot 4 Dp264159) – SEAR 1188.

Reference is made to correspondence dated 13 November 2017 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*.

If you have any queries regarding this advice, please contact Craig Casey, Development Assessment and Planning Officer, on 1300 NSW RFS.

Yours sincerely,

Jason Maslen
Team Leader, Development Assessment and Planning
Planning and Environment Services (East)

Department of Primary Industries

OUT17/47928

29 November 2017

Ms Bianca Thornton
GPO Box 39
Sydney NSW 2001
bianca.thornton@planning.nsw.gov.au

Dear Ms Thornton

SEAR's Request –Construction materials, crushing and recycling plant, 100 Fairey Rd, South Windsor, SEARs ID 1188 (Lot 4, DP264159)

Thank you for the opportunity to provide Secretary Environmental Assessment Requirements (SEAR) for the above proposal as per your email dated 13 November 2017.

The NSW Department of Primary Industries (NSW DPI) Agriculture is committed to the protection and growth of agricultural industries, and the land and resources upon which these industries depend. Important issues are the potential impact on limited agricultural resources and the ability to rehabilitate the land to enable continued agricultural investment.

NSW DPI Agriculture provides SEARs (Attachment 1) and a publication to assist consent authorities, community and proponents in addressing the recommended SEARs (Attachment 2).

Should you require clarification on the information contained in this response, please contact Agricultural Land Use Planner, Wendy Goodburn on (02) 4824 3736.

DPI Agriculture is working to ensure that the advice provided is of the highest quality. Please take some time to provide us with feedback on our work by completing a short survey.

Yours sincerely

Wendy Goodburn
Agricultural Land Use Planning

Attachment 1 Recommendations for SEARs

Issue and desired outcome	Detail / Requirement
Site Suitable for development	• Detail that the proposal is consistent with strategic plans and zone requirements • Complete a Land use Conflict Risk Assessment (LUCRA) to identify potential land use conflict, in particular relating to separation distances and management practices to minimise odour, dust and noise from sensitive receptors. A LUCRA is described in the DPI Land Use Conflict Risk Assessment Guide. • Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors.
Consideration for impacts to agricultural resources and land	• Describe the current and potential *Important Agriculture Land* on the proposed development site and surrounding locality including the land capability and agricultural productivity. • Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated. • Consider possible cumulative effects to agricultural enterprises and landholders. • Detail the expected life span of the proposed development
Bushfire risk identified and managed	• Risk assessment level and mitigation plan developed to address bush fire risk.
Suitable and secure water supply	• Outline any impacts to water use from agriculture and mitigation measures if required.
Surface & Groundwater protected	• Proposed development design, operation and by-product management should be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession.
Biosecurity Standards met	• Include a biosecurity (pests, weeds and disease) risk assessment outlining the likely plant, animal and community risks. • Develop a biosecurity response plan to deal with identified risks as well as contingency plans for any failures. Including monitoring and mitigation measures in weed, disease and pest management plans. • Details of adequate fencing to keep livestock out.
Suitable traffic movements	• Consideration of the route for movements needs to be taken into account so that impacts on sensitive receptors are minimised (e.g. noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves1 (TSR) and the movement of livestock or farm vehicles along / across the affected roads
Adequate consultation with community	• Consult with relevant agencies such as on the design, construction and operation of the proposed infrastructure. • Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about; the proposal, the likely impacts and suitable mitigation measures or compensation. • Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with Council in relation to complaint issues.
Contingency and Environmental Management Plan developed	• Contingency plans should be developed to enable the operation to deal with emergency situations.

Attachment 2: Guidelines for assessment

Title	Location
Infrastructure proposals on rural lands	https://www.dpi.nsw.gov.au/agriculture/lup/development-assessment2/infrastructure-proposals

13 December 2017

RMS Reference: SYD17/01584/01 (A20284577)
DP&E Ref: SSD 1188

Team Leader
NSW Department of Planning & Environment
Resource Assessments
GPO Box 39
Sydney NSW 2001

Attention: Bianca Thornton

Dear Sir/Madam,

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARs) FOR CONCRETE RECYCLING PLANT, 100 FAIREY ROAD WINDSOR (LOT 4 DP 264159)

Reference is made to your email dated 13 November 2017 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 require the following issue to be included in the transport and traffic impact assessment of the proposed development:

1. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required).

