

Statement of Environmental Effects
Cowal Gold Operations Accommodation Village

VOLUME 2 – APPENDIX D TO J

Prepared for Evolution Mining (Cowal) Pty Limited
April 2021

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Appendix D

Construction management plan

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EVOLUTION MINING
CGO ACCOMMODATION VILLAGE
WEST WYALONG

CONSTRUCTION MANAGEMENT PLAN

MARCH 2021

Revision	Description	Date	Author	Reviewed
V1.0	Preliminary Draft Issue for Comment	22 March 2021	KO	SS
V2.0	Final Issue for DA	26 March 2021	AM	AD

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Contents

1. INTRODUCTION

This Construction Management Plan (CMP) has been prepared to support the planning application submitted to Bland Shire Council (BSC) for the proposed development at Boundary Street, West Wyalong.

This CMP outlines the key environmental, health and safety matters to be managed during, the construction delivery of the proposed staged development.

This CMP is a preliminary plan prepared in advance of the appointment of a Principal Contractor for the project. A more detailed Construction & Environmental Management Plan (CEMP) is required to be prepared and provided to BSC prior to commencement of construction works. The CEMP is to be implemented for each stage of the construction works by the Principal Contractor prior to commencement on site.

2. THE PROJECT AND STAGING

2.1. The Site

The site is located at Boundary Street, West Wyalong NSW.

The existing improvements on the site include an internal circulation road and inground service infrastructure.

The site is bounded by:

- North-west boundary: 14 Hyde Street, West Wyalong
- South boundary: 20 Cedar Street, West Wyalong
- Eastern Boundary: Boundary Street
- Western Boundary: Hyde Lane

2.2. The Project

The project involves site preparation works, construction of building foundations and enabling infrastructure as well as the offsite manufacture, delivery and installation of modular buildings that will accommodate and provide amenity to the mine site construction and operations workforce. Handover will be in three stages to prioritise early occupation of key areas. A fourth stage will occur in approximately three years and will include the demobilisation of the construction workforce accommodation and the installation of further recreation areas.

2.3. Delivery Phase

Site Establishment

The site establishment will focus on providing a secure and safe site that adequately contains construction activities, prevents unauthorised access by the public and is regularly maintained to minimise its visual impact.

The construction works will be contained by 'A Class' temporary fencing and shade cloth to reduce the visual impact of construction and provide segregation to the surrounding residents and the public. The two existing points of access off Boundary Street will be utilised for construction access, one each for entry and exit. The builder's compound will be located near the entry gate in the Southern zone within the site. An additional satellite ablution block will be provided to serve the north portion of the site. A material handling zone will be located between the operation accommodation modules and the construction accommodation modules.

A Site Establishment Plan for Stage 1 is provided for reference in Appendix 1.

At the completion of the Stage 1 works, Evolution will take possession and have exclusive use of the northern portion of the site. For Stage 2 and 3 works, the Principal Contractor will adjust the builder's fence to separate the activities of Evolution and its operator from the construction works.

The builder's compound and materials handling zone will remain unaffected, both in size and location.

An alternative entry and exit access point will be created. We will be seeking separate Council permission to use the no-through council road to the south of the site to link to Boundary Road.

This site establishment is expected to service and remain in place for Stage 2 and 3 of the project delivery.

A Site Establishment Plan for Stage 2 and 3 is provided for reference in Appendix 2.

Earthworks

The earthworks will commence with the removal and disposal of the existing stockpiles. A qualified soil environmental consultant will undertake soil contamination classification prior to distribution of fill across the site for waste classification purposes for either on-site reuse or off-site disposal.

Minor grading of the site will be required to form four flat building pads.

The footings will be screw piles, concrete pads or a slab on ground the design of which will correspond with both ground conditions and geotechnical requirements. Following survey and set works, excavators will be used to either drill the screw piles or undertake detailed excavation for the pad footing or slab on ground options. The placement of formwork, reinforcement and concrete for any concrete pads or slab will complete the substructure works.

Inground Services

Where possible the existing inground services infrastructure will be reused. The position and location of all existing services will be identified and marked.

Trenches will be excavated and conduits laid to reticulate services throughout the site. Connection points for services with upturns will be provided at the site of each building.

The site is now prepared for the delivery and placement of the modules.

Building Works

The buildings will be engineered and constructed offsite by a modular building manufacturer. The onsite works will be limited to assembly.

The modules will be single storey of nominal size 14.5 x 3.5m. Modules will be delivered to site and lifted in place using mobile cranes. These will be tied to the footings and connected to the services upturns. The interconnection decks and roof awnings will be flat packs, typical 3m wide and installed separately. Stairs, ramps and subfloor enclosures will complete the installation sequence.

Works will be staged to enable the completion of the highest priority accommodation modules and key amenities at the earliest opportunity. Staged occupation certificates will be required to allow the completed buildings to become suitable for occupation. The remaining accommodation will be delivered shortly after.

External Works

The internal roadway will be replaced and slightly realigned from its current location. The removal and laying of the new road is anticipated to be completed in stage 1 and maintained for the duration of the remaining works.

The pathways, swales and landscaping will be completed with each relevant stage.

Decanting

The builder's compound will progressively bump out as the workforce decreases in size in Stage 3. This will allow access to the area last construction accommodation cluster so it can be completed in time. The balance of the compound will be removed following the completion of stage 3.

3. ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

3.1. General

The Principal Contractor engaged to undertake the works will be licensed and competent and will be required to establish, maintain and enforce a Health and Safety Management Plan (HSP) for the proposed works.

The Principal Contractor will be required to prepare a CEMP that considers the findings of the SEE and details of proposed mitigation measures that will be implemented for the construction phase of the project.

All parties entering the site will be required to attend a site induction, at which time the site environmental, health and safety management plan will be presented and its requirements explained as a prerequisite for site access and before undertaking any work within the site.

3.2. Safety

The general site safety principles will be to:

- ensure a safe environment for the public travelling past the site and the adjoining neighbours,
- ensure safe access onto the site for staff, employees, subcontractors and site visitors,
- ensure a safe working environment for site staff, employees and subcontractors, and
- ensure site safety is addressed by all persons on the site in accordance with the NSW Work Health and Safety legislation.

Upon appointment of a contractor for a stage of the works, the contractor will be nominated as the Principal Contractor and will be required to prepare a site safety plan and manage the site in accordance with the NSW Work Health and Safety Act.

3.3. Sediment Control and Dewatering

The construction works will include for subsoil drainage protected with geo-textile and granular filters to prevent the movement of fine particles into the storm water system. During construction, waste points and storm water entry points will be protected with geo-textile fabrics and hay bales to filter storm water lines from run-off.

A sediment control barrier/fence will be established in accordance with the relevant standards and guidelines to ensure sediment control both during the works and on completion. The sediment control barrier will be maintained throughout the works to ensure any erosion is contained by the fence within the site.

Wheels of vehicle departing from the site will be washed via a wheel wash facility and be monitored for cleanliness prior to leaving site. The immediate adjacent public roads will also be monitored for accidents and a sweeper engaged to keep these roads clear of spoil if the need arises.

3.4. Earthworks and Contamination

Prior to the commencement of earthworks, an unexpected finds procedure will be defined in the CEMP prepared by the Principal Contractor.

This procedure will be reviewed and endorsed by a suitably qualified and experienced person with experience in site contamination risk assessment. This process will identify the correct procedure to manage of any contamination if found on site during the proposed works.

3.5. Acid Sulphate Soils

Acid sulphate soils (ASS) are not likely to be present on the site. An ASS / Potential Acid Sulphate Soil Material (PASSM) management plan is not required to be prepared by an appropriately qualified consultant prior to commencement of excavation works to the satisfaction of the Principal Certifying Authority.

Any ASS or PASSM encountered during excavation is to be treated or removed off site to an approved treatment or disposal facility in accordance with the approved ASS / PASSM management plan.

3.6. Dust Management

The Principal Contractor will minimise the potential for any air quality impacts by providing whenever possible, a wet process for cutting, drilling and grinding to limit dust emission. The Principal Contractor will adopt adequate measures to prevent dust from affecting the amenity of the surrounding land uses during construction to prevent the escape of dust or other materials in accordance with WorkCover NSW codes of practice.

The Principal Contractor shall ensure that all trucks leaving the site have their loads covered. Loose materials will be appropriately stored onsite in order to minimise potential impacts from prevailing weather conditions. The contractor is to establish dust monitoring on the site and report monthly their results to Evolution. Should readings exceed the permissible standards the contractor will be required to mitigate the dust source immediately and report more frequently.

3.7. Noise and Vibration Management

The Principal Contractor is expected to undertake all works using equipment and a methodology which will consider the requirements of the EPA noise guidelines.

The applicant will prepare dilapidation reports of the adjoining properties, councils' road and public ways prior to the commencement of excavation.

The Principal Contractor will be required to prepare a detailed noise and vibration management plan as part of their Construction Environmental Management Plan for the project to ensure construction noise and vibration is minimised and kept within acceptable levels throughout the project.

3.8. Waste Management

As part of the CEMP a detailed waste management plan will be prepared by the Principal Contractor.

Waste during the construction period will be sorted into, paper, cardboard, brick, concrete, timber, steel, aluminium and general waste. Separate bins will be provided to allow all possible materials to be recycled. All bins will be removed by a licenced contractor with appropriate systems to track waste recycling and disposal.

The Principal Contractor will ensure offsite fabrication is maximised where practical to ensure the amount of wastage on site is minimised.

3.9. Ecology and Biodiversity

The Principal Contractor will be required to comply with the recommendations included in the Biodiversity Development Assessment Report (BDAR) prepared by EMM Consulting and included in this Development Application.

3.10. Other

The Principal Contractor will be required to comply with any other conditions of development consent related to environmental, health and safety mitigation measures not stated within this document.

4. CONSTRUCTION MANAGEMENT

4.1. Working Hours

The site working hours will be within the working hours approved in the development consent.

The applicant will be seeking 7.00 am to 5.30 pm Monday to Saturday of each week.

4.2. Site Security

Generally, the contractor will be responsible for site security and access during the construction of the project.

It is envisaged that the site will be secured by way of the use of the following but not limited to:

- Australian Standards approved temporary fencing, with a designated site entry gate which will be chained, and pad locked after hours.

All temporary fencing will comply with WorkCover NSW codes of practice. A daily inspection of all hoardings/fences/gates will be undertaken. All graffiti and bill posters encountered will be removed and/or painted over within 48 hours.

All illegally dumped materials encountered will be removed as soon as possible. Regular vandalism inspections will be undertaken, and damages repaired as soon as possible.

Should any security issues arise, these will be reported to the Principal Contractor responsible for the site. They will then pursue the matter with local police.

4.3. Site Accommodation & Ablution Facilities

Temporary facilities will be provided by the contractor(s) in accordance with WorkCover NSW requirements. These will be located within the worksite, adjacent to the entry gate or as determined by the Principal Contractor.

4.4. Hoardings & Fencing

As noted under security, all fences and hoardings will be supplied and erected in accordance with WorkCover NSW codes or practice and relevant Australian Standards.

Separate applications will be submitted to Council for the approval of hoardings and overhead protection to be installed on Council's property as required.

4.5. Pedestrian Circulation

Minimal disruption is expected to pedestrian movements to footways that are open to the public.

Any changes to the pedestrian circulation or temporary footpath closures to publicly accessible footpaths will require the submission of a Traffic Management Plan to Council.

4.6. Neighbour Notifications

The Principal Contractor engaged will be required to notify adjoining neighbors during the construction period in accordance with the following principles:

- The site will be managed in accordance with this Construction Management Plan, CEMP, HSP and all other required management plans.
- Construction works will be undertaken strictly within the Council approved working hours.
- In the event that any work, delivery or operation which is considered out of the ordinary is required, then the Principal Contractor is to attain all necessary approvals and make the required notices prior to undertaking the work, delivery or operation.
- In the event that out of hours work will be required, approval from Council is to be obtained and a letterbox note to adjoining neighbors is to be affected at least 24 hours prior to the work being undertaken.

4.7. Deliveries and Materials Handling

The following outlines the proposed indicative deliveries and materials handling process for the project:

Construction vehicles will enter and depart the site from Boundary Street. The two existing access points will be used for Stage 1. The south access point will be the entry. The north access point will be the exit. Vehicles will enter and exit the site in forward facing direction traveling clockwise around the site using the internal roadway.

The project will be successively handed over to Evolution for their occupation. A builder's fence will isolate the construction area and provide Evolution access to their Loading Dock, Bus Lane and the remainder of the site. Construction traffic will now be diverted to a temporary access point to the south east corner of the site.

All loading and unloading of vehicles will be undertaken within the site boundaries. The modules will be delivered as close to their final location as possible to minimise the mobile crane size.

4.8. Traffic Management

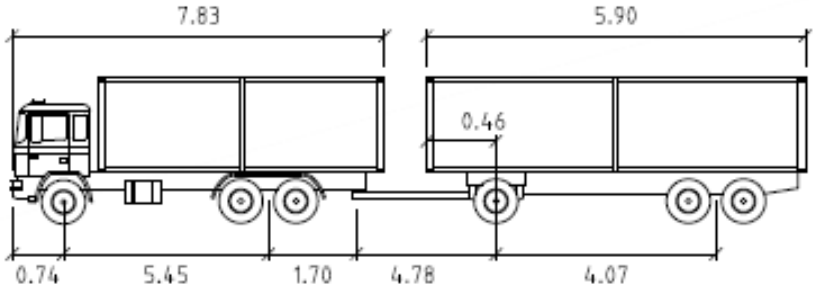
A detailed construction plan has not yet been developed, and as such the number of contractors employed are not confirmed at the present time. It is expected that the maximum vehicle size that will ordinarily require access to site is a 20m semi-trailer. It is anticipated that works on site will be carried out during normal construction hours from 7:00am to 5:30 pm Monday to Saturday, with no work being carried out on Sundays and public holidays.

The proceeding sections contain estimates of construction traffic generation for each phase of construction.

4.8.1. Earthworks

During the earthworks phase all activities will be undertaken within the site boundaries. The indicative plant that will be used onsite are bobcat, grader 140M 200 HP, 6t vibration roller and a bobcat with screw pile rig or a 25t CFA piling rig.

18.1m Truck and Dog will be used to export spoil from the site. The departure route will north along Boundary Street followed by east or west onto the Newell Highway.



TRUCK AND DOG 18.1m

	meters		
First Unit Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 36.9
First Unit Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

The Principal Contractor, when appointed, will prepare a site specific traffic management plan prior to works commencing onsite

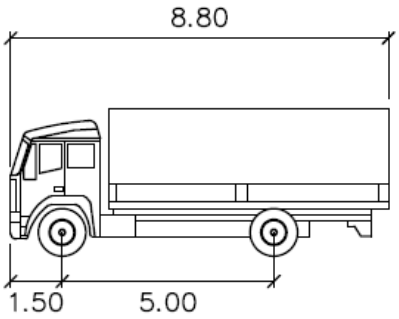
4.8.2. During Construction

The larger construction vehicles that are expected to travel to and from the site during the construction phase are listed as follows:

- 20m Semi Trailer
- 18.1m Truck and Dog
- 12.5m Heavy Rigid Vehicles (HRV)
- 9.75m Concrete Truck

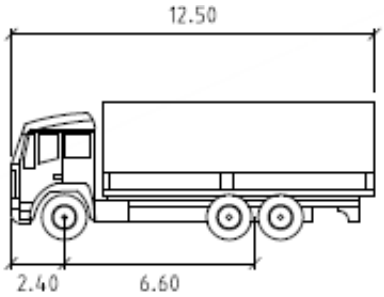
- 8.8m Medium Rigid Vehicle (MRV).

The dimensions for these vehicles are shown below:



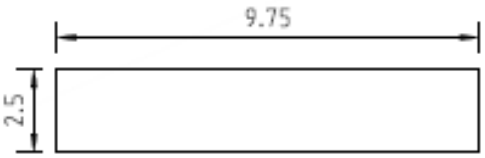
MRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



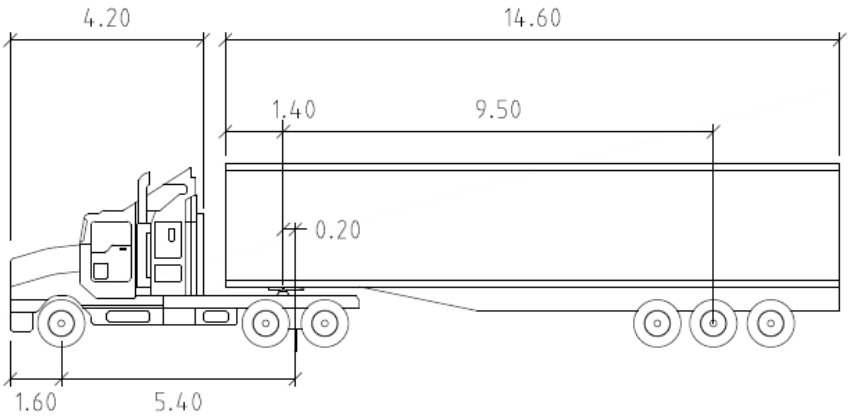
HRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 35.2



CONCRETE-10x4 - 9.75m

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 3.8
Steering Angle	: 32.6



20m AS2890.2-2018

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

4.8.3. Construction Traffic Generation

During the earthworks and construction phase, the maximum construction traffic generation is expected to be 34 trips per day, this rate allows for heavy vehicles movements that will be in the order of 20 trips per week evenly disturbed. This translates to an approximate peak trip generation of around 5 during the earthworks and construction phase.

It is important to note that the daily construction traffic will fluctuate throughout the duration of the project.

Construction Phase	Trip Generating Movements	Duration (weeks)	No. of Trips (per day)	No. of Peak Trips (per hour)
Construction	Delivery of plant and building materials, concrete pours, spoil removal	20 weeks	34	5

Considering the low volume of trucks over the course of the day and discounting of trips generated by the existing residential buildings, the net increase in traffic on the surrounding road network is expected to be negligible.

Construction vehicles will be scheduled to avoid peak commute times wherever possible.

4.8.4. Parking for Construction Workers

There will be parking onsite for construction workers. Construction workers will not be permitted to park in the emergency vehicle access area along the southern boundary. This area will be excluded with the builder fence.

4.8.5. Traffic Control

All vehicles entering construction sites will be managed and attended by traffic control personnel as required who are certified with the RMS Traffic Controller course.

Separate applications will be submitted for works zones and road closures.

Any traffic control plans created for this project must be approved by someone with current TfNSW - Prepare a Work Zone Traffic Management Plan certification.

4.9. Emergency Vehicle Access

Emergency vehicles occasionally travel along the south boundary allowing direct connection between Boundary Street and Cedar Street. The route will be kept clear and unobstructed at all times during the works. The temporary builders fence will be located off this boundary to allow clear, dedicated access. Parking or storage of materials and plants is not permitted in this area.

4.10. Pedestrian and Cyclist Access

The proposed works are expected to have a negligible impact on pedestrians and cyclists. No cycle routes are affected.

During some construction activities, it may be necessary to temporarily stop access along the frontage of the site to allow for service connections. If this occurs, pedestrians will be directed to the eastern side of Boundary Street. An approved traffic control plan is to be used for this instance.

Otherwise, pedestrian activity is unaffected by construction activities.

4.11. Tree Protection

The trees shown to be retained as indicated within this development application will be protected in accordance with tree protection zone requirements.

5. CONCLUSION

This preliminary Construction Management Plan has been prepared to support the planning application submitted to Bland Shire Council for the proposed development at Boundary Street, West Wyalong.

The impact of construction traffic is expected to be minimal and can be managed through appropriate traffic control measures. Development of a detailed construction traffic management plan can be conditioned with the development consent.

A further Construction and Environmental Management Plan (CEMP) and Health and Safety Plan (HSP) will be prepared by the Principal Contractor prior to the commencement of any construction works on site to the satisfaction of the Principal Certifying Authority.

6. APPENDICES

6.1. Appendix 1 Site Establishment Plan – Stage 1

SITE ESTABLISHMENT PLAN - STAGE 1

6.2. Appendix 2 Site Establishment Plan – Stage 2 and 3

SITE ESTABLISHMENT PLAN - STAGE 2 & 3



Appendix E

Biodiversity impact assessment

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Biodiversity Development Assessment Report

Cowal Gold Operations Accommodation Village

Prepared for Evolution Mining (Cowal) Pty Limited
April 2021

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Biodiversity Development Assessment Report

Cowal Gold Operations Accommodation Village

Report Number

J190140A RP9

Client

Evolution Mining (Cowal) Pty Limited

Date

13 April 2021

Version

v2 Final

Prepared by

Steven Ward
Associate Ecologist
13 April 2021

Approved by

Nathan Garvey
Associate Director
13 April 2021

Executive Summary

ES1 Project introduction

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the site), located immediately west of Boundary Street, West Wyalong.

This Biodiversity Development Assessment Report (BDAR) supports a development application (DA) and statement of environmental effects (SEE) submitted to assess the project. The BDAR has been triggered due to the presence of land mapped under the Biodiversity Values map on the site and the clearing exceeding the clearing threshold defined in Section 7.2 of the Biodiversity Conservation Regulation 2017 (BC Regulation).

ES2 Landscape features

The subject land occurs within the NSW South Western Slopes Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and the Lower Slopes IBRA subregion. The BioNet NSW Landscape which intersects with the subject land is Manitoba Hills and Footslopes.

The majority of the area surrounding the subject land is urban and non-native; a buffer area of 805.2 hectares (ha) around the subject land contains 210.8 ha (26%) native vegetation cover. The patch size of native vegetation within the subject land is over 100 ha.

There are no important geological features within or near the subject land. The nearest water bodies are a highly modified first order creek and an artificial wetland, both located within 1 kilometre (km) of the subject land.

There are no areas of outstanding biodiversity value, as defined in Part 3 of the NSW *Biodiversity Conservation Act 2016* (BC Act) within a 1,500 m buffer of the subject property.

ES3 Native vegetation

Field surveys including vegetation plots and vegetation mapping identified one plant community type (PCT) within the subject land; PCT 217 Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion. Two vegetation zones were identified, Medium and Poor.

It was determined that vegetation within the subject land did not represent a threatened ecological community (TEC). No candidate entities for Serious and Irreversible Impacts (SAII) were identified.

ES4 Threatened species

An assessment of the geographic and landscape constraints within the subject land identified the potential occurrence of three candidate threatened species; a subshrub (*Tylophora linearis)*, Squirrel Glider (*Petaurus norfolcensis*) and Koala (*Phascolarctos cinereus*). Targeted surveys did not record any threatened species within the subject land. No threatened species were identified on the site.

ES5 Impact avoidance, minimisation and mitigation

The project is located within an area that is already disturbed from historical development at the site. The site was formerly the location of Barrick Gold's accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The Barrick Gold accommodation village was demolished between 2005-2006 and the site is currently devoid of built structures. Since this time, vegetation has regrown across part of the site.

A precautionary and conservative approach has been adopted for this BDAR by assuming that all vegetation within the site boundary will be removed. This approach is intended to provide maximum flexibility to future minor changes in layout as the project progresses into the detailed design, tender and construction phases. However, EMM understands that it is Evolution's intention, wherever possible, to retain native vegetation across the site to enhance village amenity and compliment planned landscaping with floral species native to the surrounding environment.

ES6 Assessment of impacts under other relevant biodiversity legislation

The BDAR has considered impacts on species and ecological communities listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The development is not expected to result in significant impacts on the EPBC Act listed threatened and migratory species of Swift Parrot (*Lathamus discolor*), Superb Parrot (*Polytelis swainsonii*), or Coben's Long-eared Bat (*Nyctophilus corbeni)*. As such, it is considered that a referral under the EPBC Act to the Department of Agriculture, Water and Environment is not required.

ES7 Biodiversity impacts and offsets

Based on the assumption that all vegetation on site will be disturbed, the development will result in clearing of 2.19 ha of PCT 217 Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion. A further 0.63 ha of the same PCT will be subject to an asset protection zone (APZ) within the Boundary Road corridor. No threatened species credit species were recorded on the site.

To compensate for impacts on native vegetation and ecosystem credit species, 16 ecosystem credits will be required. No threatened species credits are required.

Evolution will compensate for the residual impacts via purchase from the biodiversity credit market, establishment of site(s) to create credits, or payment to the Biodiversity Conservation Fund (BCF) to meet the credit obligation.

Abbreviations

BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
BioNet	NSW BioNet
Biosecurity Act	NSW *Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and Environment
DFSI	NSW Department of Finance, Services and Innovation
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EMM	EMM Consulting Pty Limited
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GDE	Groundwater-dependent Ecosystem
GPS	Geographic Positioning System
IBRA	Interim Biogeographic Regionalisation of Australia
KFH	Key Fish Habitats
KTP	Key Threatening Process
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	Office of Environment and Heritage (now BCD)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
RVA	Rapid Vegetation Assessment
SEPP	State Environmental Planning Policy
SRD	State and Regional Development
SEE	Statement of Environmental Effects
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TECs	Threatened Ecological Communities

TPZ	Tree Protection Zone
VIS	Vegetation Information System

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Appendices

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Figures

1 Introduction

1.1 The project

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the site), located immediately west of Boundary Street, West Wyalong (see Figure 1.1 and Figure 1.2).