   The key intersection to be examined and modelled is:
   - Macquarie Street / Argyle Street
   - Hawksbury Valley Way / Mileham Street

Any inquiries in relation to this Application can be directed to Amanda Broderick on 8849 2391 or development.sydney@rms.nsw.gov.au

Yours sincerely,

RJCumming

Rachel Cumming
Senior Land Use Coordinator
Network Sydney North West Precinct

Bianca Thornton

From: Kirk Dahle <kirk.dahle@dpi.nsw.gov.au>
Sent: Friday, 24 November 2017 2:04 PM
To: Bianca Thornton
Subject: Re: FW: HPE CM: Request for Input: Concrete Recycling Plant, 100 Fairey Road (Lot 4 DP 264159) - SEAR 1188

Hello Bianca,

Thank you for the opportunity to comment on this Preliminary Environmental Assessment. DPI Fisheries has no specific comments associated with the information supplied but notes that it is located adjacent to Key Fish Habitat (South Creek). DPI Fisheries supports the use of best management practices to ensure surface runoff from the works location is contained and prevented from entering the adjacent waterway.

Kind regards,

Kirk

Kirk Dahle | Fisheries Manager, Aquatic Ecosystems
Fisheries NSW | NSW Department of Primary Industries
Port Stephens Fisheries Institute | Taylors Beach Road | Taylors Beach | NSW 2316
Postal address: Locked Bag 1 | Nelson Bay | NSW 2315
T: 4916 3998 | M: 0468 416 101 | E: kirk.dahle@dpi.nsw.gov.au

Bianca Thornton

From: Marnie Stewart
Sent: Thursday, 23 November 2017 2:35 PM
To: Bianca Thornton
Subject: Request for Input: Concrete Recycling Plant, 100 Fairey Road (Lot 4 DP 264159) – SEAR 1188

Dear Bianca

After reviewing the relevant documents, OEH's Greater Sydney Planning Team has concluded that the matter does not contain biodiversity, natural hazards or Aboriginal cultural heritage issues that require a formal OEH response at this stage.

Please note that the Heritage Division in the Office of Environment and Heritage may wish to provide separate comments. The Heritage Division can be contacted at HERITAGEMailbox@environment.nsw.gov.au.

Regards,

Marnie Stewart
Senior Project Officer – Planning, Greater Sydney Branch
Regional Operations Division
Office of Environment and Heritage
T: 02 9995 6868
W: www.environment.nsw.gov.au

EIS Attachment 2: Pre-lodgement Meeting Advice

Our Ref: PD0034/17

6 November 2017

Andy's Earthworks Pty Ltd
C/- Macroplan Holdings Pty Ltd
Level 52, 19 Martin Place
SYDNEY NSW 2000

Dear Sir/Madam,

Pre-lodgement Meeting No. PD0034/17 for a Construction Materials crushing and recycling plant processing facility on Lot 4 DP 264159, No. 100 Fairey Road SOUTH WINDSOR NSW 2756

Reference is made to your meeting with Council's Pre-Lodgement Advisory Panel on 12 October 2017 where Council Officer's Ronald Brear, Richard Nej and William Pillon were in attendance.

Please find below a summary of the matters discussed at this meeting:

1. The subject land is zoned part IN1 General Industrial and part RU1 Primary Production under Hawkesbury Local Environmental Plan (LEP) 2012 and the following definitions are applicable to the proposed development:

   waste or resource management facility *means any of the following:*
   (a) a resource recovery facility,
   (b) a waste disposal facility,
   (c) a waste or resource transfer station,
   (d) a building or place that is a combination of any of the things referred to in paragraphs (a)–(c).

   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.*

   The above uses are permitted in the IN1 General Industrial zone but not the RU1 Primary Production and it was advised during the meeting that it would be unlikely that the proposed land use would be considered over both zones under Clause 5.3 of LEP 2012.

   In order to avoid any about about permissibility of the development, including but not limited to ancillary works such as water storage facilities or access, it was advised that you consider limiting all proposed uses/works to the part of the land zoned IN1 General Industrial.

   Should your client wish to extend into the part of the land in the RU1 Primary Production zone you would need to consider modifying LEP 2012 in the future by lodging a planning proposal.

   During the meeting was discussed that your client may wish to use the land for the parking of vehicles or storage of material, such as sandstone, prior to obtaining approval to use the land as a *resource recovery facility*.

Please note that there are a number of different uses which may apply to the proposed interim use of the land. In this respect the following uses may be applicable:

storage premises *means a building or place used for the storage of goods, materials, plant or machinery for commercial purposes and where the storage is not ancillary to any industry, business premises or retail premises on the same parcel of land, and includes self-storage units, but does not include a heavy industrial storage establishment or a warehouse or distribution centre.*

truck depot *means a building or place used for the servicing and parking of trucks, earthmoving machinery and the like.*

landscaping material supplies *means a building or place used for the storage and sale of landscaping supplies such as soil, gravel, potting mix, mulch, sand, railway sleepers, screenings, rock and the like.*

Please note that the above uses don't allow for the separating, sorting, treating of material on the land and that they are not all permitted in both zones.

2. Based on the information provided it is understood that the proposed development has been identified as being designated development under Part 1 of Schedule 3 of the *Environmental Planning and Assessment Regulation 2000.*

   In this regard the proposal involves crushing, grinding or separating works and/or Waste management facilities or works.

   Pre-lodgement discussions will need to be held with the Department of Planning and an Environmental Impact Statement (EIS) will need to be prepared. A form for designated development is available from the Department of Planning's website.

   It was strongly advised that you obtain specific comments from the Department concerning the flood liability of the land and the types of activities proposed on flood liable land.

3. Based on the nature of the proposal the development to be categorised as:

   - State significant development under State Environmental Planning Policy (State and Regional Development) 2011, and/or

   - Development that needs to be determined by the Joint Regional Planning Panel under Schedule 4 of the Environmental Planning and Assessment Act 1979.

   Any application being prepared must clearly address the above matters and provide specific information as to the proposed amount of material being handled on the site and the capital investment values of the proposal.

4. Section 91 of the *Environmental Planning and Assessment Act 1979* identifies different types of integrated development. It was noted that approvals under the *Protection of the Environment Operations Act 1997* or *Water Management Act 2000*.

5. The site has been classified as having a high risk given that there is a high probability of flooding on the site. The following flooding information is provided:

   - the 1:100 Average Recurrent Interval (ARI) flood event is predicted at 17.3 metres above Australian Height Datum (AHD)

   - the 1:50 ARI flood event is predicted at 15.7 metres above AHD

- the 1:20 ARI flood event is predicted at 13.7 metres above AHD
- the 1:10 ARI flood event is predicted at 12.3 metres above AHD
- the 1:5 ARI flood event is predicted at 11.1 metres above AHD
- the highest part of the site appears to be located at the access from Fairy Road and is approximately 18 metres AHD
- the lowest point of the site appears to be approximately 2 metres AHD, and
- the Hawkesbury Floodplain Risk Management Study and Plan identifies the subject land as being located in a “extreme flood risk” and “high Flood risk precinct”. Industrial development within this risk category must consider the general prescriptive controls listed in the plan.

  Please note that recreation and non-urban uses are generally expected in extreme flood risk precincts.

6. Any application being lodged must demonstrate that that the land use acceptable having regard to Clause 6.3 of LEP 2012 and Council’s *Development of Flood Liable Land Policy* apply to the proposal.

   Particular attention must be made towards evacuation and flood impacts on downstream properties and potential for pollution.

7. Filling of land within the floodplain to address access or building height standards is not considered suitable.

   Any application proposed to be lodged for the use of the land would need to be supported by a flood study specific to the proposed development. This study is required to be prepared by a suitably qualified and experienced person.

   Please note that the preparation and submission of a flood study may not guarantee support of the proposal.

8. Materials below the 1:100 ARI flood event must be of flood compatible materials and designed to withstand potential impacts of flood waters.

9. The Riverstone topographic map No. 9030-1S identifies a watercourse running thorough the land, any construction works within close proximity to this watercourse would require the approval of the NSW Office of Water.

10. The land is mapped as being bushfire prone. The application must consider bushfire risk of the site.

11. The land is mapped as containing significant vegetation on the Terrestrial Biodiversity Map under LEP 2012.

    Any application is to demonstrate that the proposed development will have no significant impact on threatened species, communities or populations or their habitats by the submission of a flora and fauna report prepared by a suitably qualified and experienced person.

    A flora and fauna report is to be prepared in accordance with the Department of Environment and Climate Change Threatened Species Assessment Guidelines. Whist the proposal may not involve significant removal of vegetation on site the report should focus on impacts the proposal would have on surrounding vegetation. Impacts such as potential wastewater and stormwater should be considered.

12. Trees, shrubs and grasses shall be planted around the development site to provide visual buffers to adjoining properties. Native vegetation of a local provenance shall be used within these buffer zones.

13. A Water Balance Report shall be provided to address nutrient runoff and environmental impacts associated with material being processed on site.

14. A traffic impact assessment report shall be provided to cover traffic associated with the proposed use. This must detail the total number of vehicles expected to the site including hours, access routes and number of vehicles.

15. Any application being submitted must be accompanied by an acoustic report, dust impact assessment report and traffic impact assessment report prepared by a suitably qualified and experienced person. The reports must consider any potential impacts anticipated with the development and its effect on adjoining land uses.

16. A detailed Plan of Management for the site must be prepared showing how the land would be operated and managed. Including, but not limited to hours of operation and control of potential dust nuisance.

17. Disabled access and facilities would need to be provided within the development to satisfy the Disability (Access to Premises — Buildings) Standards 2010 and the Building Code of Australia (BCA).

18. Any Development Application shall provide an assessment against the following environmental planning instruments:

    a) Hawkesbury LEP 2012
    b) State Environmental Planning Policy No. 55 – Remediation of Land (SEPP No. 55)
    c) State Environmental Planning Policy No 44—Koala Habitat Protection (SEPP No. 44)
    d) State Environmental Planning Policy No 33—Hazardous and Offensive Development
    e) State Environmental Planning Policy (Infrastructure) 2007
    f) Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (SREP No. 20).