EMM Consulting Pty Limited (EMM) has been engaged by Evolution to prepare a development application (DA) and accompanying statement of environmental effects (SEE) for the project under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This Biodiversity Development Assessment Report (BDAR) has been prepared by EMM in support of the SEE for the project.

1.2 Project description

The project is located within the Bland Shire Local Government Area (LGA) and is considered as a multi-dwelling residential development under the *Bland Local Environmental Plan 2011* (LEP) and *Bland Shire Development Control Plan 2012* (DCP).

The village is being developed to accommodate the anticipated workforce associated with the construction and operation of the Cowal Gold Operations (CGO) Underground Development Project, located approximately 38 kilometres (km) north-east of West Wyalong (see Figure 1.1). The CGO Underground Development Project is currently the subject of a State Significant Development (SSD) application (SSD 10367), under section 4.38 of the EP&A Act.

The project conceptually comprises the following key components:

- accommodation capacity for up to 176 people, total, supporting the CGO Underground Development Project, including:
    - temporary construction workforce accommodation modules to house 96 people;
    - semi-permanent operational workforce accommodation modules to house 72 people; and
    - semi-permanent accessible accommodation modules to house 8 people, with facilities which are Commonwealth *Disability Discrimination Act 1992* (DDA) compliant;
- use of upgraded existing access points and on-site roads;
- administration buildings;
- communal facilities, including:
    - laundry units;
    - communal dining and kitchen building;
    - outdoor eating areas;
    - first aid and nursing room;

  - prayer room;
  - quiet room;
  - gymnasium;
  - multipurpose outdoor court; and
  - running track;
- undercover bus shelter and car parking spaces;
- light vehicle car parking;
- fencing and lighting;
- reticulated services; and
- landscaping.

The village components will be modular in design with different layouts dependent on the workforce (construction, operational and accessible) supporting the CGO Underground Development Project. The development will be staged, with the operational and accessible workforce modules being constructed first to ensure this area of the village is ready to house the construction workforce as soon as possible. The construction workforce modules will be completed as soon as possible thereafter.

Approval is sought for all stages of development as part of the SEE and DA. Construction of the accommodation modules is expected to take approximately eight months total. Construction of additional amenities/facilities may take up to a further three years, post removal of construction accommodation modules. Minor earthworks will be required for site establishment activities, including vegetation clearing and grubbing, ground levelling and trenching for service installation. Any excavated topsoil will be stockpiled and reused on site where possible.

Appropriate security measures such as fencing, gates, cameras and night lighting will be installed. Site landscaping will be undertaken to increase visual amenity consistent with the surrounding neighbourhood and will incorporate water sensitive urban design practices. This includes maintaining existing native vegetation wherever possible.

1.3 Site description

The site is located on Boundary Street in West Wyalong (Figure 1.2), in central west New South Wales (NSW), which is located approximately 360 km west of Sydney (Figure 1.1). Under the Bland LEP (Land Zoning Map – Sheet LZN_007F), the site is zoned as Zone R1 General Residential.

The site is located on vacant freehold land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (see Figure 1.2), held by the West Wyalong Local Aboriginal Land Council (LALC) subject to determination of native title. A native title claim (NN2020/007) was lodged on 21 August 2020 by the West Wyalong LALC over part of the site. This claim was yet to be determined at the time of writing.

The site was formerly the location of Barrick Gold's accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The Barrick Gold accommodation village was demolished between 2005-2006 and the site is currently devoid of built structures. The site is located within a larger area of relatively flat vacant land which now contains fragmented native vegetation that has regrown across part of the site since the former accommodation village was demolished.

The site is bounded by Hyde Lane and Cedar Street to the west and Hyde Street to the north. Other land uses surrounding the site include residential, industrial and retail. The closest private residence is located immediately adjacent to the site on Hyde Lane.

1.4 Biodiversity assessment pathway

Under section 7.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act) if a proposed development is likely to significantly affect threatened species or communities, the development application must be accompanied by a BDAR. Criteria for determining whether a development or activity is likely to significantly affect threatened species or communities is set out in section 7.2 of the BC Act and includes:

- the development is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3 of the BC Act; or
- the development exceeds the biodiversity offsets scheme threshold (set out under section 7.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation) and including;
  - the clearing of native vegetation of an area declared by clause 7.2 as exceeding the threshold; or
  - the clearing of native vegetation, or other action prescribed by clause 6.1, on land included on the Biodiversity Values Map; or
- the development is carried out in a declared area of outstanding biodiversity value.

A preliminary assessment of whether the proposed development would trigger the Biodiversity Offset Scheme and thus require preparation of a BDAR was undertaken and is set out in Table 1.1.

Table 1.1 Assessment of whether the project will trigger the Biodiversity Offset Scheme (Part 4 local development)

Criterion	Assessment
The proposed development is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in Section 7.3 of the BC Act.	Not required.
The development exceeds the biodiversity offsets scheme thresholds outlined in Section 7.1 of the BC Regulation:	The site is located within the Bland Shire LGA and is subject to the Bland LEP.
• it involves clearing of native vegetation that exceeds the threshold for clearing;	The minimum lot size gazetted in the Bland LEP is 500 m^2. The clearing threshold for this minimum lot size is 0.25 ha or more. The project will result in clearing of 0.7 ha of native vegetation and thus exceeds this threshold.
• clearing of native vegetation on land included in the Biodiversity Values Map	The site is located on land mapped on the Biodiversity Values Map (checked 15 March 2021).
The site is a declared area of outstanding biodiversity value.	The site is not located in an area of outstanding biodiversity value.

The project exceeds the clearing thresholds in section 7.2 of the BC Regulation, and the site is mapped on the Biodiversity Values Map. Thus, the DA must be accompanied by a BDAR.

1.5 Purpose of this report

This BDAR accompanies a DA for the proposal under Part 4 of the EP&A Act. The assessment has been completed by an accredited assessor, Steven Ward (BAAS17062) in accordance with the Biodiversity Assessment Method (DPIE 2020).

This BDAR has been prepared by EMM in support of the SEE and the specific objectives of this report are to:

- describe biodiversity values of the subject land;
- assess the likelihood that threatened species and communities (threatened biodiversity) listed under relevant the BC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) could occur in the subject land;
- document the strategies implemented to avoid and/or minimise impacts of the project on threatened biodiversity;
- assess residual biodiversity impacts, after avoidance and minimisation strategies have been implemented; and
- provide environmental safeguards to mitigate biodiversity impacts during construction and operation.

1.6 Site definitions

Project elements referred to in this BDAR are described in Table 1.2.

Table 1.2 Project elements referred to in this BDAR

Project elements	Definition
Buffer area	1,500 m buffer of project footprint (site-based developments only)
Site (disturbance footprint)	Area subject to all proposed direct and indirect impacts, as described in Section 6.1
Subject land	Area which was surveyed for ecological values. For this project this was a broader area than that impacted by both direct and indirect impacts, as shown in Figure 3.2

1.7 Information sources

1.7.1 Publications and databases

To provide context for the project, information about flora and fauna species, populations, communities and habitats from the locality (generally within 10 km) was obtained from the following databases:

- BioNet Atlas of NSW Wildlife for previous threatened species records;
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) for Matters of National Environmental Significance (MNES) likely to occur within the subject land; and
- the NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database.

1.7.2 Other relevant reports

This biodiversity assessment has been prepared with reference to other technical reports that were prepared as part of the project. The other relevant reports referenced in this biodiversity assessment are:

- bushfire constraints and opportunities assessment (Blackash Bushfire Consulting 2021); and
- West Wyalong Accommodation Village site plan – ground level (Nettleton Tribe 2021).

1.7.3 Spatial data

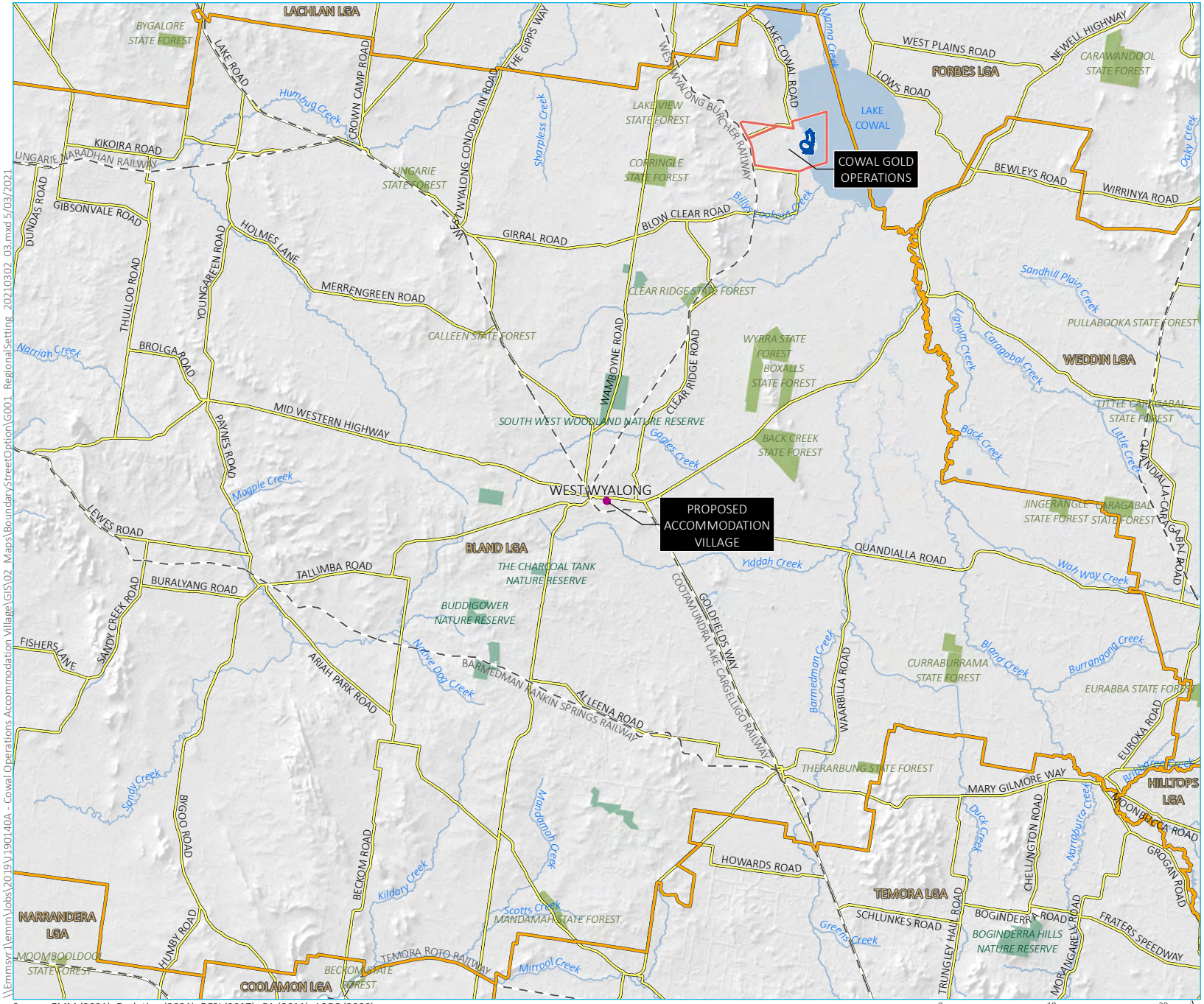
Spatial data encompassing the subject land, including the disturbance footprint, was obtained from Currajong Planning, Property and Project Management. Base map data was obtained from Department of Finance, Services and Innovation (DFSI) NSW databases, with cadastral data obtained from DFSI digital cadastral database.

The following spatial datasets were utilised during the development of this report:

- State Vegetation Type Map: Central West Lachlan v1.4 - VIS_ID 4468 (OEH 2016b);
- Mitchell Landscapes Version V3.1 (OEH 2016a);
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7 (DoEE 2017a);
- Strahler Stream Order (DPI 2013);
- Directory of Important Wetlands (DoEE 2018); and
- NSW Wetlands (OEH 2010).

Mapping undertaken during the site assessment was conducted using a hand-held GPS unit, mobile tablet computers running Collector for ArcGIS™ and Survey123 for ArcGIS™ and aerial photo interpretation. Accuracy of data collected is subject to the accuracy of the GPS devices used, generally ± 5 m. Mapping has been produced using a Geographic Information System (GIS; ArcGIS 10.5).

Spatial data relevant to this BDAR was provided to the Bland Shire Council following lodgement of the BDAR.



Source: EMM (2021); Evolution (2021); DFSI (2017); GA (2011); ASGC (2006)

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Regional setting

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 1.1

EMM
creating opportunities

Source: EMM (2021); Evolution (2021); DFSI (2017)

0 50 100 m

GDA 1994 MGA Zone 55

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Local setting

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 1.2

EMM
creating opportunities

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as Matters of National Environmental Significance (MNES) under the EPBC Act. These are:

- world heritage properties;
- places listed on the National Heritage Register;
- Ramsar wetlands of international significance;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have a significant impact on a MNES is to be referred to DAWE for determination as to whether or not it is a controlled action. If deemed a controlled action, the project is assessed under the EPBC Act and a decision made as to whether or not to grant approval.

An assessment of the project against the EPBC Act is provided in Section 7.1.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act was enacted to encourage the consideration and management of impacts of proposed development or land-use changes on the environment and the community. The EP&A Act is administered by the NSW Department of Planning, Industry and Environment (DPIE).

The EP&A Act provides the overarching structure for planning in NSW; however, is supported by other statutory environmental planning instruments (EPIs) including State Environmental Planning Policies (SEPPs). EPIs relevant to the natural environment are outlined further below.

i State Environmental Planning Policy (Koala Habitat Protection) 2021

State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP 2021) aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. It applies to development applications on land which is >1 ha on its own, or together with adjoining land in the same ownership, whether or not the development application applies to only part of the land, and which are within council areas listed in Schedule 1 of Koala SEPP 2021. Bland Shire Council is not listed under Schedule 1 of Koala SEPP 2021, and thus the SEPP does not apply.

Consideration of the Koala SEPP 2021 is not required. Notwithstanding this, the potential for the Koala to occur is considered as part of the BDAR.

2.2.2 Biodiversity Conservation Act 2016

The BC Act, administered by the Biodiversity Conservation Division of DPIE, is the primary legislative tool for the conservation of biodiversity in NSW through the protection of threatened flora and fauna species, populations and ecological communities. The BC Act, together with the BC Regulation, establishes the Biodiversity Offsets Scheme (BOS).

The BOS includes establishment of the Biodiversity Assessment Method (BAM, DPIE 2020) for use by accredited persons in biodiversity assessment under the scheme. The purpose of the BAM is to assess the impact of actions on threatened species and threatened ecological communities, and their habitats and determine offset requirements. For major projects, use of the BAM is mandatory, unless a BDAR waiver is granted.

The BAM sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land in order to:

- identify the biodiversity values on land subject to proposed development area;
- determine the impacts of a proposed development, following all measures to avoid, minimise and mitigate impacts; and
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

This biodiversity assessment has been undertaken in accordance with the requirements of the BAM.

The BC Act and BC Regulation set out assessment requirements for projects being assessed under the EP&A Act. The biodiversity assessment pathway for this project is assessed in Section 1.4.

2.2.3 Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* (FM Act) contains provisions for the conservation of fish stocks, key fish habitat, biodiversity, threatened species, populations and ecological communities. It regulates the conservation of fish, vegetation and some aquatic macroinvertebrates and the development and sharing of the fishery resources of NSW for present and future generations. The FM Act lists threatened species, populations and ecological communities, key threatening processes (KTPs) and declared critical habitat. Assessment guidelines to determine whether a significant impact is expected are detailed in section 220ZZ and 220ZZA of the FM Act.

Another objective of the FM Act is to conserve key fish habitat (KFH). These are defined as aquatic habitats that are important to the sustainability of recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. KFH is defined in Section 3.2.1 and 3.2.2 of the Policy and Guidelines for Fish Conservation and Management (DPI 2013).

No streams are present with the subject land, and hence an assessment of impacts under the FM Act is not required.

2.2.4 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* has superseded the *Noxious Weeds Act 1993*, which has now been repealed.

The primary objective of the Biosecurity Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

The Biosecurity Act stipulates management arrangements for weed biosecurity risks in NSW, with the aim to prevent, eliminate and minimise risks. Management arrangements include:

- any land managers and users of land have a responsibility for managing weed biosecurity risks that they know about or could reasonably be expected to know about;
- applies to all land within NSW and all waters within the limits of the State; and
- local strategic weed management plans will provide guidance on the outcomes expected to discharge duty for the weeds in that plan.

An assessment against the provisions is detailed in Section 7.2.

2.2.5 Water Management Act 2000

Division 6 of the NSW *Water Management Act 2000* (WM Act) requires consideration of controlled activities (ie activities within 40 m of riparian land) and aquifer interference activities. The NSW Aquifer Interference Policy (NOW 2012) requires an assessment of potential impacts on groundwater users, including groundwater dependent ecosystems.

Impacts on riparian land and groundwater dependent ecosystems (GDEs) are considered in Section 7.3 of this report.

Stage 1 – Biodiversity assessment

3 Landscape features

3.1 Landscape features

The identification of landscape features at the disturbance area was determined using Section 4 of the BAM (DPIE 2020), as summarised within this chapter. Landscape features are shown in Figure 3.1 and Figure 3.2.

3.1.1 Bioregions and landscapes

The disturbance area occurs within the NSW South Western Slopes Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion and the Lower Slopes IBRA subregion (Figure 3.1 and Figure 3.2). These were used in the assessment.

One BioNet NSW Landscapes (formerly Mitchell Landscapes) intersects with the disturbance area, Manitoba Hills and Footslopes, as such this is the landscape used in this assessment.

3.1.2 Rivers, streams, estuaries and wetlands

The site is within the catchment of the Murrumbidgee River. The site is not bisected by any watercourses, the nearest is an unnamed, first order creek 400 m north of the site. The creek occurs within an urban landscape and is highly modified.

A small local wetland is located approximately 1 km east of the site. The wetland is artificial, developed as an environmental and passive recreational area as part of the town's drainage catchment. The wetland will not be impacted by the proposed development.

No wetlands of national or international importance occur within or in close proximity to the site. The closest important wetland listed on the Directory of Important Wetlands in Australia (DIWA) is Lake Cowal/ Wilbertroy Wetlands, over 30 km to the north-east of the site.

3.1.3 Connectivity

The site sits within a predominantly urban landscape and does not include any biodiversity corridors mapped by local council or by DPIE. The site makes up the north western edge of a large patch of predominantly remnant native vegetation. Vegetation within the site is fragmented by cleared areas, pre-existing roads and on-going disturbance by maintenance and recreational activities such as bike trails. Connectivity within the site is limited to small patches of woodland and scattered trees and shrubs. It is likely to provide connectivity for highly mobile arboreal fauna only, predominantly birds.

The site is bounded by an urban area to the north and west. A large patch of remnant native vegetation is present to the south and east of the site, with both sealed roads and informal tracks present. The vegetation patch was determined to be at least 100 ha in size.

Additional patches of native vegetation are located approximately 1 km to the north and 2 km to the east of the site. Street trees through the town provide some connectivity for birds between these areas and those adjacent to the site. For the purposes of impact assessment, it has conservatively been assumed that all vegetation within the site will be removed; however, it is understood that existing vegetation will be retained wherever possible as part of the development. Vegetation outside of the site boundary on adjacent land will also be retained, as such, connectivity characteristics will not change significantly.

3.1.4 Areas of geological significance

The site and surrounding area does not contain karst, caves, crevices, cliffs or other areas of geological significance.

3.1.5 Areas of outstanding biodiversity value

There are no areas of outstanding biodiversity value, as declared by the NSW Minister for Energy and Environment, within the 1,500 m buffer of the site.

3.2 Assessment of site context

Mapping of native vegetation within a 1,500 m distance of the disturbance area was undertaken using State Vegetation Type Map: Central West Lachlan (VIS 4468; OEH 2016b) and refined though comparison with aerial imagery.

Native vegetation within the disturbance area was primarily assessed and mapped through field surveys, with aerial imagery used to assist with verification of PCT boundaries. Plots, undertaken in accordance with the BAM, were used to determine vegetation integrity scores across the vegetation types.

Native vegetation within the buffer area is shown in Figure 3.1. The area of native vegetation within the buffer, the percent native vegetation and patch size is shown in Table 3.1.

Table 3.1 Percentage of native vegetation cover

Native vegetation in buffer area (ha)	Buffer area (ha)	Percentage of native vegetation in buffer area	Patch size (ha)
210.8	805.2	26%	101

KEY

- Site boundary
- Subject land
- 1500 m buffer
- Rail line
- Main road
- Minor road
- Strahler 1st order stream
- Dam/artificial wetland
- Native vegetation cover

BioNet NSW landscapes (Mitchell landscapes)

- Ardlethan Hills
- Bimbi Plains
- Manitoba Hills and Footslopes

Note:
IBRA Bioregion - NSW South Western Slopes
IBRA subregion - Lower Slopes

Source: EMM (2021); Evolution (2021); DFSI (2017)

0 250 500 m
GDA 1994 MGA Zone 55

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Location map

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 3.1

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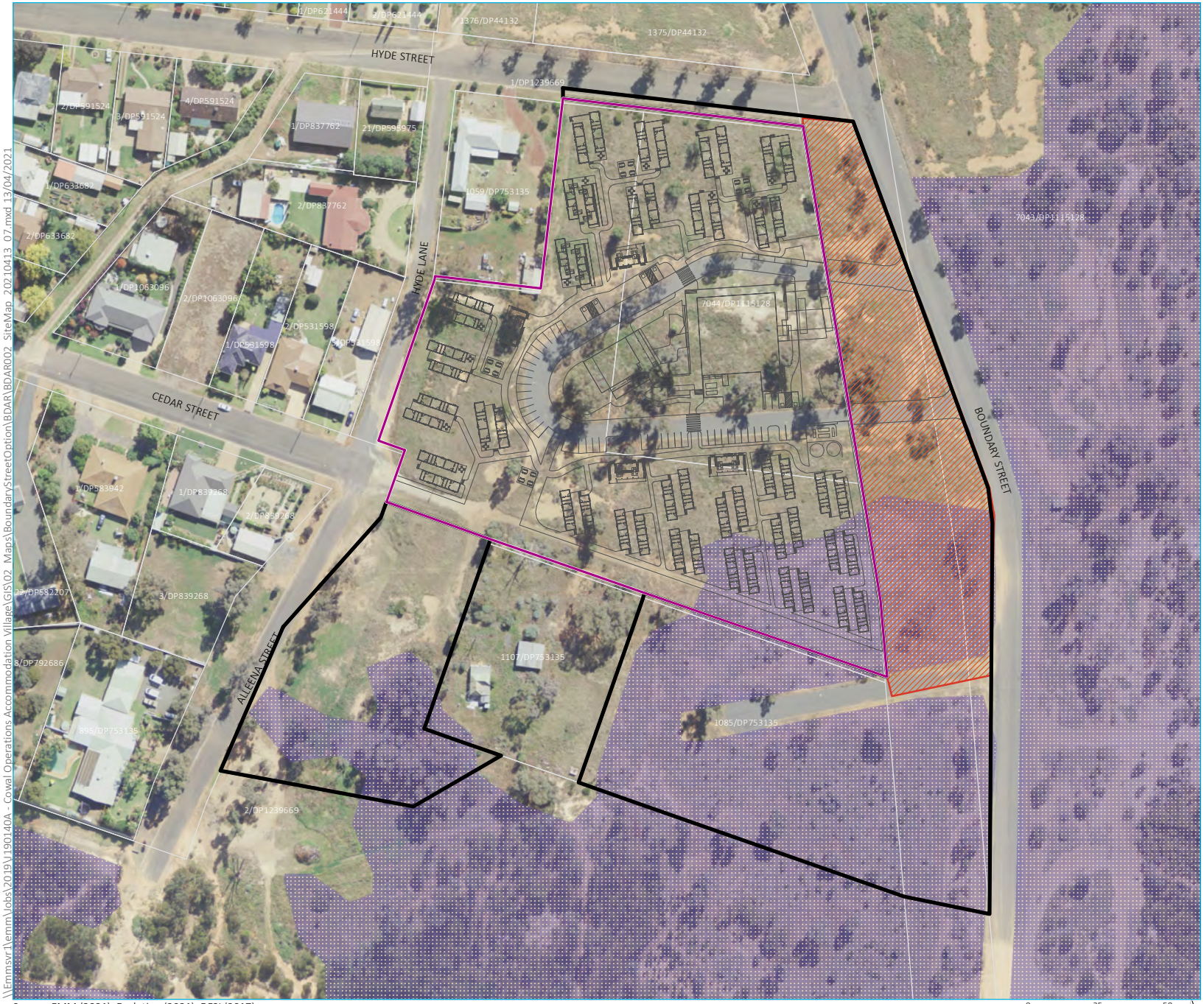

KEY

- Site boundary
- Subject land
- Proposed site layout
- Asset protection zone (managed land)
- Cadastral boundary
- Biodiversity values map layer

State Vegetation Type Map: Central West Lachlan (VIS 4468)

- PCT177 - Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion

Note:
No rivers, streams or estuary features present within 1:25,000 topographic map

Source: EMM (2021); Evolution (2021); DFSI (2017)

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Site map

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 3.2

EMM
creating opportunities

4 Native vegetation

4.1 Background review

A review of the State Vegetation Type Map: Central West Lachlan (VIS_ID 4468; OEH 2016b) was undertaken to inform the site investigations.

The majority of the subject land was mapped as non-native. One PCT was identified as being mapped within the south-eastern corner of the site (Figure 3.2) within regional vegetation mapping:

- PCT 177 - Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion.

This PCT designation was considered when undertaking site surveys and final assignment to PCT.

The site boundary also had a portion of land mapped under the biodiversity values map layer, which coincided with the extent of land mapped as PCT 177 (OEH 2016b). The presence of land mapped under the biodiversity values map layer (Figure 3.2) was the trigger for the preparation of this BDAR.

4.2 Methods

4.2.1 Detailed vegetation mapping and habitat assessment

A preliminary assessment of the subject land was undertaken on 5 August 2020. This preliminary assessment included detailed vegetation mapping and habitat assessments.

The subject land was traversed on foot and by vehicle, with vegetation mapped and aligned with NSW PCTs. PCTs were stratified into vegetation zones based on broad condition state using the definitions in Table 4.1.

Table 4.1 Definitions used in delineation of vegetation zones

Condition class	Description
Medium	Some elements or stratum missing or immature, but minimal disturbance.
Poor	Tree stratum absent or emerging, some mid stratum present, but understorey vegetation degraded due to weeds or other major disturbance.

To inform the PCT allocation, a brief inspection of vegetation to the south of the subject land occurred, and a rapid vegetation assessment (RVA) was undertaken approximately 200 m to the south. The dominant species in the overstorey, midstorey and groundcover were recorded. The results of this assessment are discussed in Table 4.4.

4.2.2 Vegetation integrity assessment

Following the stratification of vegetation zones within the subject land, native vegetation integrity was assessed using data obtained via a series of plots, as per the methodology outlined in Section 4.2.1, 4.3.3 and 4.3.4 of the BAM (DPIE 2020). Plot data was collected from the subject land on 5 and 6 August 2020. At each plot location the following was undertaken:

- one 20 x 20 m plot, for assessment of composition and structure; and

- one 20 x 50 m plots for assessment of function, including a series of five 1 x 1 m plots to assess average leaf litter cover.

The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1-5%) or estimated to the nearest 5% (5-100%). Abundance was counted (up to 20) and estimated above 20, and recorded using the following intervals: 1, 2, 3, 4, 5, 10, 20, 50, 100, 500, 1,000, 1,500, 2,000, etc.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 20 x 50 m plot and five 1 x 1 m subplots. The minimum number of plots and transects per vegetation zone was determined using Table 3 of the BAM (DPIE 2020). A total of four plots were undertaken within the subject land. Datasheets are provided in Appendix A while compiled plot data is provided in Appendix B.

Surveys for flora and vegetation communities were completed under the authority of Scientific License (SL100409). A list of flora species was compiled for each plot and PCT. Records of all flora species will be submitted to BCD for incorporation into the Atlas of NSW Wildlife.

4.2.3 Management zones

Delineation of a proposed development into different management zones allows for direct impacts (ie total loss of native vegetation and fauna habitat in a given area) and indirect impacts (eg decreasing condition in retained native vegetation and fauna habitats adjacent to direct impacts) to be quantified and offset.

To provide adequate bushfire protection for the village infrastructure and occupants, asset protection zones (APZs) will be required around the northern, eastern and southern boundaries of the site where adjacent land is classed as bushfire prone. The APZs will primarily be located within the site boundary adjacent to native vegetation. It was considered that retaining native vegetation within the APZ within the site, albeit in a fuel reduced state, would account for indirect impacts arising from the development, especially given the currently degraded nature of the natïve vegetation within the subject land. APZs can be assessed as having a separate management zone with a lesser impact. However, within the site a conservative approach was adopted where it was assumed that all vegetation within the site boundary would be removed, including APZs.

The APZ on the eastern boundary will cover the Boundary Street Road reserve. The bushfire assessment (Blackash 2021, Section 9.4) states in regard to the Boundary Street road reserve:

> *"This area will be mown regularly and will be managed land. As managed land, this area will need to be mown regularly by the village operator or council, as part of the operational management plan for the village. The existing trees and shrubs can remain in this area."*

Although vegetation is already disturbed, and with low understorey cover and ground cover, as the vegetation will be managed for fuel reduction purposes this has been treated as additional management zones for both the medium and poor condition vegetation.

Thus, four management zones have been applied across the site (Table 4.2).

Table 4.2 Vegetation management zones

Vegetation zone	Management zone	Impact
217_Poor	Site	Assumed to be cleared
217_Poor	Managed	Managed (see below)
217_Medium	Site	Assumed to be cleared
217_Medium	Managed	Managed (see below)

For all management zones within the site, it has been assumed that all vegetation will be removed. Notwithstanding this, there will be potential for some native vegetation to be retained within the site, in particular within the APZs. Measures are also provided in Section 6.3 to manage these indirect impacts.

For all lands within the APZ managed land along Boundary Road vegetation, including trees and shrubs currently present, will be retained. The following changes to future vegetation integrity scores were applied within the APZ management zone ('Managed' in table above):

- native grass cover will be limited to a maximum cover score of 20%;
- litter cover score will be reduced to 50% of the current value within the vegetation zone; and,
- tree regeneration will be set to absent (ie it is assumed that saplings <5cm diameter would be removed).

4.3 Results

4.3.1 Flora and plant community types

The majority of the subject land consists of cleared woodland of poor quality with scattered shrubs. Sections of these cleared areas are subject to on-going slashing maintenance. Where intact woodland exists, it is dominated by native species however, it is patchy and modified by past development including under scrubbing of the mid storey (removal of shrubs and other vegetation underneath the tree canopy) and on-going disturbance by recreational activities such as bike trails.

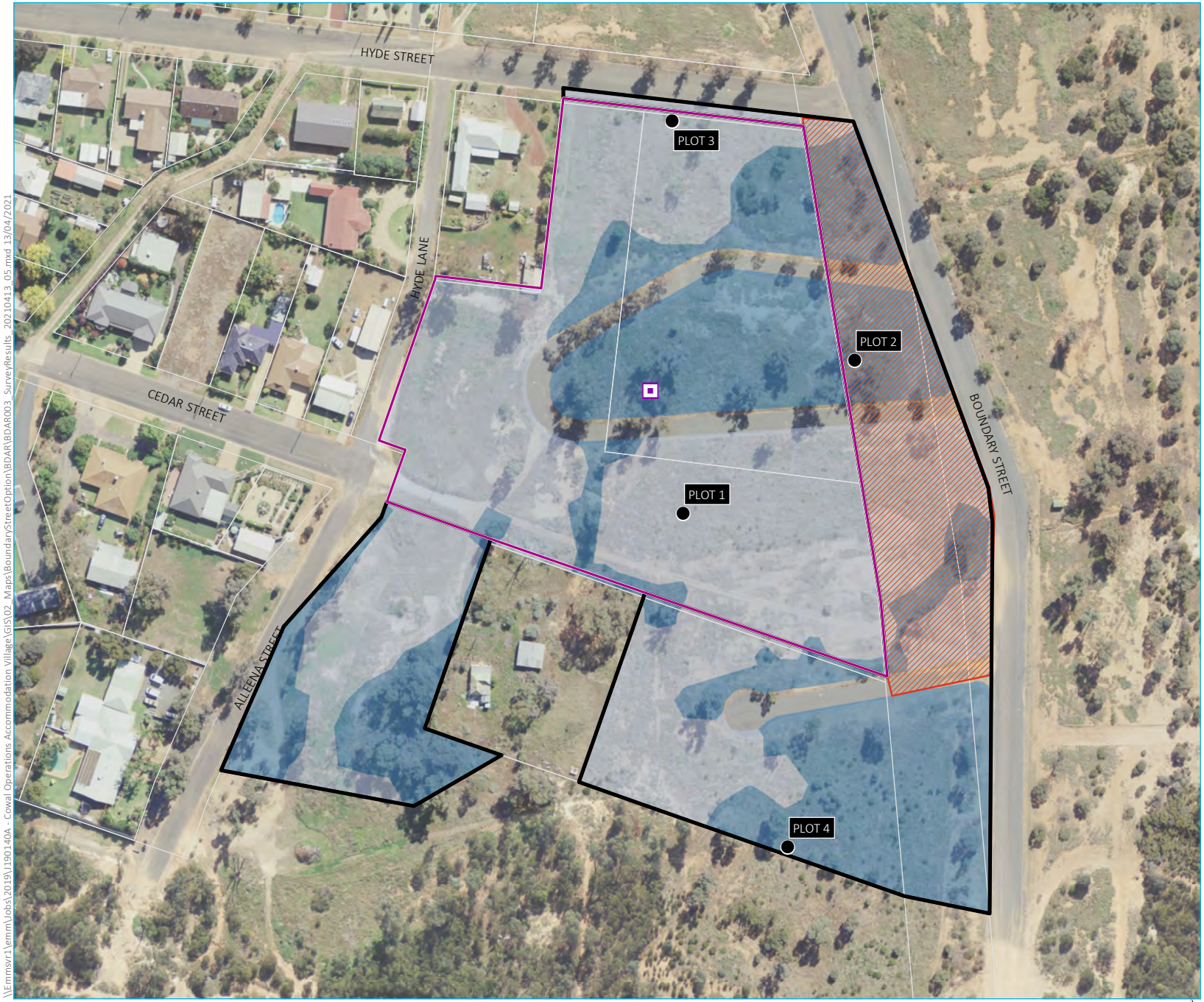
One PCT and two vegetation zones were identified within the subject land (Figure 4.1). Vegetation zones were differentiated by the presence/absence of a canopy and were classed as either Medium or Poor condition respectively.

During the background research prior to field works, PCT 177 - Blue Mallee - Bull Mallee - Green Mallee very tall mallee shrubland of the West Wyalong region, NSW South Western Slopes Bioregion, was identified as the only PCT as being mapped within the subject land (Figure 3.1). Other areas within the subject land were mapped as non-native. Following detailed field investigations, including vegetation plots and vegetation mapping by EMM, the entire subject land was revised to PCT 217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion. The floristic composition across the site and the PCT descriptions on BioNet Vegetation Classification shared more similarities with PCT 217 than PCT 177.

A list of vegetation zones occurring across the disturbance footprint, including PCT, vegetation formation, vegetation class (Keith and Simpson 2006) and the area of impact is provided in Table 4.3.

Table 4.3 PCT and vegetation zones

PCT ID	PCT name	Vegetation formation	Vegetation class	Condition	Extent in the site (ha)	Extent Boundary Street APZ (ha)	Extent in the subject land (ha)
217	Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	Medium	0.70	0.32	1.98
217	Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	Poor	1.49	0.31	2.51



KEY

- Hollow bearing tree
- Plot location
- Site boundary
- Subject land
- Asset protection zone (managed land)
- Cadastral boundary

Vegetation mapping (EMM, 2021)

PCT 217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion

- Medium
- Poor

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Source: EMM (2021); Evolution (2021); DFSI (2017)

0 25 50 m

GDA 1994 MGA Zone 55

N

Plant community types
in the subject land
and plot/transect locations

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 4.1

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creating opportunities

i Flora species richness

A total of 75 species (50 native and 25 exotic) were recorded across the four plots undertaken by EMM. Most species were groundcover species with six canopy species recorded.

ii Plant community types

Site investigations identified the presence of one PCT within the subject land, PCT 217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion. PCT 217 is best described as a tall open woodland with a sparse mid stratum. It has been heavily disturbed and selectively cleared across the subject land. The two vegetation zones of medium and poor quality are distinguished by presence or absence of a canopy. Table 4.4 provides a description of the vegetation zones attributed to this PCT.

Table 4.4 PCT 217 Vegetation zones 1 and 2

Vegetation Zones 1 and 2 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion (PCT 217)

PCT ID	217
Common name	Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion
Condition class	Vegetation zone 1 – Medium Vegetation zone 2 – Poor
Extent within the site	Medium 0.70 ha Poor 1.49 ha
Description	Zone 1 - Medium A woodland dominated by Mugga Ironbark (*Eucalyptus sideroxylon)* with occasional Western Grey Box *(Eucalyptus microcarpa)* and Green Mallee *(Eucalyptus viridis).* Dwyer's Redgum *(Eucalyptus dwyeri*), Kurrajong (*Brachychiton populneus* subsp*. populneus*) and Bulloak *(Allocasuarina luehmannii)* were also identified within the subject land at very low densities. The midstorey is sparse to absent. Where present, it is dominated by native species, predominantly Hakea Wattle *(Acacia hakeoides)* and Wedge-leaf Hop-bush (*Dodonaea viscosa subsp. cuneata*). The exotic shrub African Boxthorn (*Lycium ferocissimum)* also occurs within the subject land at low densities. The groundcover is sparse, dominated by native species consisting predominantly of forbs and low shrubs with few grasses. The most dominant native forbs are Blue Crowfoot (*Erodium crinitum*), *Chenopodium curvispicatum* and Blue Flax Lily (*Dianella revoluta* var*. revoluta*). Dominant low shrubs are Climbing Saltbush (*Einadia nutans)* and Ruby Saltbush (*Enchylaena tomentosa).* The most common exotic groundcover recorded were Onion Grass (*Romulea rosea* var*. australis)*, Spotted Burr Medic (*Medicago arabica*) and Soursob (*Oxalis pes-caprae*). In some parts of the vegetation zone these exotic species are dominant, particularly on disturbed edges. Zone 2 - Poor Within this zone canopy species are predominately absent. The midstorey is also largely absent with some scattered native shrubs, predominantly Hakea Wattle and Wedge-leaf Hop-bush. The groundcover is much more persistent than Zone 1 with a lower species diversity. It is co-dominated by exotic and native species. The most dominant grass is the native Curly Windmill Grass (*Enteropogon acicularis*). Exotic forbs *Gazania linearis* and Patterson's Curse (*Echium plantagineum*) are also dominant while the native forb Blue Crowfoot is dominant in areas.
Survey effort	Four plots within the subject land: Vegetation zone 1 – medium: two plots; 2 and 4.

Table 4.4 PCT 217 Vegetation zones 1 and 2

Vegetation Zones 1 and 2 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion (PCT 217)

	Vegetation zone 2 – poor: two plots; 1 and 3.
Condition description	Zone 1 – Medium The woodland is in medium condition. The canopy is reasonably intact; however, there has been historical clearance and thinning of canopy species and there is low species diversity. The woodland is criss-crossed with bike paths and access tracks in several areas. Dumped rubbish is present, and a dirt stockpile is in the centre of the largest patch of woodland (within the northern portion of the ring road from Boundary Street). The midstory has been entirely removed in some areas and is very sparse in others; however, species present are native. The groundcover is mostly native and of reasonable diversity; however, it is sparse and dominated by exotics in some areas. Litter is generally low and larger woody debris is mostly absent. Zone 2 – Poor These areas are highly disturbed and historically cleared of the canopy and most of the midstorey as a result of the former CGO Accommodation Village. Groundcover is of low diversity and invasive species are co-dominant with native species. Some of these areas appear to be continually disturbed with on-going slashing maintenance.
Characteristic species used for identification of PCT	Two of the seven characteristic upper stratum species for PCT 217 (Mugga Ironbark and Green Mallee), listed in NSW vegetation information system (VIS) Classification Version 2.1 vegetation description, were recorded in plots and another four within the subject land (Western Grey Box, Dwyer's Redgum, Kurrajong and Bulloak). The upper stratum was heavily dominated by Mugga Ironbark throughout the subject land, which VIS notes may occur on some sites. This represents a strong alignment and two of the key attributes used to assign the PCT. Given the midstory was likely cleared throughout the subject land, this may not be a particularly useful indicator of PCT fit. However, it is noted that PCT 217 generally has a sparse mid stratum and the two dominant native mid stratum species recorded from plots performed are listed in the vegetation description. Four native groundcover species recorded in the subject land are associated with PCT 217. The sparse nature of the groundcover in vegetation zone 1 and the highly disturbed poor quality of vegetation zone 2 limit the groundcover as a useful indicator of PCT fit.
Justification of evidence used to identify the PCT	State Vegetation Type Map: 4468 (OEH 2016b) maps part of the subject land as PCT 177 and the remaining area as non-native. Review of EMM's vegetation mapping, plot data and species records within the subject land determined that the entire subject land was more closely aligned to PCT 217 rather than PCT 177. The upper stratum structure and species are the most disparate features of the two PCTs. VIS describes PCT 177 as a tall open mallee shrubland composed of Blue Mallee (*Eucalyptus polybractea*), Bull Mallee (*Eucalyptus behriana*) and White Mallee (*Eucalyptus dumosa*) with Green Mallee (*Eucalyptus viridis*) on rises. Of these species, only Green Mallee was recorded within the subject land. There are no other associated canopy species within the subject land. Blue Mallee and Green Mallee were both recorded further to the south outside of the subject land during investigations. PCT 217 is described as a tall open forest to woodland dominated by Mugga Ironbark and Western Grey Box with either White Cypress Pine (*Callitris glaucophylla*) or Black Cypress Pine (*Callitris endlicheri*). Mugga Ironbark may dominate some sites. Other associated canopy species are Dwyer's Red Gum, Kurrajong and Green Mallee. As the midstratum has likely been largely cleared it is not a particularly useful indicator of PCT fit. The two dominant species recorded are associated with both PCTs. The lack of Broombush (*Melaleuca uncinate*), the low diversity and sparse structure is more closely associated with PCT 217. Groundcover species are not well aligned with either PCT, both with just two associated species recorded. *Dianella revoluta* is associated with both PCTs while *Einadia nutans* and *Sida corrugate* are associated with PCT 217 and PCT 177, respectively.

Table 4.4 PCT 217 Vegetation zones 1 and 2

Vegetation Zones 1 and 2 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion (PCT 217)	
	Soil profiles of red clay to red-brown clay-loam soils recorded in plots fit soil profiles of PCT 217, but do not match red loam and sandy loam soils of PCT 177. A RVA located approximately 200 m south of the subject land recorded species associated with both PCT 177 and PCT 217. Dominant canopy species recorded were Mugga Ironbark, Blue Mallee and Green Mallee; dominant midstratum species were Hakea Wattle, Wedge-leaf Hop-bush and Broombush. This area located to the south of the subject land may be an ecotonal area between PCTs 217 (to the north) and PCT 177 (to the south). Comparison between the RVA and species compositions recorded within the subject land further support selection of PCT 217. Species indicative of both PCT 177, Blue Mallee and Broombush, that were not present within the subject land suggests there is a transition area from PCT 217 to PCT 177 south of the subject land. PCT 177 woodland areas are likely to occur further to the south. In summary, the following aspects strongly demonstrate that vegetation within the subject land is more closely aligned with PCT 217 than PCT 177: woodland rather than mallee structure; dominance of Mugga Ironbark not Mallee species; absence of PCT 177 canopy species (except Green Mallee); presence of PCT 217 canopy species (Western Grey Box, Dwyer's Red Gum, Kurrajong and Green Mallee); although the midstorey has been largely disturbed, the lack of Broombush, low diversity and sparse structure is more closely associated with PCT 217; red clay to red-brown clay-loam soils recorded in plots align with PCT 217; and species recorded at a RVA to the south of the subject land are indicative of both PCT 177 and PCT 217. This composition is not recorded in the subject land, suggesting a transition from PCT 217 to PCT 177 south of the subject land.
Status	PCT 217 is not associated with any Threatened Ecological Communities (TECs) under the EPBC Act. VIS states PCT 217 is part associated with the Critically Endangered Ecological Community (CEEC) *Mallee and Mallee-Broombush dominated woodland and shrubland, lacking* Triodia*, in the NSW South Western Slopes Bioregion* (BC Act). Listing advice for this CEEC states that PCT 217 is a vegetation type that contains mallee eucalypts but is not considered to be part of the CEEC (TSSC 2010). VIS and the listing advice note that PCT 217 grades into the CEEC. It is possible that vegetation to the south of the subject land transitions into PCT 177 and the CEEC. The woodland within the subject land, however, is clearly dominated by Mugga Ironbark. Whilst Mugga Ironbark species can be associated with the CEEC, it is not dominant. Previous clearing of the subject land may have preferentially cleared mallee species; however, the density and age of the Mugga Ironbark suggest it was the dominant species before clearing. It is thus considered that vegetation on the subject land is likely not aligned with any threatened ecology community.
Estimate of percent cleared value of PCT across its distribution	69%
Patch size	Vegetation zone 1 – Medium: 101 ha Vegetation zone 2 – Poor: 101 ha
Hollow-bearing trees	Vegetation zone 1 – Medium: present (one tree, Figure 4.1) Vegetation zone 2 – Poor: absent

Table 4.4 PCT 217 Vegetation zones 1 and 2

Vegetation Zones 1 and 2 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion (PCT 217)

Photograph 4.1 PCT 217 Medium

Table 4.4 PCT 217 Vegetation zones 1 and 2

Vegetation Zones 1 and 2 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion (PCT 217)

Photograph 4.2 PCT 217 Poor

iii Vegetation integrity scores

One PCT occurs in site, with two vegetation zones mapped and entered into the credit calculator to determine vegetation integrity scores. A summary of the vegetation integrity score for each vegetation zone is provided in Table 4.5. The vegetation integrity score is based on the plot data which is compared with benchmark values for each vegetation type.

Table 4.5 Vegetation zones mapped within the disturbance area

Vegetation zone	Plant community type	Ancillary code	Area (ha)	Vegetation integrity score
1	217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	Medium	0.70	58.8
2	217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	Poor	1.49	8.5

The vegetation integrity score of 58.8 for vegetation zone 1 reflects the moderate condition of these areas, particularly considering past disturbance. Vegetation zone 2 gave a vegetation integrity score of 8.5, reflecting the high level of past and on-going disturbance. This score is below the threshold for requiring offsets under the BAM.

5 Threatened species

5.1 Threatened species habitat description

The subject land has been used as an accommodation village in the past and thus has been previously cleared, with some remnant or regrowth present. On-going disturbance including slashing and bike trails have further reduced habitat suitability within the subject land.

The vegetation condition in areas where the canopy has been cleared is very poor and provides limited refuge or habitat. In these areas, some foraging habitat for mobile species, particularly small birds, may be found in scattered shrubs and suitable forbs and grasses.

Woodland within the subject land of medium condition offers some better habitat features, mainly for mobile fauna such as bird and bat species, and arboreal mammals. However, sparse structural features within the subject land mean that the habitat is still of low quality for fauna habitat. Low amounts of fallen timber and sparse to moderate litter cover, a sparse to absent mid stratum and predominantly sparse groundcover are present. One hollow bearing tree with small hollows (less than 5 cm diameter) was recorded in the subject land.

No creeklines or water sources are present within the subject land.

5.2 Ecosystem credit species

Ecosystem credits species are threatened species that can be reliably predicted to use an area of land based on habitat surrogates. For the purposes of the BAM (DPIE 2020), ecosystem credit species are deemed to be offset through the habitat surrogates (PCTs) in which they occur.

A list of ecosystem credit species predicted to occur within the subject land, based on the PCTs present and generated by the calculator associated within the BAM (DPIE 2020) is provided in Table 5.1. The potential for these species to occur within the disturbance footprint was assessed in accordance with Section 5.2.2 of the BAM (DPIE 2020).

Table 5.1 Predicted species assessment

Scientific name	Common name	Justification for exclusion
Anthochaera phrygia	Regent Honeyeater (Foraging)	Excluded from cleared vegetation zones (condition class poor) as no foraging resources (feed trees) are present.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Not excluded.
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	Excluded from cleared vegetation zones (condition class poor) as no foraging resources (feed trees) are present.
Chthonicola sagittata	Speckled Warbler	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Daphoenositta chrysoptera	Varied Sittella	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Dasyurus maculatus	Spotted-tailed Quoll	Not excluded.