19. Any Development Application shall provide an assessment against the Hawkesbury Development Control Plan 2002 (HDCP 2002), in particular:

    a) Part C Chapter 2 – Car Parking and Access
    b) Part C Chapter 3 – Signs
    c) Part C Chapter 6 – Energy Efficiency
    d) Part C Chapter 4 – Soil Erosion and Sediment Control
    e) Part C Chapter 8 – Management of Construction and Demolition Waste
    f) Part D Chapter 2 – Industrial Development.

20. Any proposed easements that burden the land shall be detailed and noted on the plans.

21. Access into the site, parking, manoeuvring areas and sight lines shall conform to AS2890.1. Turning paths shall be shown from all spaces.

22. Hawkesbury City Council is the Sewer Authority for the locality.

23. The following information would be required to be submitted with the application:

    a) Site plan
    b) Floor plan
    c) Elevation and section plans
    d) Survey plan
    e) Drainage plan

f) Statement of Environmental Effects
g) Site and building survey plan to AHD
h) Flood study
i) Flora and Fauna assessment
j) Acid Sulfate Soils Management Plan
k) Acoustic Report
l) Traffic impact assessment report
m) Dust impact assessment report
n) Landscaping plan
o) Concept drainage plan
p) Cost Summary report for the development prepared by a quantity surveyor who is a registered member of the Australian Institute of Quantity Surveyors
q) Schedule of external materials, finishes and colours.

2. Please be aware that Section 94A Contributions or Section 94 Contributions may apply to this development.

Council has development contributions for certain development based on the estimated cost of development and for heavy haulage activities.

Councils Section 94A Contributions Plan 2015 and Section 94 Contributions Plan 2015 available at http://www.hawkesbury.nsw.gov.au/development/development-information/planning-policies

***

This letter should not be construed as support or otherwise of the proposal. A full assessment can only be made upon submission of a development application.

If you have any enquiries in relation to this matter please contact me.

Yours faithfully,

William Pillon | Senior Town Planner | Hawkesbury City Council
☎ (02) 4560 4424 | (02) 4587 7740 | www.hawkesbury.nsw.gov.au

EIS Attachment 3: Community Leaflet

Proposed Construction Materials Processing Facility
100 Fairey Road, South Windsor
COMMUNITY INFORMATION SHEET

Andy's Earthworks Pty Ltd is proposing to establish a construction materials processing facility at 100 Fairey Road, South Windsor. The land is located in the Hawkesbury Local Government Area, in the suburb of South Windsor in Sydney's north-west and is a primary production and general industrial area. An Environmental Impact Statement (EIS) for the proposal is currently being prepared for submission to Hawkesbury City Council. The EIS will be exhibited for a designated 30 day period, at which time the community are invited to make submissions.

About Andy's Earthworks

Andy's Earthworks is one of Australia's leading Earthmoving, demolition and quarry companies and first joined the industry in 1997. They provide excavation & demolition services across Sydney, Penrith, Richmond and Windsor as well as supplying sandstone, riprap and retaining wall blocks under the name of Sydney Sandstone.

The Proposed Site

The site is located at 100 Fairey Road, South Windsor and is currently being used for a cattle paddock and microfiltration research facility. The land is approximately 22 hectares in area and is rectangular in shape. The site is on land that has two zonings: general industrial and primary production. The site has frontage to Fairey Road to the west. To the north is a cattle field, the east is South Creek and a concrete batching facility is south of the site.

Figure 1: Site Location (Source: Google Maps)

The Proposed Development

The development as proposed, is for the establishment of a facility which will receive, handle and process construction and demolition waste and sort this into individual products for reuse. It is proposed that the site would process up to 28,000 tonnes of material per annum (5,500 tonnes of construction and demolition waste 22,500 tonnes of sandstone). The proposed development would also receive up to 100,000 tonnes of sandstone for storage and resale.

The facility would operate during day time hours only (7am-6pm). No work would occur on weekends or public holidays.

The Manufacturing Process

The operation of the proposed facility involves the following activities to be undertaken on site:

- Unloading and loading of materials;
- Material handling and sorting;
- Crushing and screening;
- Material storage and stockpiling.

Wastes to be accepted on site are typical building materials, including bricks, concrete, tiles and similar materials. The quantity for each material may vary significantly depending on the source that generated the waste. Concrete bricks and similar waste would be crushed and screened on site.

Project Benefits

The project would provide a number of benefits including preventing construction and demolition waste entering landfill, improving efficiency and providing local employment opportunities.