Table 5.1 Predicted species assessment

Scientific name	Common name	Justification for exclusion
Glossopsitta pusilla	Little Lorikeet	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Grantiella picta	Painted Honeyeater	Excluded from cleared vegetation zones (condition class poor) as no mistletoe is present.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Not excluded.
Hieraaetus morphnoides	Little Eagle (Foraging)	Not excluded.
Lathamus discolor	Swift Parrot (Foraging)	Excluded from cleared vegetation zones (condition class poor) as no foraging resources (feed trees) are present.
Leipoa ocellata	Malleefowl	Excluded from cleared vegetation zones (condition class poor) as no mallee or dense understorey habitat present.
Lophochroa leadbeateri	Major Mitchell's Cockatoo (Foraging)	Not excluded.
Lophoictinia isura	Square-tailed Kite (Foraging)	Not excluded.
Melanodryas cucullata	Hooded Robin (south-eastern form)	Not excluded.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Neophema pulchella	Turquoise Parrot	Not excluded.
Ninox connivens	Barking Owl (Foraging)	Not excluded.
Nyctophilus corbeni	Corben's Long-eared Bat	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Pachycephala inornata	Gilbert's Whistler	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Petroica boodang	Scarlet Robin	Not excluded.
Petroica phoenicea	Flame Robin	Not excluded.
Phascolarctos cinereus	Koala (Foraging)	Excluded from cleared vegetation zones (condition class poor) as no foraging resources (feed trees) are present.
Polytelis swainsonii	Superb Parrot (Foraging)	Not excluded.
Pomatostomus temporalis	Grey-crowned Babbler (eastern subspecies)	Excluded from cleared vegetation zones (condition class poor) as no woodland habitat present.
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	Excluded from cleared vegetation zones (condition class poor) as no foraging resources (feed trees) are present.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Not excluded.
Stagonopleura guttata	Diamond Firetail	Not excluded.
Tyto novaehollandiae	Masked Owl (Foraging)	Not excluded.

5.3 Species credit species

5.3.1 Candidate species assessment

In accordance with Step 3 (Section 5.2.3 of BAM (DPIE 2020)), a field assessment was undertaken in August 2020 and March 2021 of habitat constraints and microhabitats to determine the suitability of habitat within the subject land for:

- predicted species (ecosystem credit species associated with recorded PCTs, predicted by the Biodiversity Assessment Method Calculator (BAMC));
- candidate species (species credit species associated with specific geographic and landscape feature constraints); and
- species predicted to occur by the EPBC Act Protected Matters Search Tool.

This field assessment included a search of the subject land for bird nesting sites, including nests and hollow-bearing trees.

Candidate species predicted by the BAMC are shown in Table 5.2. An assessment of the geographic and landscape constraints has been provided for each species, with a justification provided where species have been excluded, in accordance with Steps 1 to 3 (Section 5.2.1 to 5.2.3) of the BAM.

Table 5.2 Candidate threatened species assessment

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species		Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in subject land?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**
Flora					
Austrostipa wakoolica	A spear-grass	Alluvial plains and plains (habitat). South of Narranderra (geographic).	Yes	N/A	No. Habitat degraded. Species is unlikely to tolerate disturbance (DoE 2014). Suitable habitat for the species includes open woodland on grey, silty clay or sandy loam soils. Open woodland soil profiles on the site are limited to red-brown clay loam to red clay and as such do not provide suitable habitat for the species.
Tylophora linearis	*Tylophora linearis*	N/A	N/A	N/A	Yes. Species is associated with Mugga Ironbark woodland, which occurs on site. Associated mid stratum species, Hakea Wattle, is present in woodland areas on the site. Shrub layer is degraded on site with few areas providing viable dense shrub microhabitat.
Fauna					
Anthochaera phrygia	Regent Honeyeater	Important mapped areas (breeding).	No	N/A	No. The site is not a mapped important area.
Burhinus grallarius	Bush Stone-curlew	Fallen/standing dead timber including logs.	No	No	No. Habitat degraded. No fallen timber and very little standing dead timber on site.
Calyptorhynchus lathami	Glossy Black-Cockatoo	Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	No	No	No. The site contains one hollow bearing tree; however, the hollows do not meet requirements for the species.

Table 5.2 Candidate threatened species assessment

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species		Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in subject land?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**
Cercartetus nanus	Eastern Pygmy-possum	N/A	N/A	No	No. Habitat degraded. Species is found in a broad range of habitats, usually with a complex mid stratum which is not present on site. All habitat within the site is considered marginal to suboptimal. Site is outside of the known range of the species.
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs; Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	No	No	No. No rocky areas containing caves nor any mines or tunnels within 2 km of the site. Habitat constraints are not present on site.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	No	No. Potential breeding habitat is present at the site, including live large old trees within 1km of small dams. Stick nest surveys were undertaken and no suitable nests were recorded within the subject land.
Hieraaetus morphnoides	Little Eagle (breeding)	Nest trees - live (occasionally dead) large old trees within vegetation)	Yes	No	No. The site contains marginally suitable breeding habitat for the species including open woodland with live large old trees within vegetation. Stick nest surveys were undertaken and no suitable nests were recorded within the subject land.
Lathamus discolor	Swift Parrot (breeding)	Important mapped areas	No	No	No. The site is not a mapped important area.

Table 5.2 Candidate threatened species assessment

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species		Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in subject land?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**
Lophochroa leadbeateri	Major Mitchell's Cockatoo (Breeding)	Living or dead tree with hollows greater than 10cm diameter.	No	No	No. Species has been recently sighted in the area. The site contains one hollow bearing tree; however, the hollows do not meet any requirements for the species.
Lophoictinia isura	Square-tailed Kite (Breeding)	Nest trees	Yes	No	No. Preferred nest trees along water courses do not occur on site however nesting may occur in sub-optimal trees. Stick nest surveys were undertaken and no suitable nests were recorded within the subject land (August 2020 and March 2021).
Ninox connivens	Barking Owl	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	No	No	No. The site contains one hollow bearing tree; however, the hollows do not meet any requirements for the species.
Petaurus norfolcensis	Squirrel Glider	N/A	N/A	No	Yes. The site supports woodland dominated by Mugga Ironbark with a sparse mid stratum and only one hollow bearing tree.
Phascolarctos cinereus	Koala (Breeding)	Important' habitat (however this is not a mapped important habitat area), defined by the density of koalas and quality of habitat determined by on-site survey.	No	No	Yes. Two Eucalyptus species listed under the NSW Koala Recovery Plan (DECC 2008) as secondary feed trees in the Western Slopes and Plains Koala management area occur on site; namely Dwyer's Red Gum and Western Grey Box. There are no records in proximity to the subject land, with the nearest recent record is approximately 70 km south-west of the site and the nearest large population approximately 100 km south-west near Narranderra.

Table 5.2 Candidate threatened species assessment

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species		Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Habitat/geographic constraints**	**Constraint present in subject land?**	**Vagrant species?**	**Candidate species (yes/no) and rationale**
Polytelis swainsonii	Superb Parrot (Breeding)	Hollow bearing trees; Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm.	Yes	Yes	No. The species has been recorded in the area and the site contains Western Grey Box. One hollow bearing tree was recorded within the subject land, namely a Mugga Ironbark. However, the hollow in this tree was <5cm in diameter. As such there is no suitable breeding habitat on site.
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Breeding camps	No	No	No. The Grey-headed Flying-fox is not a candidate species as no breeding camps were recorded on site.
Tyto novaehollandiae	Masked Owl (Breeding)	Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter.	Yes	No	No. The site contains one hollow bearing tree however the hollows do not meet any requirements for the species.

5.3.2 Candidate species credit species requiring further assessment

Candidate species for further assessment were identified in accordance with Step 1 to 2 (Section 5.2.1 to 5.2.2) of BAM (DPIE 2020). A list of species requiring further assessment is provided in Table 5.3.

Table 5.3 Candidate species credit species requiring further assessment

Scientific name	Common name	EPBC Act	BC Act	Flora or fauna
Tylophora linearis	*Tylophora linearis*	Endangered	Vulnerable	Flora
Petaurus norfolcensis	Squirrel Glider	n/a	Vulnerable	Fauna
Phascolarctos cinereus	Koala (Breeding)	Vulnerable	Vulnerable	Fauna

5.3.3 Targeted survey methods

i Targeted flora surveys

Targeted flora surveys were undertaken over two days on 6 August 2020 for Spiny Peppercress (*Lepidium aschersonii*), and 3 March 2021 for *Tylophora linearis*. Surveys have been undertaken in accordance with NSW guidelines Surveying threatened plants and their habitats (EES 2020) and included transects spaced at intervals of 10 m. Targeted flora survey transect locations are illustrated in Figure 5.1.

ii Targeted fauna surveys

Targeted fauna surveys were undertaken for the following species:

- Squirrel Glider; and
- Koala.

Surveys were over three nights between 16 and 19 February 2021 for Squirrel Glider, and on 4 March 2021 for Koala. Stratification units and area of each survey unit in the survey area is shown in Table 5.4.

Table 5.4 Stratification units and survey area

Stratification unit	Area (ha)
Western Slopes Dry Sclerophyll Forests	4.41

Methods and survey effort have been developed in accordance with DEC (2004), DSEWPaC (2011a) for the Squirrel Glider and Biolink (2008) for the Koala. Survey methods and effort are outlined in Table 5.5. Fauna survey locations are illustrated in Figure 5.1.

Table 5.5 Methods and survey effort – arboreal mammals

Method	Survey description	Survey effort
Arboreal trapping	Ten Elliot B or cage traps were placed at 2-4 m above the ground. It was not possible for traps to be placed in lines due to the small size of the site, and scattered trees. Traps were thus located on suitable trees, with trap locations shown on Figure 5.1. Methods consisted of: • Traps were baited with a mixture of peanut butter, rolled oats and honey. • A mixture of water and honey was sprayed on each tree trunk. • Traps were checked early in the morning and closed for the day. • Traps were re-opened and rebaited in the late afternoon.	DEC (2004) requires 24 trap nights over 3-4 consecutive days per 50 ha of stratification unit, with replication for every additional 100 ha. Based on the above stratification units, this would equate to a minimum survey effort of 24 trap nights. A survey was undertaken across the subject land, equating to 30 trap nights. The minimum survey effort was exceeded.
Detection Dog Survey (Koala)	Detection dogs trained to signal on Koala faecal pellets, and on Koalas themselves when present, have been found to much more efficient at undertaking survey that human observers, and more accurate (Cristescu et al 2015). A detection dog was utilised to undertake survey across the entirety of the subject land over one day.	No survey effort has been determined for the use of detection dogs. However, the detection dog was able to cover the entire site, and the path travelled is shown in Figure 5.1.

5.3.4 Targeted survey results

i Targeted flora surveys

No *Tylophora linearis* individuals were detected within the subject land during the parallel transects performed.

ii Targeted fauna surveys

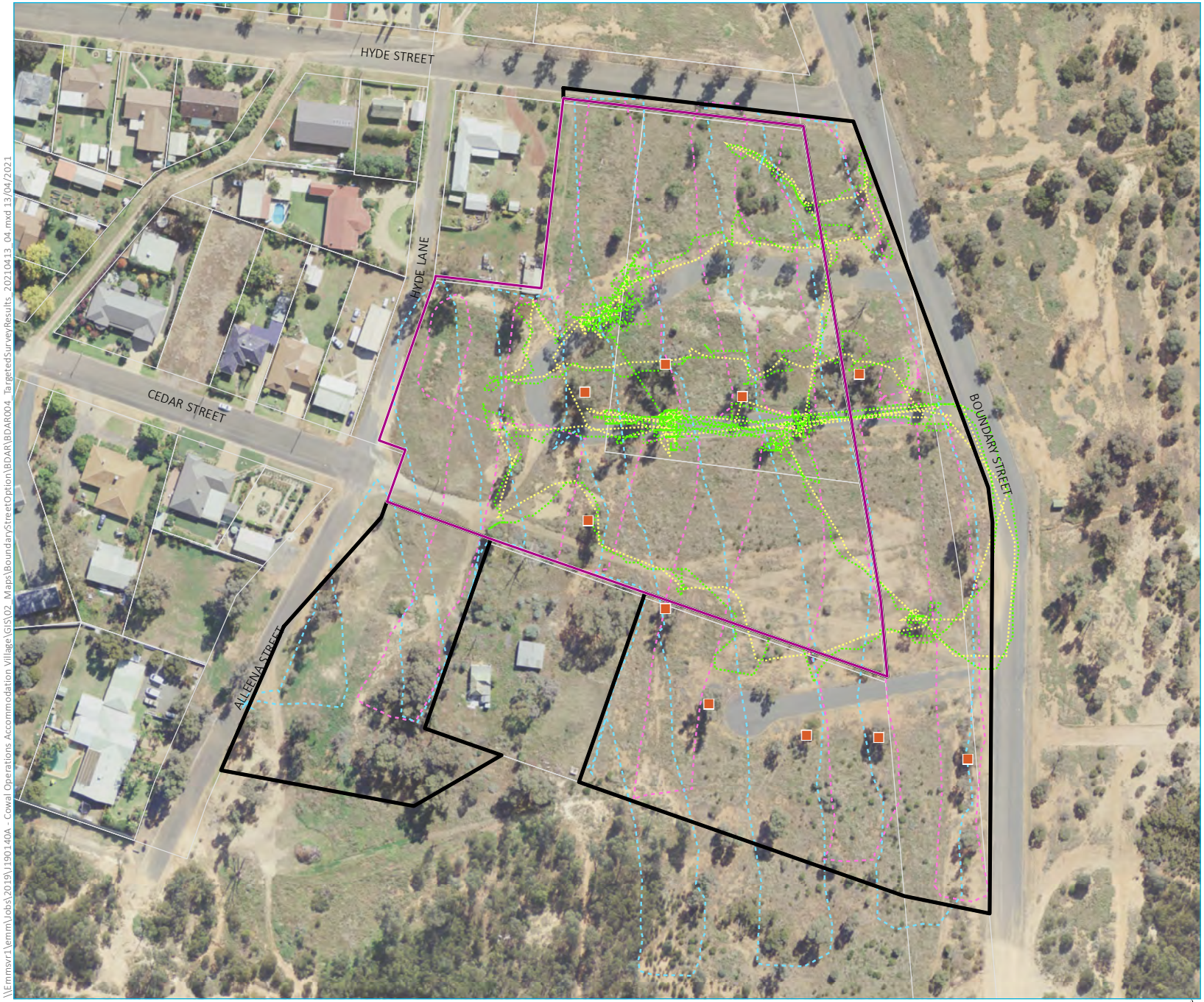
No Squirrel Gliders were detected (captured) during the 30 tree-mounted trap-nights undertaken. No Koalas or Koala faecal pellets were detected during the Koala detection dog survey.

iii Candidate species presence, extent and habitat quality

Table 5.6 defines the presence (or absence) of candidate species in the subject land and habitat quality. The number of individuals impacted by the project is provided for count-based species, while the area of habitat impacted is provided for area-based species. The area of habitat has been used to define the species polygon for area-based species, in accordance with Step 4 to 6 of the BAM (Section 5.2.4 to 5.2.6).

Table 5.6 Candidate species presence, extent and habitat quality

Scientific name	Common name	Step 4 – Determine candidate species presence/absence	Step 5 - Determine the area or count, and location of suitable habitat for a species credit species		Step 6 - Determine the habitat condition within the species polygon for species assessed by area	
			Individuals impacted (count-based species)	Area impacted (area-based species)	Associated vegetation zone/s	Vegetation integrity score
Tylophora linearis	*Tylophora linearis*	Survey was conducted and no individuals were detected	n/a	0	n/a	n/a
Petaurus norfolcensis	Squirrel Glider	Survey was conducted and no individuals or signs of presence were detected	n/a	0	n/a	n/a
Phascolarctos cinereus	Koala	Survey was conducted and no individuals or signs of presence were detected	n/a	0	n/a	n/a



KEY

- Site boundary
- Subject land
- Cadastral boundary
- Squirrel Glider trap location

Koala survey tracks

- Koala detection dog
- Handler

Threatened flora survey tracks (track from one of two EMM ecologists undertaking survey)

- August 2020
- March 2021

Source: EMM (2021); Evolution (2021); TATE (2021); DFSI (2017)

0 25 50 m

GDA 1994 MGA Zone 55

N

\\Emmsvr1\emm\Jobs\2019\J190140A - Cowal Operations Accommodation Village\GIS\02_Maps\BoundaryStreetOption\BDAR\BDAR004_TargetedSurveyResults_20210413_04.mxd 13/04/2021

Threatened species survey undertaken

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Biodiversity development assessment report
Figure 5.1

EMM
creating opportunities

6 Impact assessment

This chapter identifies the potential impacts of project on the biodiversity values. Measures taken to date to avoid and minimise impacts are summarised and recommendations to assist in the design a development that further avoids, minimises and mitigates impacts are provided.

6.1 Potential direct and indirect impacts

Without any measures to avoid, minimise or mitigate impacts, the project would result in the following impacts on biodiversity:

- direct impacts:
  - loss of native vegetation; and
  - loss and degradation of native fauna habitats;
- indirect impacts:
  - erosion and sedimentation;
  - weed introduction and spread;
  - potential inadvertent disturbance of retained habitats;
  - removal of habitat resources for threatened fauna;
  - removal of one hollow-bearing tree; and
  - increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour).

Where possible, native vegetation will be retained within the development and provide site landscaping. However, a precautionary approach has been adopted assuming that all vegetation within the site boundary will be removed (Section 4.2.3) and this approach has been used to the purposes of determining offset requirements.

6.2 Prescribed impacts

An assessment of prescribed and uncertain impacts relevant to the project are provided in Table 6.1.

Table 6.1 Assessment of prescribed and uncertain impacts

Prescribed impact	Development
• Karst, caves, crevices, cliffs and other geological features of significance; • rocks; • human-made structures; or • non-native vegetation.	The subject land does not contain geologically significant features, rocky areas, human-made structures or non-native vegetation that represent habitat for threatened species or ecological communities.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The subject land is at the edge of the West Wyalong urban area. Native vegetation on the site is highly disturbed, and at the north-western corner of a larger area of native vegetation but will not break connectivity.
Impacts of development on movement of threatened species that maintains their life cycle	No threatened species were detected from target survey, though some mobile threatened fauna species may periodically move through the subject land. However, the site is heavily degraded.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	This is not relevant to the development as no water bodies or drainage lines are present within the site.
Impacts of wind turbine strikes on protected animals	The development does not include wind turbines; therefore, this prescribed impact is not relevant to the project.
Impacts of vehicle strikes or on animals that are part of a threatened ecological community	The development will lead to some additional traffic movements, but the site is at the edge of the West Wyalong urban area, and traffic is likely to primarily pass through the current urban roads.

6.3 Avoidance, minimisation and management

6.3.1 Avoidance and minimisation strategy

A previous accommodation village was located at the site, which was demolished in 2005/2006. Thus, the project is located within an area that is already disturbed from historical development.

The design iteration process for the proposed new village layout has considered a number of avoidance and minimisation measures, including use of the current loop access road from Boundary Street, use of existing in-ground services, minimising removal of existing established trees during placement of accommodation modules and incorporating existing established vegetation into the landscaping design of the village.

6.4 Serious and irreversible impacts

Section 9.1.1 of BAM (DPIE 2020) requires additional impact assessment for threatened species and ecological communities that are also listed as candidate entities for Serious and Irreversible Impacts (SAII).

No threatened species entities that are SAII candidate species were identified within the subject land. No threatened community entities were identified as occurring within the subject land, and thus there are no SAII candidate entities for threatened ecological communities.

6.5 Impacts not requiring offsets

In accordance with Section 9.2.1 of BAM (DPIE 2020), impacts on vegetation zones and threatened species habitat do not require offsets where:

- a vegetation zone representative of a critically endangered or endangered ecological community has a vegetation integrity score less than 15; and/or
- a vegetation zone representative of a vulnerable ecological community and/or threatened species habitat has a vegetation integrity score less than 17; and/or
- a vegetation zone that is not listed as a threatened ecological community has a vegetation integrity score less than 20.

Areas not requiring assessment in accordance with Section 9.3 of BAM (DPIE 2020) also include existing roads.

Table 6.2 provides a summary of the vegetation zones that do not trigger the above thresholds.

Table 6.2 Summary of impacts not requiring offsets – native vegetation

Vegetation zone	PCT	Name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
2	217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	217_Poor	1.49	8.5	0.0	-8.5	0
4	217 - Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	217_Poor_APZ	0.31	8.5	4.9	-3.7	0

6.6 Impacts requiring offset

This section provides an assessment of the impacts requiring offsetting in accordance with Section 9.2 of BAM (DPIE 2020).

Impacts to native vegetation requiring offsets include:

- direct impacts on 0.70 ha of PCT 217 – Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion.

A summary of the ecosystem credits required for all vegetation zones, including changes in vegetation integrity score, are provided in Table 6.3. A total of 16 ecosystem credits are required to offset the impacts of the development. A credit report is provided in Appendix D.

There are no impacts to threatened species habitat requiring offsets.

Table 6.3 Summary of ecosystem credits required for all vegetation zones

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
1	217- Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	2217_Medium	0.70	49.8	0.0	-49.8	15
3	217- Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion	2217_Medium_APZ	0.32	49.8	45.5	-4.3	1

7 Assessment of other relevant biodiversity legislation

7.1 Environment Protection and Biodiversity Conservation Act 1999

This chapter provides an assessment of the project's impacts specific to species and communities listed under the EPBC Act. A likelihood of occurrence assessment for protected matters is presented in Section 7.1.1.

7.1.1 Likelihood of occurrence assessment

i Threatened ecological communities

Four TECs were identified as potentially occurring within the site by the PMST:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed as a CEEC under the EPBC Act;
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia listed as an EEC under the EPBC Act;
- Poplar Box Grassy Woodland on Alluvial Plains listed as an EEC under the EPBC Act; and
- Weeping Myall Woodlands listed as an EEC under the EPBC Act.

Table 7.1 assesses the likelihood of these TECs occurring within the site area. The PCT recorded within the site is not consistent with the TECs predicted to occur, and these TECs are not considered further.

Table 7.1 Likelihood of occurrence for listed ecological communities

Ecological community	EPBC Act Status	Habitat requirements	Likelihood of occurrence
White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands	CE	Characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. Tree-cover is generally discontinuous and consists of widely spaced trees of medium height in which the canopies are clearly separated.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	Community occurs in two forms, grassy woodland and derived native grassland. Typically comprised of a tree layer and a native understorey with a varying proportion of shrubs, grasses and herbs. Tree canopy is dominated or co-dominated by Grey Box (Eucalyptus microcarpa). Shrub layer is variable, often comprised of wattles (Acacia species), sweet bursaria (Bursaria spinosa), Cassinia species, hop-bushes (Dodonaea species), emu bushes (Eremophila species) and blue-bushes (Maireana species). The grass layer is generally made up of wallaby grasses (Rytidosperma species), spear grasses (Austrostipa species), wheat-grass (Elymus scaber), windmill grasses (Enteropogon species), flax-lilies (Dianella species) and mat-rushes (Lomandra species) (DSEWPC 2012). Predominantly occurs from central NSW, through northern/central Victoria into eastern South Australia.	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Poplar Box Grassy Woodland on Alluvial Plains	E	The Poplar Box Grassy Woodland occurs on floodplains in eastern Australia in NSW and Queensland. The vegetation of the ecological community varies from a grassy woodland to grassy open woodland structure. Overstorey dominated by *Eucalyptus populnea* (poplar box) and an understorey predominantly composed of perennial forbs and C4 grasses. May include a low density of shrubs however a substantial mid layer is usually not present (TSSC 2017).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.
Weeping Myall Woodlands	E	Weeping Myall Woodlands occur in a range of forms from open woodlands to woodlands, in which weeping myall (*Acacia pendula*) trees are the sole or dominant overstorey species. The understorey often includes an open layer of shrubs above an open ground layer of grasses and herbs, though the ecological community can exist naturally as either a shrubby, or grassy woodland (DEWHA 2009).	Negligible. Does not occur – this community is not consistent with any of the PCTs identified during the field surveys.

ii Threatened species

The PMST and/or BAMC identified 21 species listed under the EPBC Act could potentially occur within the site area. The likelihood of occurrence for these species is assessed in Table 7.2.

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence
Plants				
Austrostipa metatoris	A spear-grass	V	PMST	Negligible. Unlikely to occur given the absence of associated species, PCTs and habitat types (sandhills, sand ridges, undulating plains and flat open mallee country).
Austrostipa wakoolica	A spear-grass	E	PMST, BAMC	Low. Unlikely to occur given the absence of required habitat types and disturbance on site. Open woodland soil profiles on the site are limited to red-brown clay loam to red clay and as such do not provide suitable habitat for the species.
Tylophora linearis	Tylophora linearis	E	PMST, BAMC	Low. Whilst potential habitat in the form of Mugga Ironbark woodland occurs on site, the vegetation is degraded. Target survey was conducted and no individuals were detected.
Birds				
Anthochaera phrygia	Regent Honeyeater	CE	PMST, BAMC	Low. Potential foraging area. No records within 10 km of the site area within 25 years; however, preferred feed species Mugga ironbark is dominant on site. Species may occasionally occur but would be considered vagrant.
Botaurus poiciloptilus	Australasian Bittern	E	PMST	Negligible. Unlikely to occur given the absence of required habitat types (freshwater wetlands, estuarine reedbeds and other waterbodies).
Calidris ferruginea	Curlew Sandpiper	CE	PMST	Low. Unlikely to occur as suitable foraging habitat (intertidal mudflats, swamps, lakes, lagoons) are absent.
Falco hypoleucos	Grey Falcon	V	PMST	Low. Unlikely to occur given the absence of associated PCTs, records in the area and most habitat types (shrubland and wooded watercourses of arid and semi-arid regions). Derived native grassland occurs on site which may provide foraging habitat; however, its low quality, small area and proximity to urban and woodland areas means it is unlikely to be used by the species.
Grantiella picta	Painted Honeyeater	V	PMST, BAMC	Low. Recent records within 25 km of the site; however, woodland habitat on site is degraded and contains only a low density of mistletoe (ie potential foraging habitat).

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence
Hirundapus caudacutus	White-throated Needletail	V	Bionet PCT species association	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented, associated PCTs are not present, and site is outside species range.
Lathamus discolor	Swift Parrot	CE	PMST, BAMC	**Moderate.** Potential foraging area. Fewer than five records within 10 km of the site however an important area for the species is located approximately 6.5 km to the west of the site. The site contains preferred foraging species, particularly the dominant canopy species Mugga Ironbark.
Leipoa ocellata	Malleefowl	V	PMST, BAMC	Low. Unlikely to occur due to the fragmented condition of vegetation, absence of preferred soil types and dense shrub and herb stratum with high diversity. No records within 10 km of the site area in the past 30 years.
Numenius madagascariensis	Eastern Curlew	CE	PMST	Negligible. Unlikely to occur given the absence of required foraging habitat types (ie mudflats, mangroves, coastal lakes).
Pezoporus occidentalis	Night Parrot	E	PMST	Negligible. Presumed extinct in NSW. Spinifex grassland habitat is not present on site.
Polytelis swainsonii	Superb Parrot	V	PMST, BAMC	**Moderate**. Potential foraging or resting habitat. Records less than 10 years old within 10 km of the site. A preferred eucalyptus species, Western Grey Box, is present in very limited numbers on site, none with hollows. No suitable breeding habitat on site.
Rostratula australis	Australian Painted-Snipe	E	PMST	Low. Unlikely to occur given the absence of preferred foraging habitats including swamps and marshes.
Fish				
Macquaria australasica	Macquarie Perch	E	PMST	Negligible. Aquatic habitat does not occur on the site.
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	PMST, BAMC	Low. Unlikely to occur as the site area does not contain and is not proximal to suitable roosting habitat (cliffs).

Table 7.2 Likelihood of occurrence for threatened species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence
Dasyurus maculatus maculatus	Spotted-tail Quoll (SE mainland population)	E	PMST, BAMC	Low. Unlikely to occur as the species has not been recorded within 50 km of the site area, site is outside the known range for the SE mainland population and habitat is degraded and of low suitability for the species.
Nyctophilus corbeni	Corben's Long-eared Bat	V	PMST, BAMC	**Moderate.** The species can inhabit a wide range of woodland vegetation types and may roost and or forage in the woodland habitat on the site. One hollow bearing Mugga Ironbark and other Eucalyptus species on site may offer roosting habitat. The fragmented nature of the native vegetation and lack of a dense, cluttered understorey reduces the suitability of the habitat.
Phascolarctos cinereus	Koala (NSW, QLD and ACT)	V	PMST, BAMC	Unlikely. Whilst potential habitat is present, the vegetation is degraded. Target survey was also conducted and no individuals were detected.
Pteropus poliocephalus	Grey-headed Flying-fox	V	PMST, BAMC	Low. Unlikely to occur as there are no roosting camps on or near the site. One record within 10 km of the site, no recent records.

Three EPBC Act listed species (Swift Parrot, Superb Parrot, and Corben's Long-eared Bat) were considered to have a moderate likelihood to occur in the site.

These species are discussed further in Section 7.1.2.

iii Migratory species

Eight species listed as migratory under the EPBC Act were predicted to occur in the site based on database searches undertaken. Table 7.3 provides an assessment of the likelihood of these species utilising habitat within the site.

Five species listed as marine species only were identified in database searches. The site is more than 300 km inland from the coast and as such these species were not considered likely to occur. No species listed as migratory under the EPBC Act were considered likely to occur within the subject land.

Table 7.3 Likelihood of occurrence for migratory species

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence
Actitis hypoleucos	Common Sandpiper	Ma, Mi	PMST	Negligible. Unlikely to occur as wetlands are absent from the site area.
Apus pacificus	Fork-tailed Swift	Ma, Mi	PMST	Low. Species is almost exclusively aerial. Species is broad ranging and has wide habitat requirements. It may periodically fly over the site, but due to the degraded nature of the site is considered low potential.
Hirundapus caudacutus	White-throated Needletail	Ma, Mi	Bionet PCT species association	Low. Unlikely to use habitats onsite as native vegetation is heavily fragmented, associated PCTs are not present, and site is outside species range.
Calidris acuminata	Sharp-tailed Sandpiper	Ma, Mi	PMST	Negligible. Unlikely to occur as wetlands are absent from the site area.
Calidris melanotos	Pectoral Sandpiper	Ma, Mi	PMST	Negligible. Unlikely to occur as wetlands are absent from the site area.
Gallinago hardwickii	Latham's Snipe	Ma, Mi	PMST	Low. Unlikely to occur as wetlands are absent from the site area.
Motacilla flava	Yellow Wagtail	Mi	PMST	Low. Unlikely as well watered open grasslands and wetlands are absent from the site area.
Myiagra cyanoleuca	Satin Flycatcher	Ma, Mi	PMST	Low. Unlikely to occur as tall wet sclerophyll forests and rainforests are absent from the site area.

7.1.2 Significant impact assessments

In determining the significance of impacts associated with the project, the relevant criteria listed in the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DoE 2013) was applied. This assessment has been undertaken for the following threatened and migratory entities considered to have a moderate likelihood to occur within the site:

- Swift Parrot;
- Superb Parrot; and
- Corben's Long-eared Bat.

The assessments concluded that the project will not cause significant impacts to these species.

a Swift Parrot

Table 7.4 provides an assessment of significance for the removal of 0.70 ha of potential Swift Parrot foraging habitat, in accordance with the relevant assessment criteria for critically endangered species.

Table 7.4 Assessment of significance for Swift Parrot

Criteria	Discussion
Long-term decrease in population size	An action that would lead to a long-term decrease of the Swift Parrot population would be one that is undertaken in a breeding area, or one that removes key feed species when foraging resources are sparse. The species breeds in Tasmania therefore the project is not a breeding area. Favoured feed trees outlined in the national recovery plan for the species, includes Mugga Ironbark and Western Grey box which are within the disturbance area (Saunders and Tzaros 2011). Mugga Ironbark is the dominant canopy species within the disturbance area while Western Grey box is present as scattered trees at low density. Given their nomadic behaviour they have the potential to fly over or utilise seasonal foraging resources within the proposed disturbance area on occasion. It is unlikely that the species is reliant on foraging resources within the project area, nor are any substantial numbers of the species likely to occur within the project area. As such, there is not likely to be any population level impacts.
Reduce area of occupancy	A total area of 0.70 ha of potential foraging habitat that includes key tree species, Mugga Ironbark and Western Grey box, as identified in the National Recovery Plan (Saunders and Tzaros 2011), will be removed as a result of the project. The Swift Parrot is wide ranging, typically occurring in areas where profuse flowering of feed trees or significant lerp occur. It is unlikely that the loss of a small area of potential foraging habitat will significantly reduce the occupancy of the species.
Fragment a population	This species is highly mobile and is able to cross open areas. On mainland Australia the species occurs as a large, mobile single population. The loss of 0.70 ha of potential foraging habitat, that occurs on the edge of an urban area, where clearing has historically taken place, will not cause any fragmentation effects.

Table 7.4 Assessment of significance for Swift Parrot

Criteria	Discussion
Adversely affect critical habitat	Habitats of particular importance to the Swift Parrot are outlined in the recovery plan for the species (Saunders and Tzaros 2011); including: • for nesting; • by large proportions of the Swift Parrot population; • repeatedly between seasons (site fidelity), or • for prolonged periods of time (site persistence). As the project area is within mainland Australia, there is no potential for nesting to occur. The species has not been recorded within the study area with few records in the locality and there is no evidence of prolonged occurrence, repeat use or large number of the species occurring. Therefore, the project will not affect any habitat critical to the survival of the Swift Parrot.
Disrupt the breeding cycle of a population	As the Swift Parrot breeds within Tasmania, there is no potential to breed within the subject land.
Decrease availability or quality of habitat	The species has not been recorded within the project area and if it does occur is likely to be on a transient basis only, passing through to more optimal areas of foraging habitat. The Swift Parrot is not considered to be dependent on habitat in the project area and the clearance of 0.70 ha of sub-optimal foraging habitat is not likely to cause any discernible impact to the Swift Parrot, and the species will remain largely unaffected by the project.
Result in invasive species	Weed invasion impacting on habitat regeneration and health, and aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners are two key threats that invasive species pose on the Swift Parrot. Potential Swift Parrot habitat adjacent to the subject land is very limited. Suitable habitat is too far from the disturbance footprint for any invasive species impacts relating to the project to be relevant. The project will not result in invasive species that are harmful to the species becoming established in suitable habitat for the species.
Introduce disease	This species is vulnerable to Psittacine Beak and Feather Disease however the proposed activity does not play a role in the introduction of this threat.
Interfere with recovery	The key action within the recovery plan for the Swift Parrot (Birds Australia 2011), which is relevant to the project, is the management and protection of Swift Parrot habitat at the landscape scale. The habitat within the project area is unlikely to be important for this species and there is expected to be no impact on its recovery as the result of the project.
Conclusion	It is unlikely that the species is reliant on foraging resources within the project area, therefore the habitat to be removed is unlikely to be important for the species and the project is not anticipated to have a significant impact on the Swift Parrot.

b Superb Parrot

Table 7.5 provides an assessment of significance for the removal of 2.19 ha of potential Superb Parrot foraging habitat, in accordance with the relevant assessment criteria for vulnerable species.

Table 7.5 Assessment of significance for Superb Parrot

Criteria	Discussion
Long-term decrease in an important population size	The *National Recovery Plan for the Swift Parrot* (Baker - Gabb 2011) does not define an important population for the Superb Parrot. A single population of the species exists. There are records of the Superb Parrot within 10 km of the subject land and a preferred eucalyptus species, Western grey box, is present in very limited numbers on site. The project will remove 2.19 ha of potential sub-optimal foraging habitat, with a further 0.63 ha subject to an APZ. No suitable breeding habitat is located within the subject land. It is considered unlikely that Superb Parrot would be reliant on the small amount of foraging habitat provided within the project area and therefore the project will not lead to a decrease in size of an important population.
Reduce area of occupancy of an important population	An important population has not been defined (Baker - Gabb 2011) and a single population of the species exists. It is unlikely that removal of 2.19 ha of potential foraging habitat, and APZ management of a further 0.63 ha, would reduce the area of occupancy of the single population. Given records within the area it is likely that the population utilises habitat of higher quality in the area.
Fragment a population	This species is highly mobile and is able to cross open areas. The loss of 2.19 ha, and APZ management of a further 0.63 ha, of potential foraging habitat, that occurs on the edge of an urban area, where clearing has historically taken place, will not cause any fragmentation effects.
Adversely affect critical habitat	Habitat critical to the survival of the species has been defined by the National Recovery Plan (Baker - Gabb 2011) as breeding habitat that comprises riverine forests in the Riverina and Box Gum Woodlands on the tablelands and slopes and foraging habitat comprising Boree Woodlands between the Murrumbidgee and Murray Rivers, River Red Gum Forest, Box-Pine Woodland and White Cypress Pine Woodland. Critical breeding and foraging habitat are not present on the subject land. Woodland present is dominated by Mugga Ironbark with very few scattered Western Grey box.
Disrupt the breeding cycle of an important population	There are no records of breeding within the project area or surrounds. Just one hollow-bearing tree was recorded on the site. The clearing of this habitat will not disrupt the breeding cycle of the species.
Decrease availability or quality of habitat	The project will remove 2.19 ha of potential foraging habitat for the Superb Parrot, and APZ management of a further 0.63 ha.
Result in invasive species	Potential Superb Parrot habitat adjacent to the subject land is very limited. Suitable habitat is too far from the disturbance footprint for any invasive species impacts relating to the project to be relevant. The project will not result in invasive species that are harmful to the species becoming established in suitable habitat for the species.

Table 7.5 Assessment of significance for Superb Parrot

Criteria	Discussion
Introduce disease	The Superb Parrot may be susceptible to Beak and Feather disease. Disease outbreaks usually occur in wild animal populations where significant stresses arise. The clearance of potential foraging habitat is unlikely to cause significant stress such that a disease outbreak would occur.
Interfere with recovery	Recovery actions for the Superb Parrot aim to determine population trends, increase knowledge of the species ecological requirements, develop and implement threat abatement strategies and increase community involvement and awareness of the recovery program (Baker - Gabb 2011). As recovery actions are focused on increasing knowledge of the species, the project will not interfere with recovery.
Conclusion	The clearance of 2.19 ha, and APZ management of a further 0.63 ha, of potential Superb Parrot foraging habitat will not result in a significant impact and the species population will not be adversely affected. The area to be removed does not represent habitat critical to the survival of the species and the project will not interfere with recovery.

c Corben's Long-eared Bat

Table 7.6 provides an assessment of significance for the removal of 0.70 ha of potential Corben's Long-eared Bat foraging habitat, in accordance with the relevant assessment criteria for vulnerable species.

Table 7.6 Assessment of significance for Corben's Long-eared Bat

Criteria	Discussion
Long-term decrease in an important population	There is no National Recovery Plan developed for the species, with a lack of information regarding important populations. It is considered that an important population is unlikely to occur within the study area given that this slow flying species prefers to habit and hunt in areas with a complex and dense mid and understory. Mid and understory in the disturbance footprint is sparse to absent in most areas. The species was included on a conservative basis and the clearance of 0.70 ha, and APZ management of a further 0.32 ha, of sub-optimal habitat is unlikely to have any population level effects.
Reduce area of occupancy of an important population	Important populations have not been defined, given the sub-optional nature of the habitat it is considered very unlikely that an important population occurs within the disturbance area or broader study area.
Fragment a population	This species is a slow flying species, preferring well connected habitat and is therefore susceptible to fragmentation. The potential woodland habitat on site is sparse with poor connectivity. The removal of 0.70 ha, and APZ management of a further 0.32 ha, of this habitat on the edge of an urban area is unlikely to fragment a population.

Table 7.6 Assessment of significance for Corben's Long-eared Bat

Criteria	Discussion
Adversely affect critical habitat	Habitat critical to the survival of the species has not been defined and there is a lack of a National Recovery Plan. The species occupies a wide range throughout south eastern Australia and the suboptimal habitat within the disturbance area is unlikely to constitute critical habitat.
Disrupt the breeding cycle of an important population	The disturbance area is unlikely to contain an important population. This species typically breeds in hollow bearing trees, of which only one was recorded within the disturbance area. The area is not considered to be viable breeding habitat. Impacts are considered negligible, and no population level impacts are anticipated.
Decrease availability or quality of habitat	The project will remove 0.70 ha, and APZ management of a further 0.32 ha, of potential sub-optimal habitat for the species.
Result in invasive species	Weed control protocols will be undertaken to ensure increase in weeds in adjacent habitat is minimised. The subject land is adjacent to an urban area and as such the project is unlikely to create favourable conditions for invasive species that are not already present.
Introduce disease	The clearance of sub-optimal habitat is unlikely to cause significant stress such that a disease outbreak would occur. The project will not likely introduce any novel impacts given it is already adjacent to an urban area.
Interfere with recovery	The are no recovery actions specified for the species, however key impacts for the species are likely to include clearance of vegetation and removal of hollow bearing trees. Vegetation clearance will be minimal and limited to 0.70 ha of suboptimal habitat and only one hollow bearing tree, and APZ management of a further 0.32 ha. The species was included as have potential to occur within the disturbance area on a conservative basis. It is unlikely that the project will interfere with recovery of the species.
Conclusion	The clearance of 0.70 ha, and APZ management of a further 0.32 ha, of potential sub-optimal habitat will not result in a significant impact and the species population will not be adversely affected. The area to be removed does not represent habitat critical to the survival of the species and the project will not interfere with recovery.

7.2 Biosecurity Act 2015

Two priority weeds listed in the Riverina Regional Strategic Weed Management Plan 2017–2022 (Riverina Local Land Services 2017) were recorded in the site; namely African Boxthorn (*Lycium ferocissimum)* and Bridal Creeper (*Asparagus asparagoides*). Both species are priority weeds for all of NSW and Weeds of National Significance. They are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. The species must not be imported into NSW or sold.

7.3 Water Management Act 2000

The project will not be constructed within 40 m of riparian land and therefore does not represent a controlled activity.

Groundwater will not be intercepted for the project and therefore it does not represent an aquifer interference activity or assessment of potential impacts on groundwater dependent ecosystems.

8 Conclusion

This BDAR has been prepared in accordance with BAM (DPIE 2020). A separate assessment of potential impacts on MNES has been completed for the purposes of assessment by the Commonwealth DAWE.

Evolution proposes to construct and operate an accommodation village within the site, immediately west of Boundary Street, West Wyalong. The site was formerly the location of Barrick Gold's CGO accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The accommodation village was demolished between 2005-2006 and the site is currently devoid of built structures, except for an existing loop road within the site. The site now contains fragmented native vegetation that has regrown across parts of the site since the former accommodation village was demolished.

Survey of the site has identified the presence of one PCT within the subject land; PCT 217 Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion. Two vegetation zones were identified, Medium and Poor. BAM vegetation plots were performed to assess the condition of the vegetation zones, and this data was used to inform the credits calculations (as required under the BAM, DPIE 2020).

Candidate species assessment identified 18 threatened potential species credit species (those that may require species credits). In accordance with Steps 1 to 3 (Section 5.2.1 to 5.2.3) of the BAM with consideration of habitat/geographic constraints, assessment of habitat features in the site, and whether the species may be vagrant, this list was reduced to three species: *Tylophora linearis*, Koala and Squirrel Glider. Target survey for *Tylophora linearis* was undertaken consisting of parallel transect searches, detection dog survey for Koala (seeking to detect faecal pellets or Koalas themselves), and tree-mounted Elliott trapping for Squirrel Glider.

Target survey for *Tylophora linearis*, Koala and Squirrel Glider did not detect these species, and thus it is considered that these species are unlikely to occur within the development site, and no threatened species credits are required.

The development requires 16 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. Evolution will meet the credit obligation via purchase of credits from the biodiversity credit market, establishment of site(s) to create credits, or payment to the Biodiversity Conservation Fund.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The development is not expected to result in significant impacts on the Swift Parrot, Superb Parrot, and Coben's Long-eared Bat and, as such, it is considered that a referral under the EPBC Act to the Commonwealth DAWE is not required.

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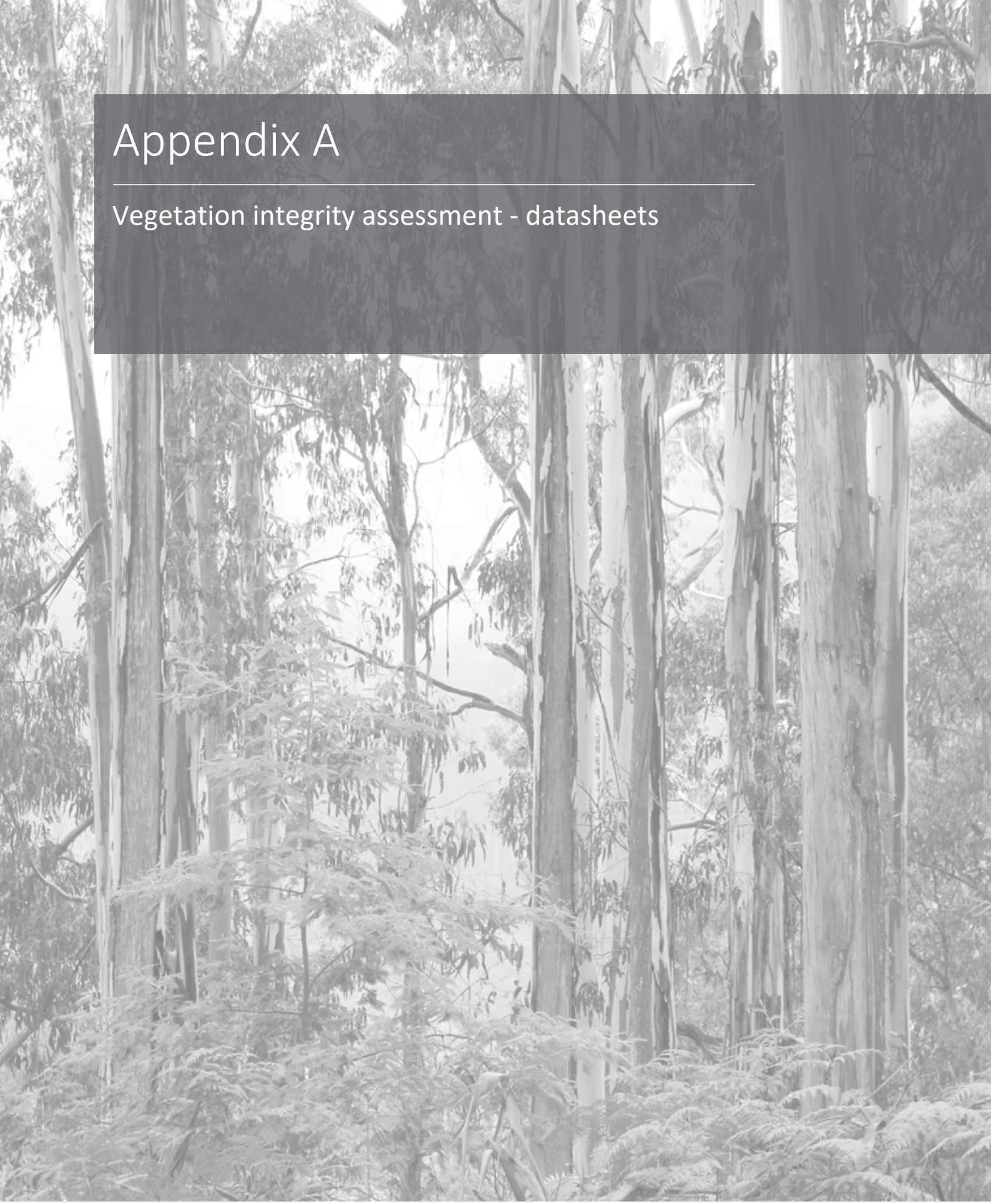


Appendix A

Vegetation integrity assessment - datasheets

BAM Site – Field Survey Form

Plot ID:	1	**Date:**	06/08/20	**Project number:**	J190140A	**Plot dimensions:**	20x20x50
Datum:	GDA94	**Easting:**	519,899	**Recorders:**	RP (floristics) & SGW		
Zone:	55	**Northing:**	6,245,970	**IBRA region:**	South Western Slopes (Lower Slopes)	**Midline bearing:**	83
Plant Community Type:		217: Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion		**Condition class:**	Poor	**PCT confidence:**	medium
Vegetation Class:		Western Slopes Dry Sclerophyll Forests		**EEC:**	yes	**EEC confidence:**	low

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	4
	Grasses etc.:	4
	Forbs:	8
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	4.4
	Grasses etc.:	16.2
	Forbs:	2
	Ferns:	0
	Other:	0.1
High Threat Weed cover:		10

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	10	5	5	10	10
Average litter cover (%):	8				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features

Flat. Plain. Red brown coloured soil. Clay soil. Poor drainage.