Environmental Considerations

The environment will be carefully considered at each stage of planning. Primary environmental issues that will be addressed in the EIS include:

- Waste Management – the facility uses construction and demolitions waste as a raw material and processes the waste for reuse or further recycling. This waste would otherwise be sent to landfill. The on-site management of this waste as well as classification in accordance with the NSW EPA Guidelines would be provided. The project would satisfy the aims and objectives of the *Waste Avoidance and Resource Recovery Act 1997.*
- Air Quality – the operations would generate dust emissions during processing and stockpiling. A dust impact assessment would be conducted to NSW EPA Guidelines.
- Soil and Water – the minor excavations proposed are unlikely to intercept acid sulphate soils or other contaminants, particularly as preliminary investigations indicated the site is low risk. Stringent environmental safeguards will be put in place to minimise the potential for pollution to land and waters during construction and operation.
- Noise – a noise impact assessment would be conducted to NSW EPA Guidelines and controls recommended to ensure noise limits are adhered to.
- Traffic and Transport – increased traffic would be associated with the construction and operations. This increase and mitigation measures would be assessed in a traffic impact assessment.
- Fire and Risk – The EIS would stipulate the environmental protection equipment that would need to be installed at the premises to minimise fire risk.
- Visual Amenity – the facility would be designed to be similar in size and nature to the surrounding area. An extensive landscaping program would be implemented with native tree planting along the boundaries to improve the appearance of the site.
- Flora and Fauna – a flora and fauna study would address any threatened species, populations or ecological communities and their habitats should they exist at the site.

Environmental safeguards and controls would be designed into the facility to ensure impacts on the environment are minimised.

For More Information

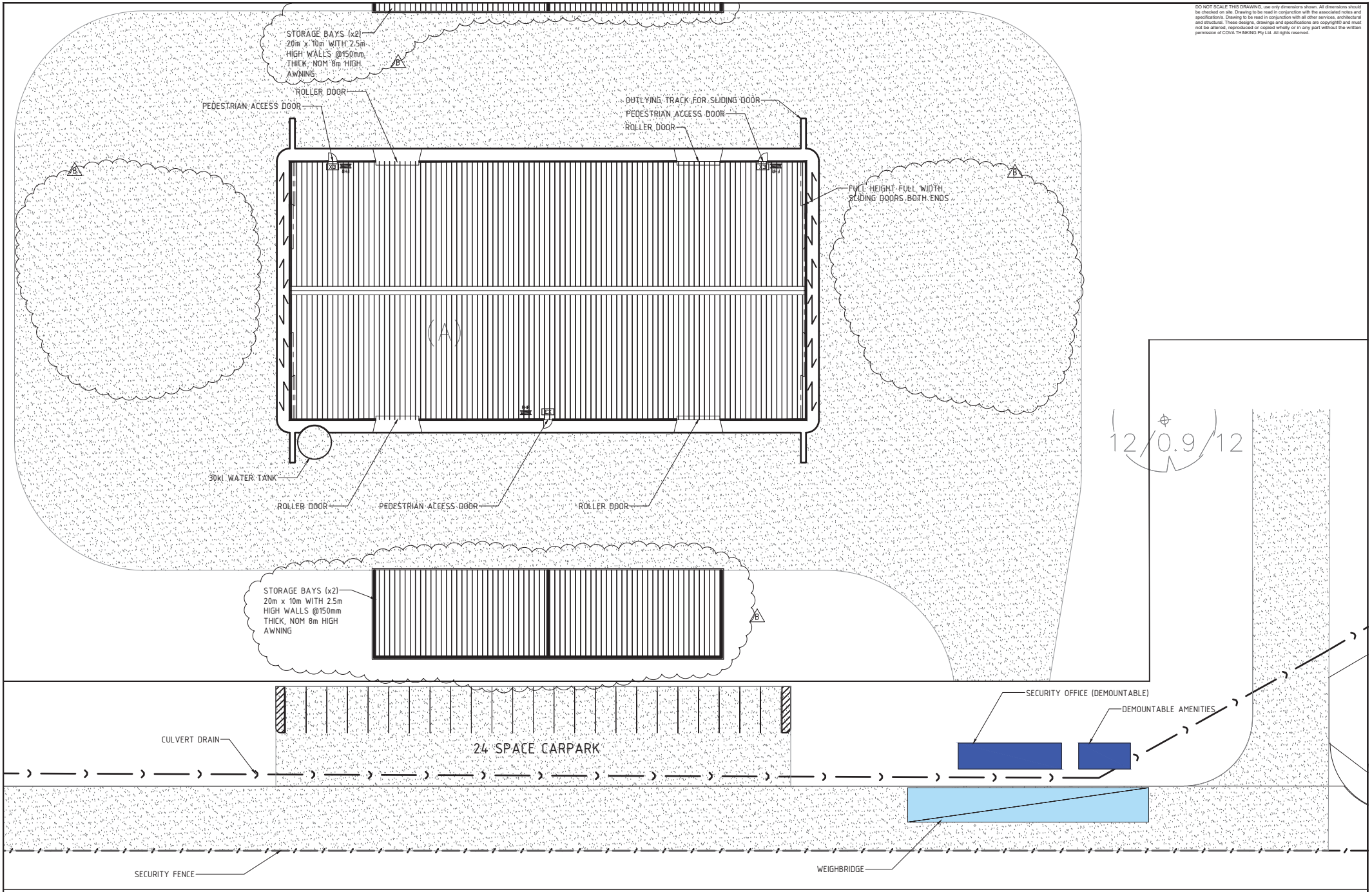
For further information contact Benbow Environmental on (02)9896 0399 or email admin@benbowenviro.com.au

Figure 2: Example of a project by Andy's Earthworks using sandstone rock wall.