Plot Disturbance

Previously cleared. Weedy. Outside plot theres trails from bicycle courses and some rubbish. Floristics would likely be higher in a month's time. Good recent rainfall has resulted in good vegetative cover.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J190140A				
Recorders:	RP (floristics) & SGW	**Plot ID:**	1	**Date:**	06/08/20

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Enteropogon acicularis (Curly Windmill Grass)*	15	400	no	N
	Echium plantagineum (Patterson's Curse)	2	100	no	E
	Eragrostis curvula (African Lovegrass)	10	1000	no	HTE
	Cyperaceae indeterminate (Sedges)	10	4000	no	E
	Poaceae indeterminate (Grasses, reeds and bamboos)	10	3000	yes	E
Shrub (SG)	*Sclerolaena spp. (Copperburr, Poverty-bush)*	4	50	no	N
Forb (FG)	*Chamaesyce drummondii (Caustic Weed)*	0.4	1200	no	N
	Arctotheca calendula (Capeweed)	35	400	no	E
	Medicago spp. (A Medic)	4	100	no	E
	Avena spp. (Oats)	2	300	no	E
Forb (FG)	*Erodium crinitum (Blue Crowfoot)*	1	400	no	N
	Trifolium arvense (Haresfoot Clover)	0.2	100	no	E
Forb (FG)	*Oxalis spp.*	0.1	20	no	N
Forb (FG)	*Einadia nutans (Climbing Saltbush)*	0.1	8	no	N
Grass & grasslike (GG)	*Rytidosperma monticola (Mountain Wallaby Grass)*	0.1	400	no	N
Forb (FG)	*Crassula spp. (Stonecrop)*	0.1	400	no	N
	Hypochaeris glabra (Smooth Catsear)	0.1	10	no	E
	Lysimachia arvensis (Scarlet Pimpernel)	0.1	5	no	E
Shrub (SG)	*Sclerolaena spp. (Copperburr, Poverty-bush)*	0.1	5	no	N
Forb (FG)	*Vittadinia spp. (Fuzzweed)*	0.1	15	no	N
	Erodium moschatum (Musky Crowfoot)	0.1	20	no	E
Forb (FG)	*Calostemma purpureum (Garland Lily)*	0.1	50	no	N
	Lepidium africanum (Common Peppercress)	0.1	5	no	E
Other (OG)	*Convolvulus erubescens (Pink Bindweed)*	0.1	5	no	N
Forb (FG)	*Portulaca oleracea (Pigweed)*	0.1	10	no	N
Shrub (SG)	*Maireana spp. (Cotton Bush, Bluebush, Fissure-weed)*	0.2	15	no	N
Shrub (SG)	*Salsola australis*	0.1	30	no	N
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	0.1	10	no	N
	Trifolium spp. (A Clover)	0.3	2	no	E
	Gazania linearis	0.1	5	no	E
Grass & grasslike (GG)	*Austrostipa spp. (A Speargrass)*	1	100	no	N
	Sonchus oleraceus (Common Sowthistle)	0.1	1	no	E

BAM Site – Field Survey Form

Plot ID:	2	**Date:**	06/08/20	**Project number:**	J190140A	**Plot dimensions:**	20 x 20 x 50 m
Datum:	GDA94	**Easting:**	519,961	**Recorders:**	SGW RP		
Zone:	55	**Northing:**	6,246,025	**IBRA region:**	South Western Slopes (Lower Slopes)	**Midline bearing:**	258
Plant Community Type:		217: Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion		**Condition class:**	Medium	**PCT confidence:**	medium
Vegetation Class:		Western Slopes Dry Sclerophyll Forests		**EEC:**	yes	**EEC confidence:**	medium

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	2
	Shrubs:	5
	Grasses etc.:	4
	Forbs:	6
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	20.3
	Shrubs:	2.3
	Grasses etc.:	0.8
	Forbs:	1.5
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.3

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	3		
30 – 49 cm:	2		
20 – 29 cm:	1	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	90	1	8	2	2
Average litter cover (%):	20.6				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features

Plains, flat plain, clayey/loam soil with small rocks, tan/fawn in colour, at least 10 cm deep. No slope or aspect. Native midstorey and ground layer species regenerating.

Plot Disturbance

Previous land use included a workers village, canopy has been thinned out with midstorey underscrubed. Mountain and motorbikes tracks throughout, discarded rubbish and a lot of exotics present.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J190140A				
Recorders:	SGW RP	**Plot ID:**	2	**Date:**	06/08/20

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	*Eucalyptus sideroxylon (Mugga Ironbark)*	20	6	no	N
Shrub (SG)	*Acacia hakeoides (Hakea Wattle)*	1	5	no	N
Shrub (SG)	*Chenopodium curvispicatum*	1	6	no	N
	Oxalis pes-caprae (Soursob)	0.3	500	no	E
Tree (TG)	*Brachychiton populneus (Kurrajong)*	0.3	1	no	N
Forb (FG)	*Dianella revoluta var. revoluta (A Blue Flax Lily)*	1	50	no	N
	Avena spp. (Oats)	0.2	200	no	E
Grass & grasslike (GG)	*Enteropogon acicularis (Curly Windmill Grass)*	0.2	100	no	N
Shrub (SG)	*Enchylaena tomentosa (Ruby Saltbush)*	0.1	20	no	N
Grass & grasslike (GG)	*Rytidosperma erianthum (Wallaby Grass)*	0.2	200	no	N
	Medicago polymorpha (Burr Medic)	0.2	20	no	E
Forb (FG)	*Vittadinia spp. (Fuzzweed)*	0.1	5	no	N
	Romulea rosea var. australis (Onion Grass)	0.2	500	no	HTE
Forb (FG)	*Erodium crinitum (Blue Crowfoot)*	0.1	50	no	N
Shrub (SG)	*Atriplex spp. (A Saltbush)*	0.1	2	no	N
Forb (FG)	*Crassula spp. (Stonecrop)*	0.1	30	no	N
	Sonchus oleraceus (Common Sowthistle)	0.1	5	no	E
	Lolium perenne (Perennial Ryegrass)	0.1	10	no	E
	Hypochaeris glabra (Smooth Catsear)	0.1	5	no	E
Forb (FG)	*Sida corrugata (Corrugated Sida)*	0.1	2	no	N
	Gazania linearis	0.1	2	no	E
Grass & grasslike (GG)	*Austrostipa spp. (A Speargrass)*	0.2	50	no	N
	Trifolium spp. (A Clover)	0.1	50	no	E
	Medicago arabica (Spotted Burr Medic)	1	100	no	E
Grass & grasslike (GG)	*Enneapogon spp. (Nineawn Grass, Bottlewashers)*	0.2	50	no	N
Forb (FG)	*Calostemma purpureum (Garland Lily)*	0.1	20	no	N
Shrub (SG)	*Maireana brevifolia*	0.1	2	no	N
	Asparagus asparagoides (Bridal Creeper)	0.1	1	no	HTE

BAM Site – Field Survey Form

Plot ID:	3	**Date:**	06/08/20	**Project number:**	J190140A	**Plot dimensions:**	20x20x50
Datum:	GDA94	**Easting:**	519,895	**Recorders:**	RP (floristics)		
Zone:	55	**Northing:**	6,246,110	**IBRA region:**	South Western Slopes (Lower Slopes)	**Midline bearing:**	201
Plant Community Type:		217: Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion		**Condition class:**	Poor	**PCT confidence:**	medium
Vegetation Class:		Western Slopes Dry Sclerophyll Forests		**EEC:**	no	**EEC confidence:**	low

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	7
	Grasses etc.:	8
	Forbs:	6
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	2.3
	Grasses etc.:	49.5
	Forbs:	6.2
	Ferns:	0
	Other:	0.1
High Threat Weed cover:		2.1

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	10	5	5	10	5
Average litter cover (%):	7				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features

Plains, Flat, poor drainage, clay red soil.

Plot Disturbance

Weedy, near road, previously cleared.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J190140A				
Recorders:	RP (floristics)	**Plot ID:**	3	**Date:**	06/08/20

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
	Eragrostis curvula (African Lovegrass)	1	50	no	HTE
Grass & grasslike (GG)	*Enteropogon acicularis (Curly Windmill Grass)*	40	600	no	N
Forb (FG)	*Oxalis spp.*	0.4	50	no	N
	Gazania linearis	20	400	no	E
	Cyperaceae indeterminate (Sedges)	50	1600	no	E
	Lolium perenne (Perennial Ryegrass)	1	100	no	E
Forb (FG)	*Alternanthera denticulata (Lesser Joyweed)*	0.1	10	no	N
Shrub (SG)	*Dodonaea viscosa subsp. cuneata (Wedge-leaf Hop-bush)*	1	4	no	N
Shrub (SG)	*Acacia hakeoides (Hakea Wattle)*	0.1	1	no	N
Forb (FG)	*Sida corrugata (Corrugated Sida)*	0.1	50	no	N
	Echium plantagineum (Patterson's Curse)	10	100	no	E
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	1	150	no	N
	Sonchus oleraceus (Common Sowthistle)	0.5	50	no	E
	Trifolium arvense (Haresfoot Clover)	5	200	no	E
	Avena spp. (Oats)	2	30	no	E
Shrub (SG)	*Enchylaena tomentosa (Ruby Saltbush)*	0.5	20	no	N
Forb (FG)	*Erodium crinitum (Blue Crowfoot)*	5	50	no	N
	Lycium ferocissimum (African Boxthorn)	0.1	1	no	HTE
Shrub (SG)	*Atriplex spp. (A Saltbush)*	0.1	20	no	N
	Medicago spp. (A Medic)	2	50	no	E
Grass & grasslike (GG)	*Austrostipa nodosa (A Speargrass)*	3	30	no	N
	Hypochaeris glabra (Smooth Catsear)	0.5	10	no	E
Grass & grasslike (GG)	*Rytidosperma erianthum (Wallaby Grass)*	5	50	no	N
Shrub (SG)	*Maireana spp. (Cotton Bush, Bluebush, Fissure-weed)*	0.4	10	no	N
	Arctotheca calendula (Capeweed)	0.5	5	no	E
Grass & grasslike (GG)	*Panicum spp. (Panicum)*	0.1	20	no	N
	Malva parviflora (Small-flowered Mallow)	0.1	10	no	E
Shrub (SG)	*Salsola australis*	0.1	15	no	N
Grass & grasslike (GG)	*Bothriochloa spp. (Redgrass, Bluegrass)*	0.2	10	no	N
Forb (FG)	*Oxalis spp.*	0.5	15	no	N
Other (OG)	*Convolvulus erubescens (Pink Bindweed)*	0.1	15	no	N
Forb (FG)	*Crassula spp. (Stonecrop)*	0.1	400	no	N
	Lepidium africanum (Common Peppercress)	0.1	3	no	E
Grass & grasslike (GG)	*Sporobolus caroli (Fairy Grass)*	0.1	20	no	N
Grass & grasslike (GG)	*Enneapogon spp. (Nineawn Grass, Bottlewashers)*	0.1	20	no	N
	Romulea rosea	1	100	no	HTE
Shrub (SG)	*Rhagodia parabolica*	0.1	2	no	N

BAM Site – Field Survey Form

Plot ID:	4	**Date:**	06/08/20	**Project number:**	J190140A	**Plot dimensions:**	20 x 20 x 50 m
Datum:	GDA94	**Easting:**	519,937	**Recorders:**	SGW RP		
Zone:	55	**Northing:**	6,245,850	**IBRA region:**	South Western Slopes (Lower Slopes)	**Midline bearing:**	60
Plant Community Type:		217: Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion		**Condition class:**	Medium	**PCT confidence:**	medium
Vegetation Class:		Western Slopes Dry Sclerophyll Forests		**EEC:**	yes	**EEC confidence:**	medium

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	2
	Shrubs:	8
	Grasses etc.:	5
	Forbs:	16
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	12
	Shrubs:	9
	Grasses etc.:	0.9
	Forbs:	3.8
	Ferns:	0
	Other:	0
High Threat Weed cover:		1

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	1		
30 – 49 cm:	1		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	1		
5 – 9 cm:	1		
< 5 cm:	1		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	18	10	28	1	30
Average litter cover (%):	17.4				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features

Plains, flat, clay/loam soil with small rocks, tan/fawn in colour, at least 10 cm deep.no slope or aspect. Mid and grpund stratums have been underscrubbed but are regenrating.

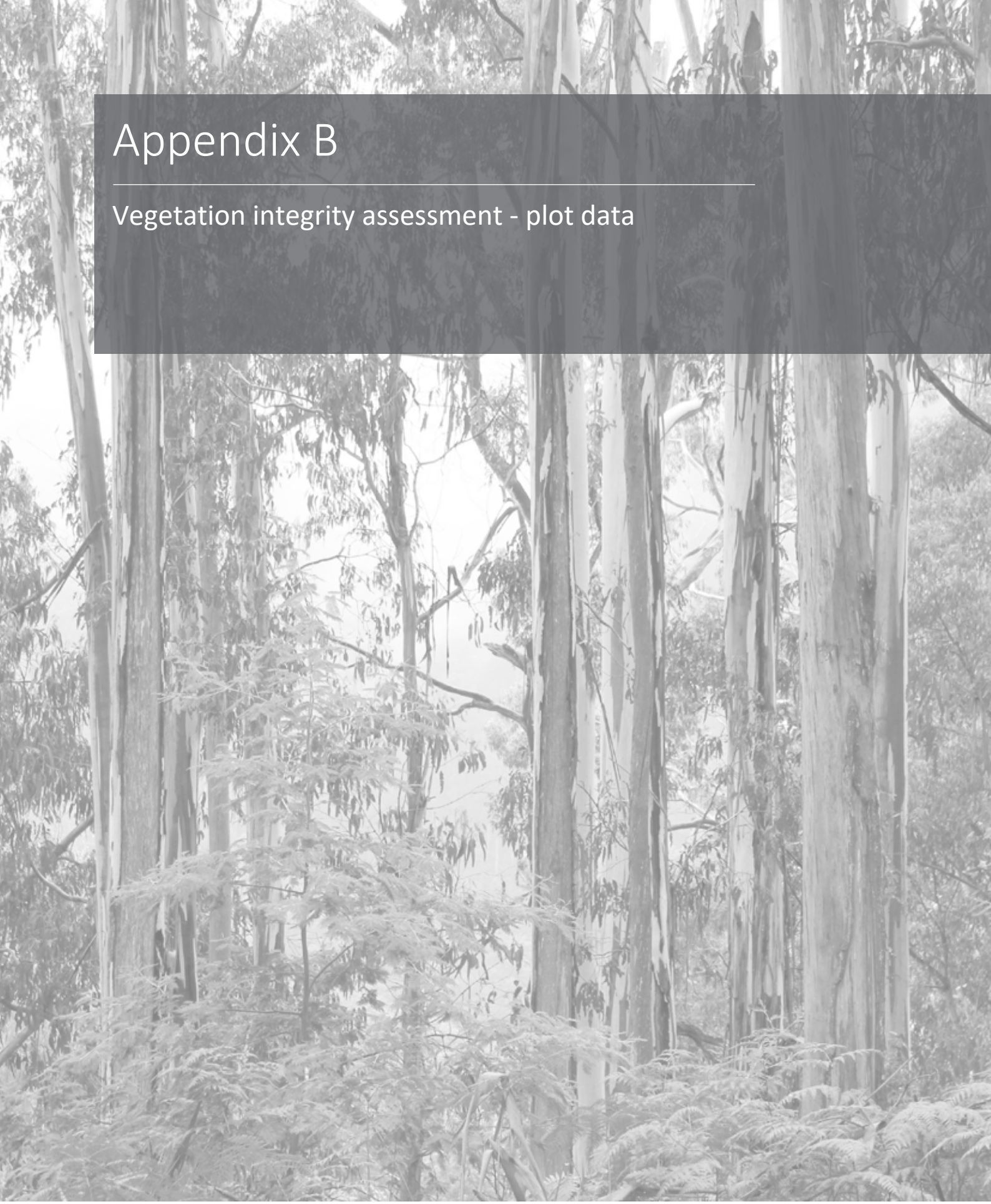
Plot Disturbance

Canopy has been thinned out, mid stratum and ground layer has been underscrubbed. Mountain and motorbike tracks throughout and discarded rubbish. Weeds present.

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J190140A				
Recorders:	SGW RP	**Plot ID:**	4	**Date:**	06/08/20

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	*Eucalyptus sideroxylon (Mugga Ironbark)*	10	6	no	N
Tree (TG)	*Eucalyptus viridis (Green Mallee)*	2	3	no	N
Shrub (SG)	*Acacia hakeoides (Hakea Wattle)*	5	8	no	N
Shrub (SG)	*Dodonaea viscosa subsp. cuneata (Wedge-leaf Hop-bush)*	3	15	no	N
Forb (FG)	*Dianella revoluta (Blueberry Lily)*	0.2	15	no	N
Shrub (SG)	*Kunzea parvifolia (Violet Kunzea)*	0.1	10	no	N
Shrub (SG)	*Chenopodium curvispicatum*	0.2	3	no	N
Forb (FG)	*Taraxacum spp. (Dandelion)*	0.1	2	no	N
Shrub (SG)	*Enchylaena tomentosa (Ruby Saltbush)*	0.2	50	no	N
Grass & grasslike (GG)	*Anthosachne scabra (Wheatgrass, Common Wheatgrass)*	0.1	5	no	N
	Oxalis pes-caprae (Soursob)	0.5	300	no	E
Forb (FG)	*Oxalis radicosa*	0.1	10	no	N
	Romulea rosea var. australis (Onion Grass)	1	500	no	HTE
Forb (FG)	*Calostemma purpureum (Garland Lily)*	0.1	20	no	N
Grass & grasslike (GG)	*Paspalidium jubiflorum (Warrego Grass)*	0.1	50	no	N
Shrub (SG)	*Atriplex spp. (A Saltbush)*	0.1	10	no	N
Forb (FG)	*Erodium crinitum (Blue Crowfoot)*	2	500	no	N
Grass & grasslike (GG)	*Eragrostis parviflora (Weeping Lovegrass)*	0.1	50	no	N
Shrub (SG)	*Lycium australe (Australian Boxthorn)*	0.2	1	no	N
	Avena spp. (Oats)	0.2	40	no	E
	Sonchus oleraceus (Common Sowthistle)	0.1	20	no	E
Grass & grasslike (GG)	*Rytidosperma erianthum (Wallaby Grass)*	0.3	100	no	N
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	1	no	N
	Echium plantagineum (Patterson's Curse)	0.2	20	no	E
Forb (FG)	*Crassula sieberiana (Australian Stonecrop)*	0.2	1000	no	N
Forb (FG)	*Erodium spp. (Crowfoot)*	0.1	10	no	N
Forb (FG)	*Portulaca oleracea (Pigweed)*	0.1	1	no	N
Grass & grasslike (GG)	*Enteropogon spp. (Windmill Grass)*	0.3	50	no	N
Forb (FG)	*Einadia nutans (Climbing Saltbush)*	0.1	20	no	N
	Trifolium spp. (A Clover)	0.2	50	no	E
Forb (FG)	*Chamaesyce drummondii (Caustic Weed)*	0.1	20	no	N
Forb (FG)	*Vittadinia spp. (Fuzzweed)*	0.1	5	no	N
Shrub (SG)	*Maireana brevifolia*	0.2	10	no	N
	Medicago spp. (A Medic)	0.1	10	no	E
	Hypochaeris glabra (Smooth Catsear)	0.1	5	no	E
Forb (FG)	*Asteraceae indeterminate (Daisies)*	0.2	50	no	N
Forb (FG)	*Calotis hispidula (Bogan Flea)*	0.1	5	no	N
Forb (FG)	*Asteraceae indeterminate (Daisies)*	0.1	10	no	N
	Lolium perenne (Perennial Ryegrass)	0.1	20	no	E
Forb (FG)	*Wahlenbergia spp. (Bluebell)*	0.1	1	no	N
	Freesia spp.	0.1	5	no	E

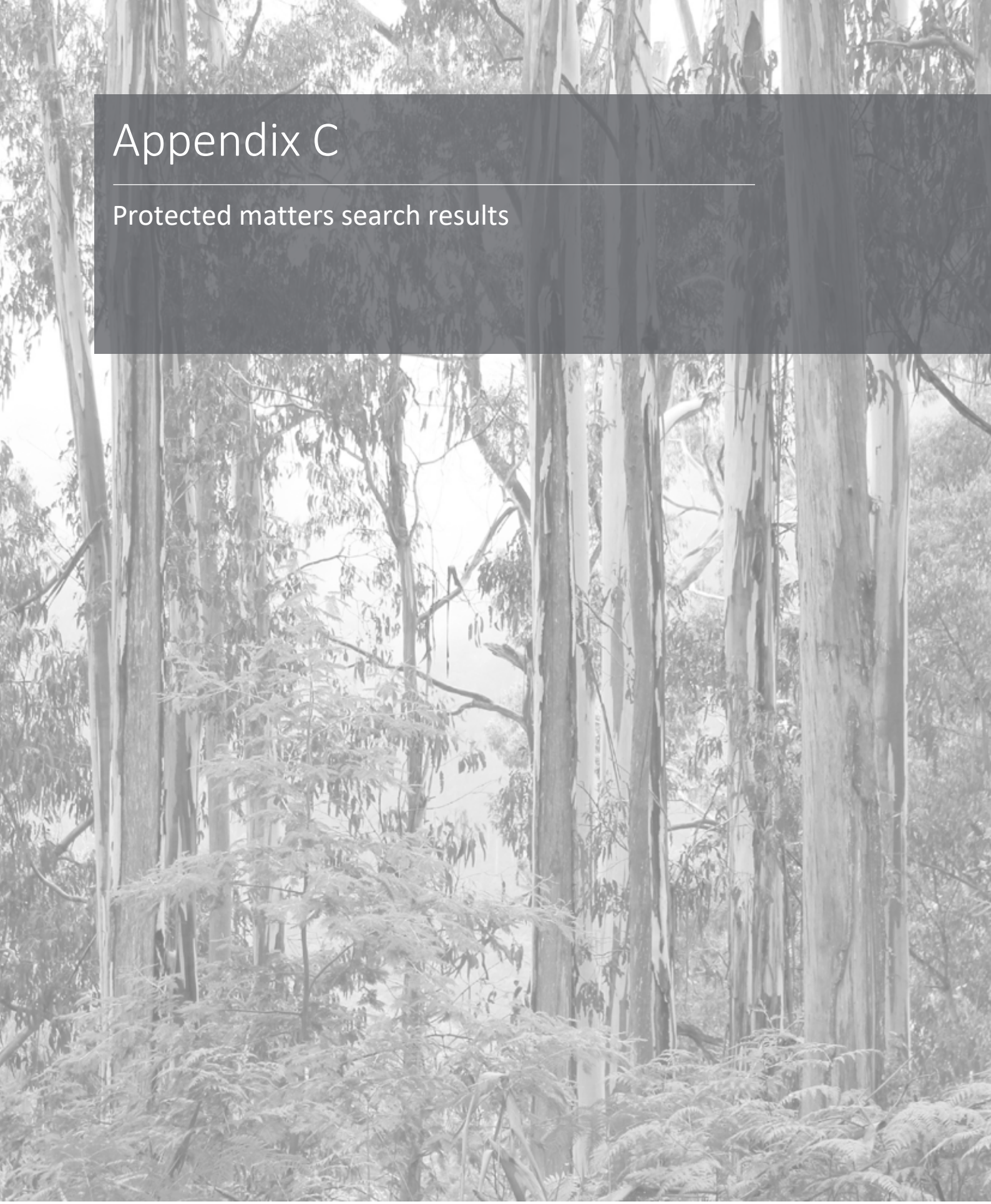


Appendix B

Vegetation integrity assessment - plot data

Table B.1 Vegetation integrity data

plot	pct	Condition class	zone	easting	northing	bearing	comp Tree	comp Shrub	comp Grass	comp Forbs	comp Ferns	comp Other	struc Tree	struc Shrub	struc Grass	struc Forbs	struc Ferns	struc Other	Fun Large Trees	Fun Hollow trees	Fun Litter Cover	Fun Len Fallen Logs	Fun Tree Stem 5 to 9	Fun Tree Stem 10 to 19	Fun Tree Stem 20 to 29	Fun Tree Stem 30 to 49	Fun Tree Stem 50 to 79	Fun Tree Regen	Fun High Threat Exotic
P01	217	Poor	55	519,899	6,245,970	83	0	4	4	8	0	1	0.0	4.4	16.2	2.0	0.0	0.1	0	0	8.0	0.0	0	0	0	0	0	0	10.0
P02	217	Medium	55	519,961	6,246,025	258	2	5	4	6	0	0	20.3	2.3	0.8	1.5	0.0	0.0	3	0	20.6	0.0	0	0	1	1	1	0	0.3
P03	217	Poor	55	519,895	6,246,110	201	0	7	8	6	0	1	0.0	2.3	49.5	6.2	0.0	0.1	0	0	7.0	0.0	0	0	0	0	0	0	2.1
P04	217	Medium	55	519,937	6,245,850	60	2	8	5	16	0	0	12.0	9.0	0.9	3.8	0.0	0.0	1	0	17.4	0.0	1	1	0	1	1	1	1.0



Appendix C

Protected matters search results

Australian Government

Department of Agriculture, Water and the Environment

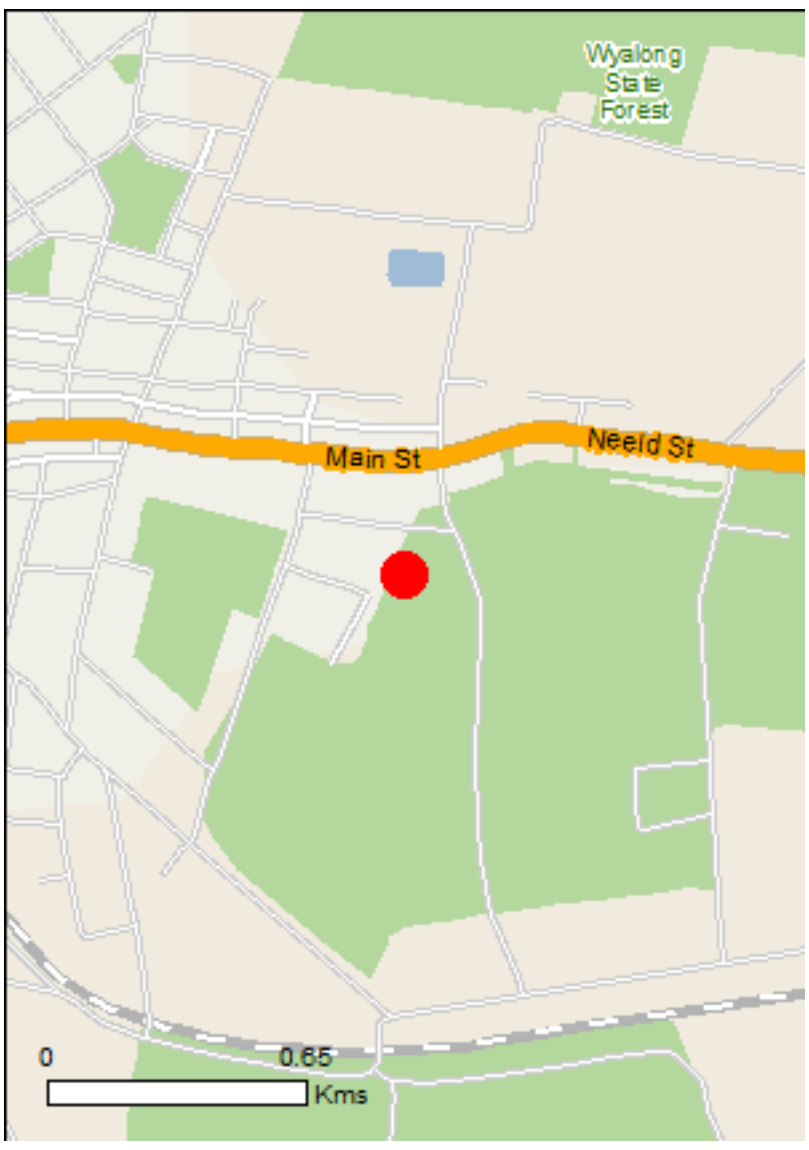
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

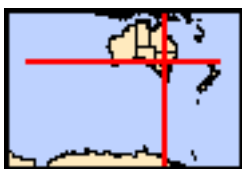
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/03/21 12:25:35



Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	15
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	600 - 700km upstream
Hattah-kulkyne lakes	400 - 500km upstream
Riverland	500 - 600km upstream
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream

Listed Threatened Ecological Communities		[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta		
Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.92601 147.21489

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix D

Biodiversity credit report

BAM Credit Summary Report

Proposal Details

Assessment Id 00023627/BAAS17062/21/00023628	Proposal Name BDAR Cowal Operations Accommodation Village	BAM data last updated * 22/02/2021
Assessor Name Steven Ward	Report Created 19/03/2021	BAM Data version * 37
Assessor Number BAAS17062	BAM Case Status Open	Date Finalised To be finalised
Assessment Revision 0	Assessment Type Part 4 Developments (General)	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Mugga Ironbark - Western Grey Box - cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion											
1	217_Medium	Not a TEC	49.8	49.8	0.7			High Sensitivity to Potential Gain	1.75		15
2	217_Poor	Not a TEC	8.5	8.5	1.5			High Sensitivity to Potential Gain	1.75		0

3	217_Medium_APZ	Not a TEC	49.8	4.3	0.32			High Sensitivity to Potential Gain	1.75		1
4	217_Poor_APZ	Not a TEC	8.5	3.7	0.31			High Sensitivity to Potential Gain	1.75		0
										Subtotal	**16**
										Total	**16**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits



Appendix F

Bushfire assessment

EMM
creating opportunities

Evolution
MINING

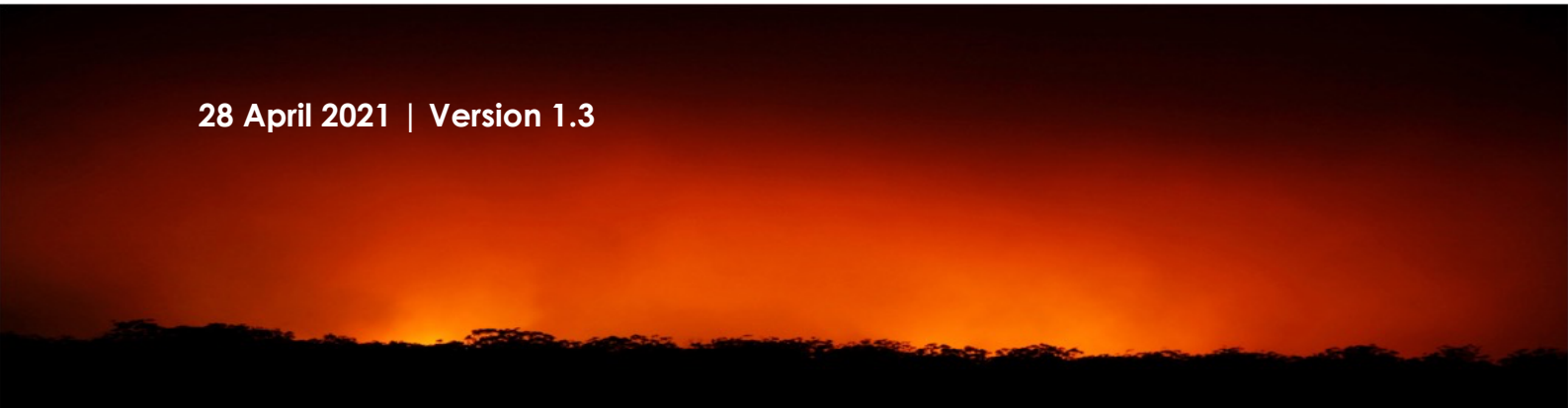
BLACKASH
BUSHFIRE CONSULTING

Bushfire Hazard Report
Cowal Gold Operations Accommodation Village NSW

Prepared for

EMM Consulting Pty Limited

BPAD Bushfire Planning & Design Accredited Practitioner Level 3



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Document Tracking:

Project Name:	Cowal Gold Operations Accommodation
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Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373

Contents

1. Abbreviations

APZ	Asset protection zone
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2018*
BAL	Bushfire Attack Level
NCC	*National Construction Code*
BFSA	Bushfire safety authority
EP&A Act	*Environmental Planning & Assessment Act 1979*
EP&A Reg	*Environmental Planning and Assessment Regulation 2000*
GTA	General terms of approval
PBP	*Planning for Bush Fire Protection 2019*
RF Act	*Rural Fires Act 1997*
RFS	NSW Rural Fire Service
RFR	*Rural Fires Regulation* 2013
SFPP	Special fire protection purpose

2. Glossary

AS3959	Australian Standard AS 3959 Construction of buildings in bushfire-prone areas, Standards Australia, 2018, that outlines construction standards applicable to residential developments in bush fire prone areas
Bushfire Prone Area	An area of land that can support a bushfire or is likely to be subject to bushfire attack.
Bush fire safety authority	An approval of the Commissioner of the RFS required for a subdivision for residential or rural residential purpose or for a special fire protection purpose listed under section 100B of the RF Act.
Infill Development	Refers to the development of land by the erection of or addition to a residential building (or buildings) which does not require the spatial extension of services including public roads, electricity or water and is within an existing allotment.

3. Property, Proposal & Summary

Address:	Cowal Gold Operations Accommodation Village on Boundary Street, West Wyalong, NSW See Figure 1
Type of development:	Other – Manufactured Home Estate
NCC Categorisation	Class 3
Intended use	Multi-dwelling residential development under the Bland LEP and DCP for a mining village

The Land Zoning is:

- R1 - General Residential

Details of the planning controls are contained in the Bland Local Environmental Plan 2011 (pub. 9-12-201.

Compliance with Planning for Bushfire Protection 2019

Type of Development	Multi-dwelling residential development under the Bland LEP and DCP
Aim of PBP	Yes
Objectives of PBP	Yes
BAL	New development is required to achieve BAL 29 setbacks. Deemed to Satisfy meeting BAL 12.5
Alternate Solution or Deemed to Satisfy?	Deemed to Satisfy No alternative solutions proposed

4. Introduction

EMM Consulting Pty Limited (EMM) has commissioned Blackash Bushfire Consulting (Blackash) to prepare a Bushfire Hazard Assessment for the proposed Cowal Gold Operations Accommodation (CGO) Village on Boundary Street, West Wyalong, NSW (See Figure 1) which is legally known as Lot 7044/-/DP1115128 and part of Lot 2/-/DP1239669 (the site). Part of the APZ is on Lot 1085/-/DP753135 to the south of the site which is under common ownership. Part of the southern APZ will be maintained on this land and by agreement with Council.

The site is on the eastern edge of West Wyalong township which is in the Bland Shire Local Government Area in the Riverina region of New South Wales. West Wyalong has a population of 3,146 people[1]. West Wyalong is located 467 kilometres west of Sydney and it is situated on the crossroads of the Newell Highway between Melbourne and Brisbane, and the Mid-Western Highway between Sydney and Adelaide.

The proposed Cowal Gold Operations Accommodation Village is a multi-dwelling residential development under the Bland LEP and DCP with a similar meaning to a Manufactured Housing Estate (MHE) village within NSW Rural Fire Service *Planning for Bushfire Protection 2019* (PBP). The site is just within the 100m buffer for Bushfire Prone Land. It is in an existing cleared area for residential development. The vegetation has been significantly cleared and modified, resulting in a site that has some remnant eucalypts with a grassy understory. From a bushfire perspective the site is low risk.

The multi-dwelling residential development will be used for the purpose of casual or permanent accommodation (but not tourist accommodation) and be sized appropriately to accommodate approximately:

- 100 construction staff
- 76 operations staff

The accommodation will be staged as follows:

- Stage 1: 52 construction personnel. Enabling infrastructure and amenities sufficient for the operation of Stage 1
- Stage 2: 48 construction personnel
- Stage 3: 76 operations personnel
- Stage 4: Provisional spatial design for additional amenities

[1] https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/SSC14256

The accommodation will be occupied by the construction and operational workforces supporting the proposed CGO Underground Development Project. The workforce will be able bodied and will be under CGO management and emergency management control.

Section 4.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) requires compliance with the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2019* (PBP). Council as the consent authority, is required to consult with the RFS under section 4.14 of the EP&A Act when a proposal is Bushfire Attack Level (BAL) 40 or BAL Flame Zone. Given the size of the site, the buildings can be setback from the boundaries to provide complying asset protection zones (APZ) and manufactured up to and including BAL 29. This has been demonstrated in this Bushfire Hazard Assessment. All proposed buildings will achieve setbacks to provide BAL 29 or lower construction. Buildings to the north will achieve setbacks to be partially BAL 19 and BAL 12.5, buildings to the east will be BAL 12.5 and buildings to the south will be BAL 29 or lower.

The proposal is for a multi-dwelling residential development under the Bland LEP and DCP. This is similar in application to a Manufactured Home Estates as outlined within PBP (p. 52) which provides prefabricated buildings up to BAL 29:

> *Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m^2 in line with Tables A1.12.2 - A1.12.3.*

The non-residential buildings must comply with the aim and objective of PBP and are able to provide a lesser APZ and higher construction level. However, minimum setbacks have been provided such that the maximum exposure on any building within the site is BAL 29.

CGO will need to ensure that the multi-dwelling residential development and associated buildings are designed and built to meet the identified BAL within this report.

This assessment has been prepared by Lew Short, Principal Blackash Bushfire Consulting (Level 3 FPAA BPAD-A Certified Practitioner No. BPD-PA-16373) who is recognised by the RFS as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to undertake alternative solution proposals.

A site inspection was completed by Lew Short on Wednesday 17 February 2021.

This report has been completed using the deemed to satisfy solutions of PBP and the *Australian Standard for Construction of Buildings in Bushfire Prone Areas* (AS3959). No alternative solutions have been proposed.

Figure 1 Site Location

BLACKASH
BUSHFIRE CONSULTING

Legend

Subject Land

N

DKGIS

Date: 29/01/2021

0 250 500 1,000

Metres

Coordinate System: GDA 1994 MGA Zone 55

Imagery: © Dept, Customer Service

Figure 2 Concept Layout (source EMM)

5. Legislative and Planning for Bushfire Protection Requirements

This section provides an overview of the relevant legislation, policy and guidelines as it relates to the proposal.

5.1. Relevant legislation

Environmental Planning and Assessment Act, 1979 (EP&A Act): section 4.14

The application is made under Division 4.3 of the EP&A Act and is subject to Section 4.14. The purpose of the section 4.14 is to ensure that the consent authority is satisfied that the development conforms to the specifications and requirements of PBP.

***Environmental Planning and Assessment Act, 1979: Section* 10.3 Bushfire Prone Land**

The designation of Bushfire Prone Land (BPL) in NSW is required under the EP&A Act (s.10.3). BPL Maps provide the trigger for the various development assessment provisions. The BPL Map is a trigger for the consideration of bushfire matters for new development. It is not intended as a detailed measure of risk. The map does not form part of the site assessment process.

Rural Fires Act, 1997

The Rural Fires Act establishes the NSW Rural Fire Service, defines its functions and makes provision for the prevention, mitigation and suppression of rural fires.

Section 52 of the Rural Fires Act requires Bushfire Management Committees to prepare Bushfire Risk Management Plans. The Bushfire Risk Management Plan provides a risk assessment across a fire district, which have been reviewed as part of this bushfire assessment. The proposal site is within the Bland Temora Bushfire Risk Management Plan area.

Section 63 Rural Fires Act of the RF Act requires public authorities and owners and occupiers of land to prevent bushfires and to manage land they are responsible for:

s. 63 Duties of public authorities and owners and occupiers of land to prevent bushfires

(1) It is the duty of a public authority to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of a bushfire on or from:

(a) any land vested in or under its control or management, or

(b) any highway, road, street, land or thoroughfare, the maintenance of which is charged on the authority.

Section 63 places on ongoing bushfire management requirement on the landholder to mitigate the risk of bushfire within the proposal site.

5.2. Relevant guidelines

Planning for Bushfire Protection 2019 NSW Rural Fire Service
Contains specifications for planning and building on land identified as bushfire prone.

Standards for Asset Protection Zones NSW Rural Fire Service
Provides standards for the establishment and maintenance of asset protection zones.

5.3. Application

Section 4.14 of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**) requires compliance with PBP. Council as the consent authority, is required to consult with the RFS under section 4.14 of the EP&A Act when a proposed residential dwelling does not comply with the "acceptable solutions" within section 7 of PBP and or is in the flame zone.

PBP (p. 52) provides the following requirements for MHE that is similar to multi-dwelling residential development:

> *Manufactured home estates – Manufactured housing can be built to achieve all levels of construction required under the NCC. However, SEPP 36—Manufactured Home Estates does not require a separate development consent for each manufactured home after development consent is given for the estate.*
>
> *Due to the nature of manufactured home estates, there is no mechanism within the development consent process to ensure that the dwellings will be constructed to the standards applied within AS 3959 or NASH Standard. Therefore, the acceptable solution for manufactured housing is the provision of an APZ which achieves 10kW/m² commensurate with SFPP development in line with Table A1.12.1.*
>
> *Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m² in line with Tables A1.12.2 - A1.12.3.*

As the multi-dwelling residential development will be occupied by workers during the construction and operation of the CGO Underground Development Project, all occupants will be under the control of CGO management systems and will be able bodied. The accommodation will not cater for vulnerable people, however, up to 8 accessible manufactured housing will comply with the accessibility provisions. As such, the building can be manufactured up to and including BAL 29. This has been demonstrated in this Bushfire Hazard Assessment.

The National Construction Code (NCC) is a performance based code which includes the Building Code of Australia (BCA). The NCC contains Performance Requirements and Deemed-to-Satisfy provisions relating to the construction of buildings in bushfire prone areas. In NSW, these provisions apply to Class 1, 2 and 3 buildings, Class 4 parts of a building, Class 9 buildings that are SFPPs, and associated class 10a buildings and decks.

The construction requirements of the *Australian Standard for Construction of Buildings in Bushfire Prone Areas* (AS3959) and the *National Association of Steel-framed Housing* (NASH) Standard are Deemed-to-Satisfy solutions in the NCC, as varied in NSW, for buildings in designated bushfire prone areas.

The intended use and classification is important in the application of setback distances (APZ) and construction levels. The Initial Building Classification Advice is that:

- Communal/dining/activities buildings: Class 9b
- Admin Building: Class 5
- Storage/linen/laundry/vehicle sheds and other non-habitable buildings: Class 10a
- Residential pre fabricated buildings: Class 3

We understand that the buildings are temporary in nature to provide accommodation, offices, administration and amenity and are designated as Class 3:

> *A residential building, other than a Class 1 or 2 building, which is a common place of long term or transient living for a number of unrelated persons. Example: boarding-house, hostel, backpackers accommodation or residential part of a hotel, motel, school or detention centre.*

PBP assesses Class 3 building types as Manufactured Home Estates. PBP (p. 52) provides prefabricated buildings up to BAL 29:

> *Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m² in line with Tables A1.12.2 - A1.12.3.*

The non-residential buildings must comply with the aim and objective of PBP and are able to provide a lesser APZ and higher construction level.

6. Site Description

The site has been cleared of most native vegetation. Access to the site will be from the existing bitumen Boundary Street which is 12m kerb to kerb with an internal loop road (see Figure 2). The site is bound to the north by Hyde Street which is 13m wide kerb to kerb and a cleared grass block. The east of the site is a narrow band of remnant vegetation within the road reserve for Boundary Street. An area of modified and cleared native vegetation is to the south of the site consisting of some remnant eucalypts and grassland. Remnant, but fragmented (by motor bike and car tracks) bushland is further to the south. Existing residential development is to the west of the site, bound by Hyde Lane.

The configuration of the site and vegetation to the east and south of the sited provides potential that that the site could be impacted by bushfire.

The final concept layout for the village which will be used for the development application is shown in Figure 2.

Site Photographs

Photo 1 Looking south from the corner of Boundary Street and Hyde Street showing the site. Boundary Street is 12m kerb to kerb.

Services are underground. Street lighting is provided, and fire hydrants have been provided.

The site is to the right of the photograph and is cleared of native vegetation and has been prepared for development. The site has some remnant eucalyptus trees that are well separated and do not form a continuous canopy, The site currently has grassland following recent rains. No mid storey vegetation is within the site.

Photo 2 shows the cleared block to the north of Hyde Street with separated eucalypts along the road verge. The block currently has low grassland vegetation.

Photo 3 looking west from the intersection of Boundary Street into Hyde Street. Hyde Street is 13m wide kerb to kerb. The site is to the left of photograph.

Photo 4 looking west from Boundary Street into the site. The site is extensively cleared of vegetation with grass within the main parts of the site.

Photo 5 looking into the south eastern corner of the site showing Boundary Street and the dead end Gunters Close to the south of the site. The existing dirt track that runs along the southern boundary can be seen in the centre of the photo.

7. Bushfire Prone Land

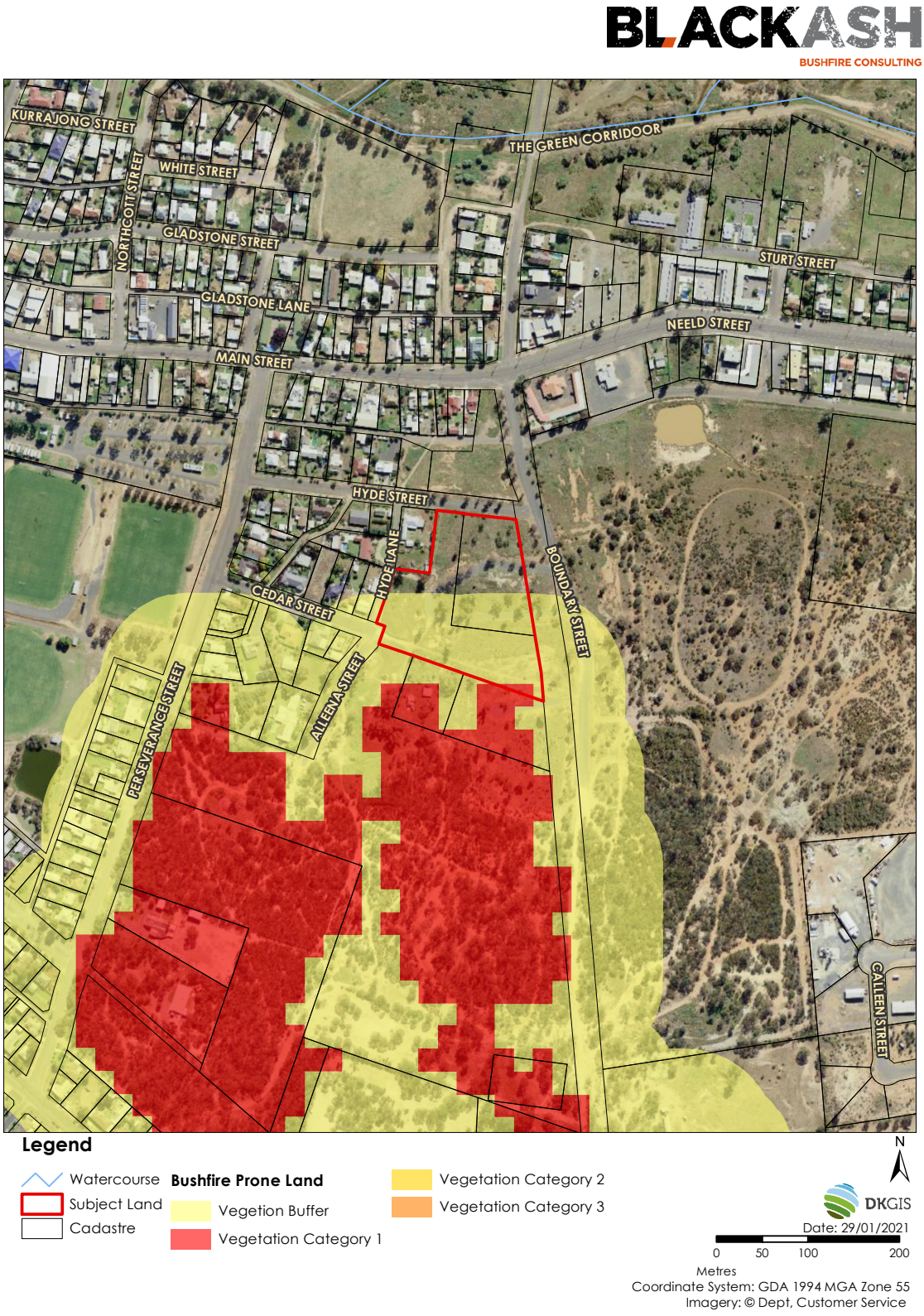
The site is identified as being in the 100m buffer for the 'bushfire prone land' (see Figure 3) for the purposes of Section 10.3 of the EP&A Act and the legislative requirements for building on bushfire prone lands are applicable.

Bushfire prone land maps provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone. Bushfire prone land (**BFPL**) is land that has been identified by council, which can support a bushfire or is subject to bushfire attack. Bushfire prone land maps are prepared by local council and certified by the Commissioner of the RFS.

The site is partially mapped as within the 100m Category 1 buffer from the Category 1 vegetation to the south of the site. The bushfire Prone Map is coarse and is considered to underrepresent the potential for land within and surrounding the site to carry or be affected by bushfire. Vegetation to the east of the Boundary Street has been managed and extensively cleared along Boundary Street. Vegetation further to the east of Boundary Street is fragmented by motor bike and car tracks but has the potential to carry bushfire.

Despite the development site being mapped as Bushfire Prone Land (Category 1 buffer), the development site itself has been cleared and modified and once constructed, will not contain any vegetation considered to be a hazard. However, the vegetation to the south of the site is Bushfire Prone Land (Category 1 vegetation), and therefore the site will remain impacted by this vegetation and associated 100m buffer.

Figure 3 Bushfire Prone Land Map



8. Bushfire Risk

Bushfire is a normal part of Australia's natural environment, particularly in eucalypt forests and grasslands. However, the frequency and intensity of bushfires varies throughout the landscape and the seasons. Bushfires are a common occurrence during the drier periods of the year in most places. Climate change is expected to bring longer bushfire seasons to parts of Australia, an increasing number of extreme fire weather days, and increasing fire intensity.

Bushfires of low or moderate intensity often pose little threat to life, property and community assets, but the potential for changes in wind direction can be a significant hazard. However, bushfires that burn in heavy fuels, steep terrain or on hot, dry and windy days often spread rapidly and can cause crown (canopy) fires in forests, produce powerful convection columns and create extensive spot fires ahead of the fire front, often making their control impossible until weather conditions moderate.

As the Fire Danger Rating reaches 'Extreme', bushfires are often described as 'firestorms' and become impossible to control. When the Fire Danger Rating approaches 'Catastrophic', the risk of serious injury or death to people in the path of a bushfire increases significantly, and many properties and other community infrastructure can become difficult or impossible to defend[2]. Isolated developments will be at higher risk under lower Fire Danger Ratings.

The safety of people may be improved if they have prepared a bushfire survival plan, including contingency plans in the event their primary plan fails or cannot be carried out, and have taken adequate steps to prepare for bushfire.