Benbow ENVIRONMENTAL
A.B.N. 17 160 013 641

Head Office:
25-27 Sherwood Street Northmead NSW 2152 Australia
P.O. Box 687 Parramatta NSW 2124 Australia
Telephone: +61 2 9896 0399 Facsimile: +61 2 9896 0544
E-mail: admin@benbowenviro.com.au
Visit our Website at www.benbowenviro.com.au

EIS Attachment 4: Site Plans



REV	DESCRIPTION	DRN	CHK	APP.	DATE
B	OPEN STOCKPILE REMOVED, WALLED IN MATERIAL HAS AWNING ADDED	RLM			09.09.19
A	PRELIMINARY ISSUE	RLM			20.08.19

DRAWING CHECK	SIGNATURE	DATE
DRAWN	RLM	22.08.19
DESIGNED		
CHECKED		
CLIENT		

CO-ORDINATION CHECK	SIGNATURE	DATE
STRUCT.		
MECH.		
ELECT.		
HYDR./CIVIL		
FIRE/ENV.		

CLIENT: ANDY'S EARTHWORKS PTY LTD

COVA Stronger Together
1300 35 7363 covathinking.com
ACN 117 492 814

PROJECT: 100 FAIREY STREET
SOUTH WINDSOR

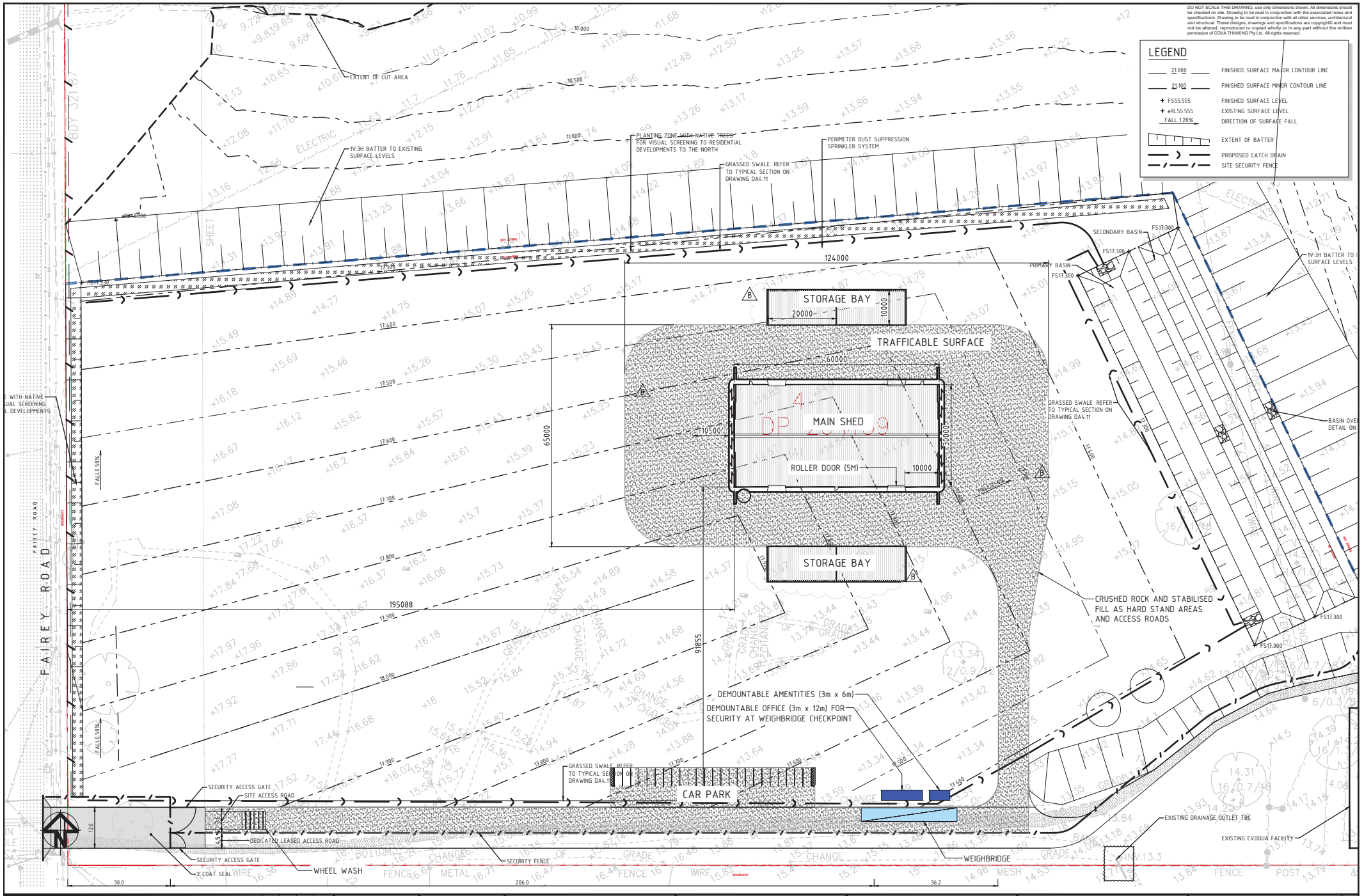
TITLE: SANDSTONE RECYCLING PLANT
PLAN AND TRAFFIC PATHWAYS

2000 0 2000 4000 6000 A1

STATUS: PRELIMINARY ONLY

SCALE @ A1: 1:100 DIMENSIONS IN: MILLIMETRES

DRAWING No.: 5388.001-G02 REV: B



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		DRN	CHK	APP.	DATE
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A	PRELIMINARY ISSUE	RLM			28.08.19

DRAWING CHECK	SIGNATURE	DATE
DRAWN	RLM	28.08.19
DESIGNED		
CHECKED		
CLIENT		

CO-ORDINATION CHECK	SIGNATURE	DATE
STRUCT.		
MECH.		
ELECT.		
HYDR./CIVIL		
FIRE/ENV.		

CLIENT: ANDY'S EARTHWORKS PTY LTD

COVA Stronger Together
1300 35 7363 covathinking.com
ACN 117 492 814

PROJECT: 100 FAIREY STREET SOUTH WINDSOR

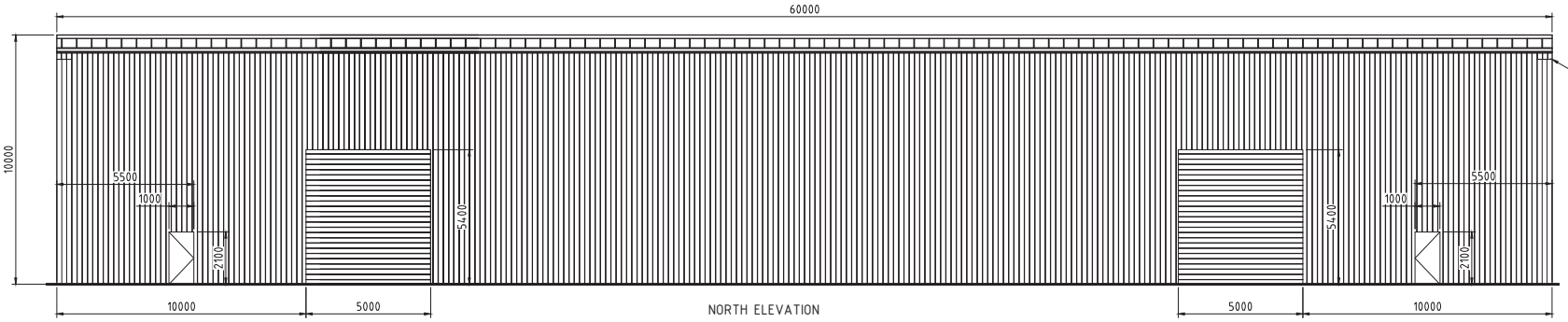
TITLE: SANDSTONE RECYLING PLANT SITE LAYOUT

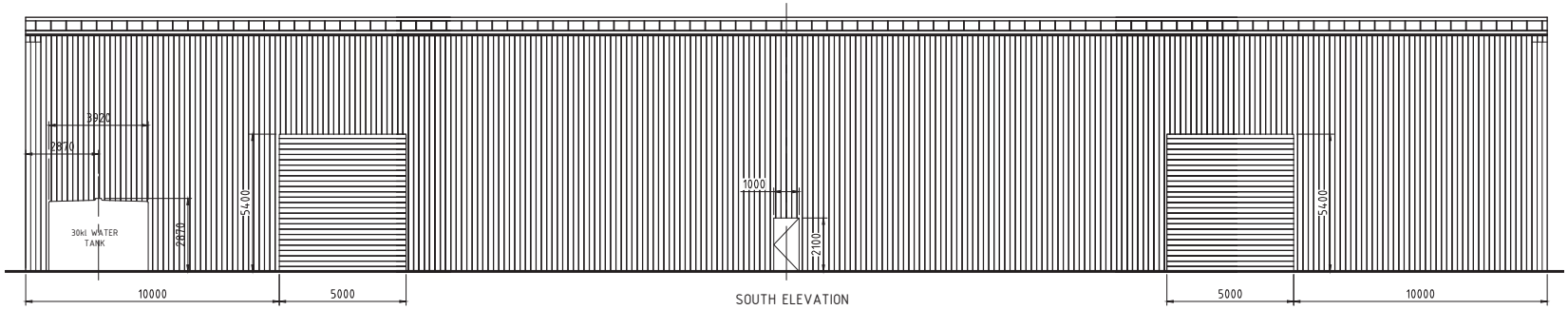
10000 0 10000 20000 30000 A1

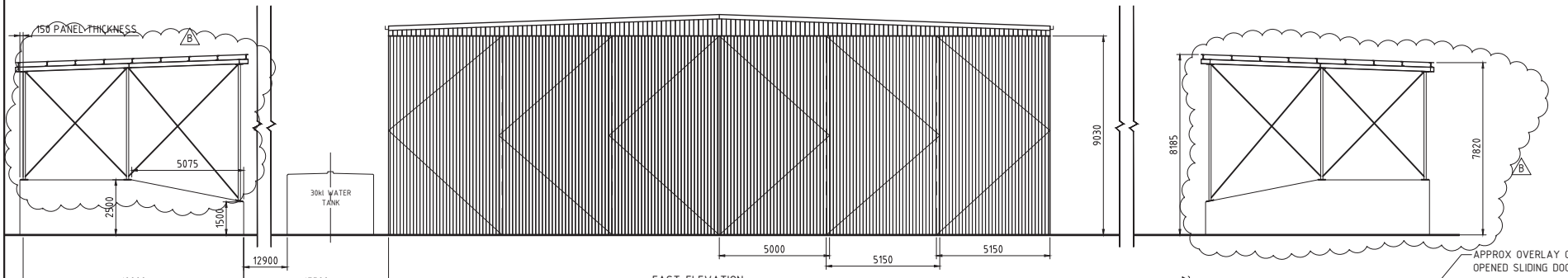
STATUS: PRELIMINARY ONLY

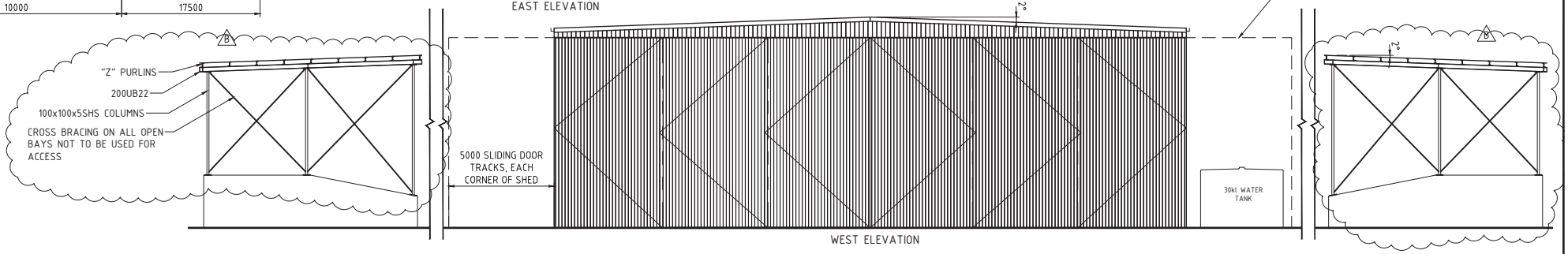
SCALE @ A1: 1:500 DIMENSIONS IN: MILLIMETRES

DRAWING No.: 5388.001-G01 REV: B









B	OPEN STOCKPILE REMOVED, WALLED IN MATERIAL HAS AWNING ADDED	RLM			09.09.19
A	PRELIMINARY ISSUE	RLM			20.08.19
		DRN	CHK	APP.	DATE

DRAWING CHECK	SIGNATURE	DATE
DRAWN	RLM	22.08.19
DESIGNED		
CHECKED		
CLIENT		

CO-ORDINATION CHECK	SIGNATURE	DATE
STRUCT.		
MECH.		
ELECT.		
HYDR./CIVIL		
FIRE/ENV.		

CLIENT: ANDY'S EARTHWORKS PTY LTD

COVA Stronger Together
1300 35 7363 covathinking.com
ACN 117 492 814

PROJECT: 100 FAIREY STREET SOUTH WINDSOR

TITLE: SANDSTONE RECYCLING PLANT ELEVATIONS

2000 0 2000 4000 6000 A1

STATUS: PRELIMINARY ONLY

SCALE @ A1: 1:100 DIMENSIONS IN: MILLIMETRES

DRAWING No.: 5388.001-G03 REV: B