In line with the national fire services position, the safest action to protect life is for people to be away from the bushfire or threat of bushfire as early as possible. Leaving a high risk bushfire location is the safest action, and leaving before a bushfire threatens is always safer than remaining until a bushfire starts. Leaving becomes increasingly appropriate with higher Fire Danger Ratings.

When bushfires are burning on days where circumstances such as weather conditions, topography or fuel loads may create intense fire behaviour, typically when 'Extreme' or 'Catastrophic' fire danger conditions are expected, or where circumstances such as weather conditions, topography or fuel loads may create intense fire behaviour, leaving early may be the only safe action, even for people who are prepared to defend well-prepared buildings.

As such, a detailed Bushfire Emergency Management and Evacuation Plan will need to be provided prior to occupation of the proposed development.

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[2] AFAC Position Paper on Community Safety p. 4

Limitations of *Planning for Bushfire Protection* 2019 (p. 11)

Due to certain limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event. Limitations of this document include, but are not limited to uncertainties in the following areas:

- *Fire Danger Index*
- *fuel loads*
- *existing developments*
- *human behaviour*
- *maintenance.*

It is possible that days of higher Fire Danger Index (FDI) may be experienced than the FDI levels assumed within this document. The performance of buildings constructed in accordance with this document and the National Construction Code of Australia may be inadequate due to excessive levels of radiant heat exposure, flame contact, embers travelling further than expected and excessive winds.

Limitations of AS3959

The measures contained in AS 3959 cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

The Standard is primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself (AS3959 p. 5). As such, the Standard seeks to construct a house to survive the passage of the fire and not necessarily to absolutely survive the fire. AS3959 notes that:

> *It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions. (AS3959 p. 5)*

Importantly, AS3959 is not applicable for fires burning under weather conditions above Fire Danger Index of 100. Under this scenario, it is anticipated that houses will ignite during the passage of the fire and will not provide any refuge for occupants.

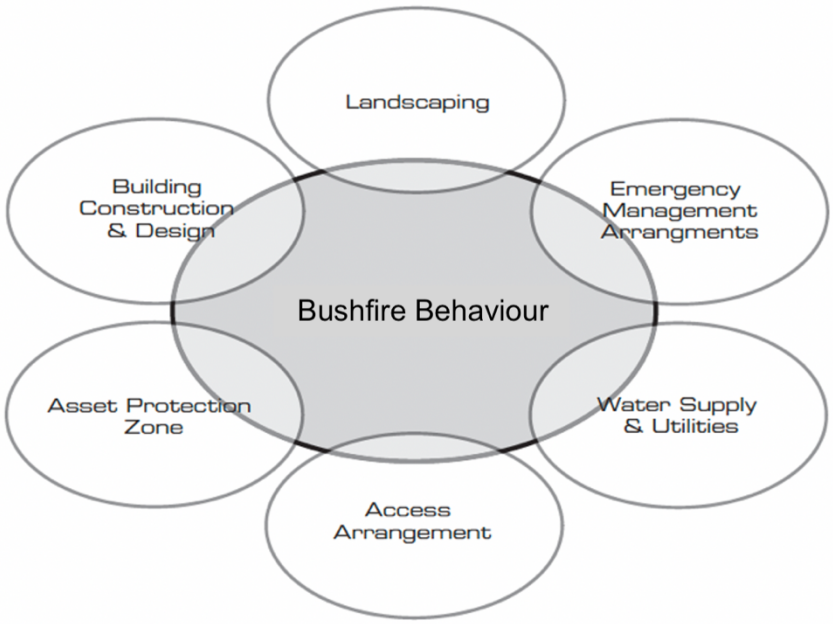
9. Bushfire Assessment Requirements

PBP promotes detailed site analysis and the application of a combination of bushfire protection measures (**BPMs**) to achieve an acceptable outcome.

The BPMs work in combination to provide a suite of measures that meet the aim and objective and Section 7 and 8 of PBP 2019. The BPMs are shown in Figure 4.

Appropriate combinations depend upon geographic location and site circumstances.

Figure 4 Bushfire Protection Measures in Combination (source PBP 2019 p. 26)



A layered approach with contingency options should be taken with the design and utilisation of the site to provide a suite of measures that reduce the impact on the site.

9.1. Methodology

PBP provides a methodology to determine the bushfire threat posed to a site and Australian Standards for the *Construction of Buildings in Bushfire Prone Areas* (**AS3959**) is used to determine the construction requirement to reduce potential bushfire attack.

The following assessment is prepared in accordance with PBP deemed to satisfy provisions outlined in Appendix 1 and Method 1 from AS3959. This assessment is based on a site inspection and desktop assessment of the site assessment utilising the following resources:

- *Planning for Bushfire Protection* (NSW RFS, 2019);
- Aerial mapping;
- GIS analysis;
- Site concept plans

In undertaking the report, Blackash has followed the methodology outlined in accordance with PBP 2019. The following methodology is from PBP 2019 (p. 80) which has been used to determine the BAL at the site. The process to determine BAL is outlined below:

To Determine Bushfire Attack Level

- Step 1: Determine vegetation formation in all directions around the building to a distance of 140 metres
- Step 2: Determine the effective slope of the land from the building for a distance of 100 metres
- Step 3: Determine the relevant Forest Fire Danger Index (FFDI) for the council area in which the development is to be undertaken
- Step 4: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall of an asset
- Step 5: Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables in PBP 2019.

9.2. Bushfire Hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone (**APZ**) locations and dimensions and future building construction requirements in accordance with AS3959. The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site and which determine the planning and building responses of PBP.

9.3. Fire weather

The fire weather used in the assessment is defined in the PBP which assumes a credible worst-case scenario based on a 1:50 year weather event and an absence of any other mitigating factors relating to aspect or prevailing winds. The site has a Forest Fire Danger Index (FFDI) of 80 as per PBP.

9.4. Vegetation

Predominant vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP. The different vegetation types give rise to particular fire behaviour and radiant heat characteristics. There are 7 vegetation formations (with sub-formations) identified in PBP.

The predominant vegetation has been determined over a distance of at least 140 metres in all directions from the proposed property boundary or building footprint on the site. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate. Based on the site inspection a mix of woodland, grassland, mallee and managed land affects the site as shown in Figure 5.

The 'predominant vegetation' within the study is grassland to the north and east with woodland vegetation further east and to the south of the site. The woodland vegetation to the east of Boundary Street consists of scattered Eucalyptus trees with a grassy understory (see Figure 5). The APZ assessment is provided at Table 1.

The area between the eastern boundary of the site and Boundary Street is road reserve and is designated on Figure 5 as managed land. PBP (p. 112) defines managed land as:

> *Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. This may include developed land (residential, commercial or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas are managed to meet the requirements of an APZ.*

This area will be mown regularly and will be managed land. As managed land, this area will need to be mown regularly by the village operator or council, as part of the operational management plan for the village. The existing trees and shrubs can remain in this area.

9.5. Slopes influencing bushfire

The 'effective slope' influencing fire behaviour approaching the sites has been assessed in accordance with the methodology specified within PBP using 2m slope contours. This was conducted by measuring the worst-case scenario slope using GIS mapping where the vegetation occurs over a 100 m transect measured outwards from the development boundary or the existing/ proposed buildings. The detailed slope assessment is shown in Figure 5.

The slope under the hazard is 0.57 degrees downslope to the east flat from the site and upslope to the south. Given the marginal grade of the land at less than 1 degree fall, the land should be assessed as flat. However, we have taken a conservative position and applied slopes of 0 – 5 degrees downslope to the east with an APZ of 13m. The west is existing residential development and not applicable.

Figure 5 Slope and Vegetation Assessment

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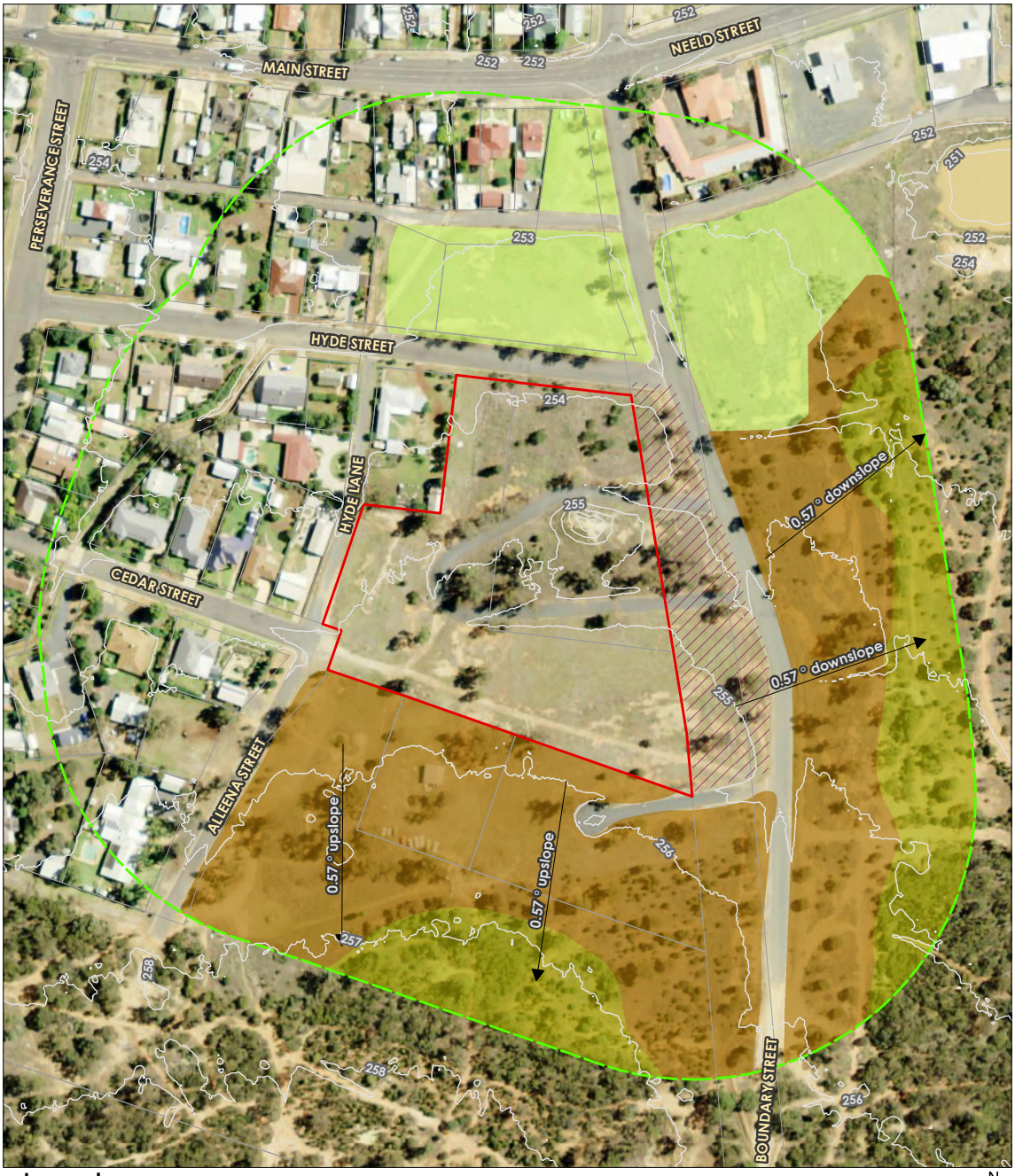


Legend

- Contour - 1m
- Watercourse
- Vegetation Assessment Area - 140m
- Subject Land
- Cadastre

Vegetation Formation

- Woodland
- Managed Land
- Mallee Shrubland
- Grassland

N

DKGIS
Date: 22/02/2021
0 12.5 25 50
Metres
Coordinate System: GDA 1994 MGA Zone 55
Imagery: © Dept, Customer Service

10. Asset Protection Zones

An APZ is a buffer zone between a bushfire hazard and an asset. The APZ minimises fuel loads and reduce potential radiant heat levels, flame, smoke and ember attack. It should not contain dangerous goods and hazardous substances. The appropriate APZ distance is based on vegetation type, slope and the nature of the development. The APZ can include roads or land managed consistent with APZ standards set out in RFS document *Standards for Asset Protection Zones* (Standards for APZs).

Part of the APZ is on Lot 1085/-/DP753135 to the south of the site which is under common ownership. Part of the southern APZ will be maintained on this land. Further, Council has agreed (see email at Attachment 1) to the maintenance of the APZ on the SE corner of the site that provides surety for the ongoing management of grassland hazards.

The APZ provides a fuel-reduced, physical separation between buildings and bushfire hazards and is a key element in the suite of bushfire measures and dictates the type of construction necessary to mitigate bushfire attack.

PBP (p. 52) provides prefabricated buildings up to BAL 29:

> *Where evidence can be provided which confirms that dwellings within the manufactured home estate will be constructed to the appropriate construction standards under AS 3959 or NASH Standard, an APZ can be provided which meets 29kW/m² in line with Tables A1.12.2 - A1.12.3.*

The APZ is based on achieving a minimum BAL 29 for the multi-dwelling residential development buildings as required by PBP.

The APZ to the south of the site will incorporate a 4m wide fire trail to provide access. This augments the existing access trail within the site and the dead-end bitumen road just to the south of the site.

The *Standards for APZs* require extensive modification of vegetation such that an area will not support a bushfire. An APZ is a fuel reduced area surrounding a built asset or structure. An APZ provides:

- a buffer zone between a bushfire hazard and an asset;
- an area of reduced bushfire fuel that allows suppression of fire;
- an area from which backburning by fire fighters may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters to defend property.

The requirement for an APZ allows for vegetation and planting. However, bushfire fuels are minimised

within an APZ. This is so the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy or ground vegetation.

The *Standards for APZ* requirements include:

- *raking or manual removal of **fine fuels**. Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis*
- *mowing or grazing of grass. Grass needs to be kept short and, where possible, green.*
- ***removal** or pruning of trees, shrubs and understorey. The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation*
- *prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset*
- ***separate tree crowns by two to five metres***
- *a canopy should not overhang within two to five metres of a dwelling*
- *native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.*

These Standards can be provided within the nominated APZ, either by virtue of them being roads, roadside verges or managed land within the site.

The entire site will be managed as an Inner Protection Zone. The APZ requirements based on vegetation and slope are shown in Table 1. The deemed to satisfy APZs from PBP are shown in Table 2.

Table 1 APZ Assessment

Aspect	Vegetation formation within 140m of the development[1]	Effective slope of the land[2]	Assessment Method[3]	APZ required (m)	APZ provided (m)	Meets DTS requirements
North	Grassland	flat	Table A1.12.3	10m	>17	Yes
East	Managed road verge, then woodland	0.57 downslope	Table A1.12.3	Grassland 10m Woodland 13m	>32m >36 - 55m	Yes

South	Woodland	0.57 upslope	Table A1.12.3	11m	11m	Yes
West	Residential development	NA	Table A1.12.3	NA	NA	Yes

[1] Predominant vegetation is identified, according to PBP and "Where a mix of vegetation types exist the type providing the greater hazard is said to be predominate".

[2] Slope most significantly influencing the fire behaviour of the site having regard to vegetation found. Slope classes are according to PBP.

[3] Assessment according to Table A1.12.3 PBP for FFDI 80.

Table 2 Minimum APZ Distance (source PBP p. 90)

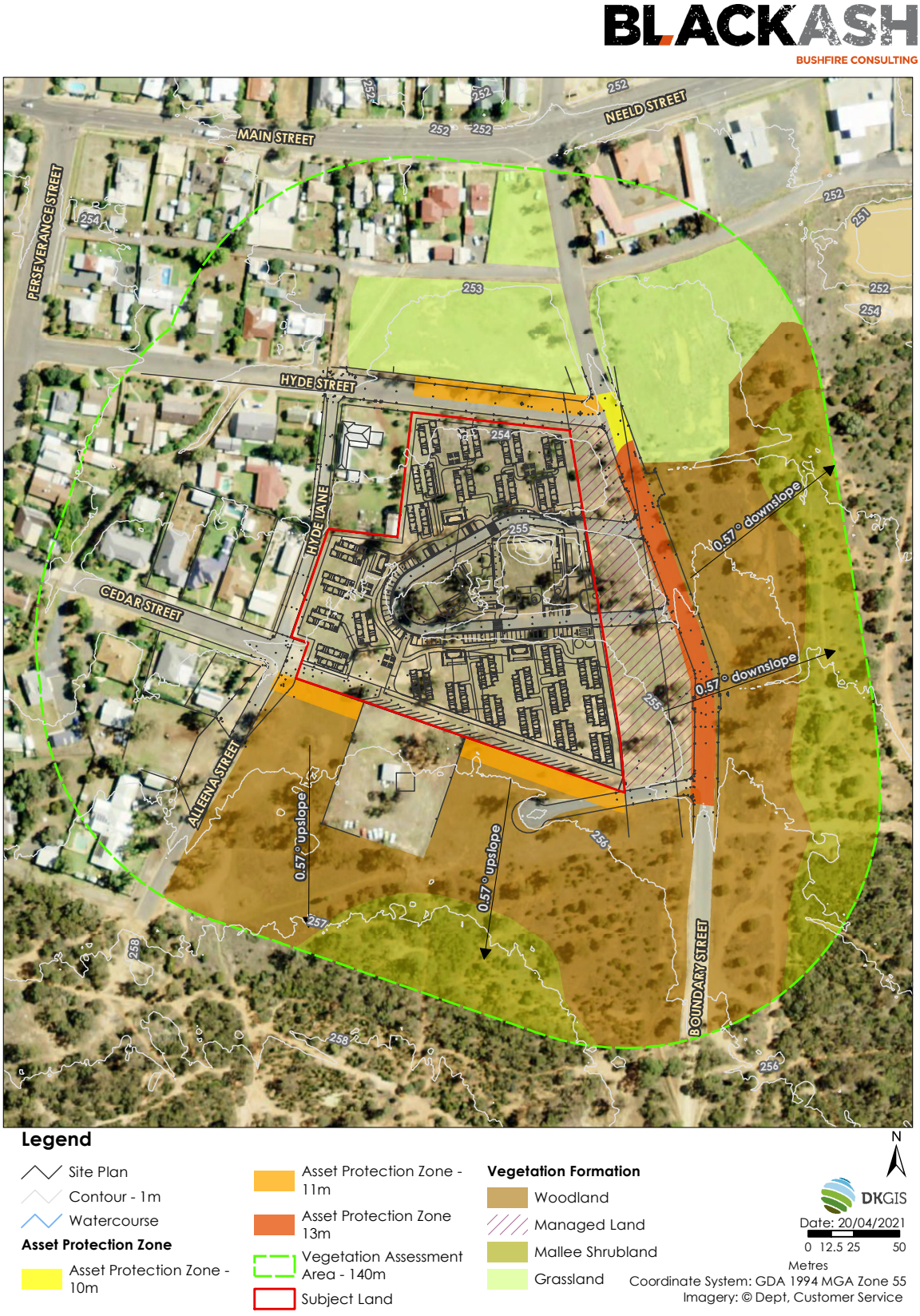
Table A1.12.3

Minimum distances for APZs – residential development, FFDI 80 areas (≤29kW/m², 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	9	12	15	20	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland (including Mallee)	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

The minimum APZs as shown in Table 1 can be provided for the proposal. The deemed to satisfy APZs are shown in Figure 6.

Figure 6 Asset Protection Zones



11. Bushfire Attack Levels

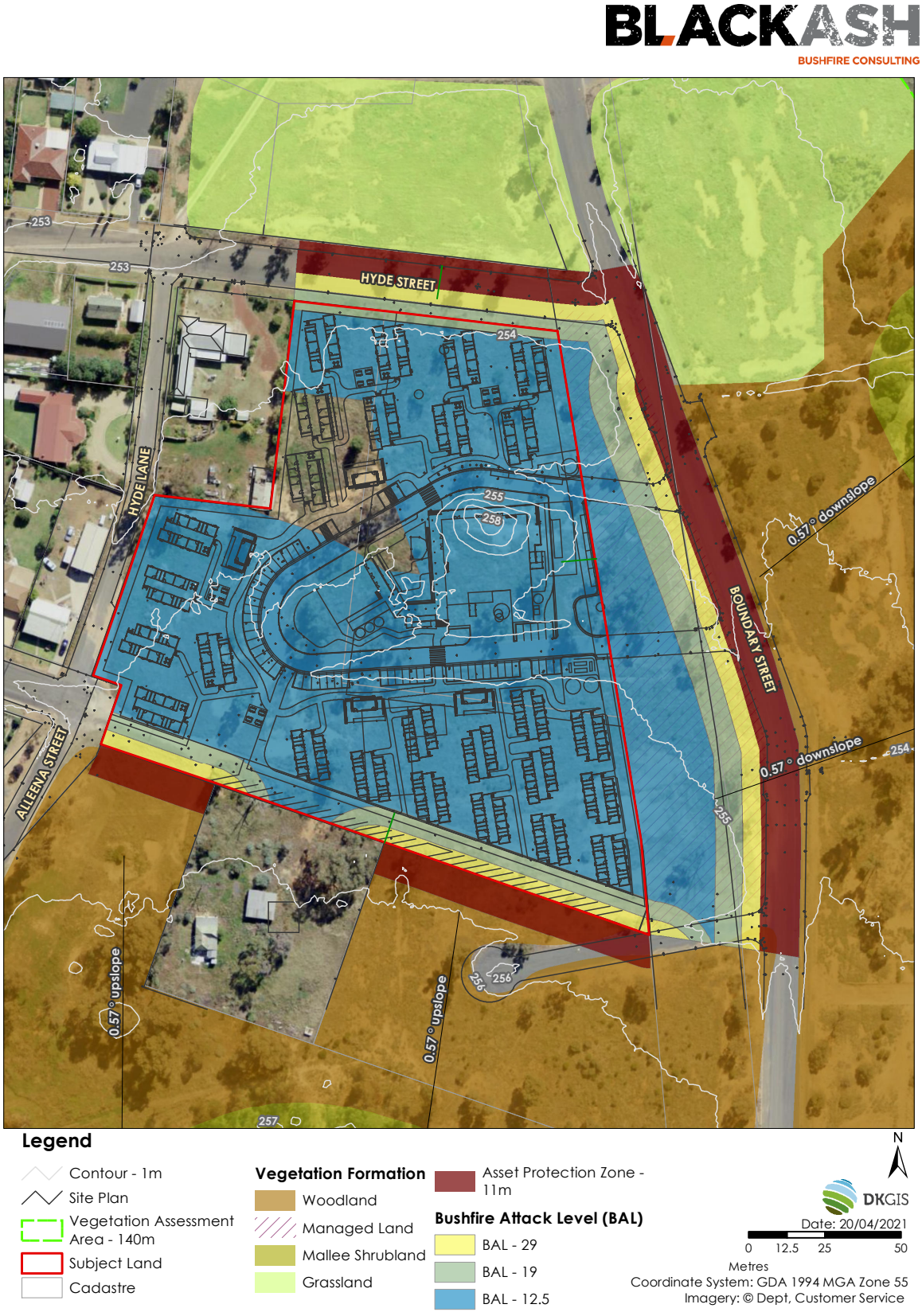
The Bushfire Attack Levels (**BAL**) is a means of measuring the ability of a building to withstand attack from bushfire. The form of bushfire attack and the severity will vary according to the conditions (FDI, vegetation, slope and setback) on the site.

The BAL assesses the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per square metre, which is the basis for establishing the requirements for construction to improve protection of a building from potential attack by a bushfire, as defined in AS 3959.

The BAL ratings are used as the basis for establishing the requirements for construction to improve protection of a (proposed) building from potential bushfire attack.

There are six BAL ratings in total: LOW, 12.5, 19, 29, 40 and Flame Zone Figure 8 shows the BAL assessment for the site layouts to provide complying APZs and construction requirements within the site. The BAL ratings for the site are shown in Figure 7. Buildings affected by BAL 12.5 as per Figure 7 will be built to this level in accordance with AS3959.

Figure 7 BAL Assessment and Construction Requirements



12. Access

The site is accessed by Boundary Street. Alternative access is provided via a proposed locked gate to Cedar Street. However, the site has an internal ring road that has two access points to Boundary Street. The site has perimeter roads to the east, north and west provided by existing public roads. As such, no perimeter roads are proposed within the site.

Access within the site should be in accordance with RFS standards such that:

- *minimum 5.5m carriageway width kerb to kerb;*
- *parking is provided outside of the carriageway width;*
- *hydrants are located clear of parking areas; roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;*
- *curves of roads have a minimum inner radius of 6m;*
- *the road crossfall does not exceed 3 degrees; and*
- *a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided*

Photo 1 shows Boundary Street is 12m kerb to kerb. Photo 3 shows Hyde Street is 13m wide kerb to kerb. Photo 5 looking into the south eastern corner of the site showing Boundary Street and the dead end road to the south of the site. The existing dirt track that runs along the southern boundary. A fire trail will be provided within the APZ that will generally follow the alignment of the existing dirt track.

13. Water Supply

The site is provided with mains water with existing hydrants in Boundary Street and Hyde Street. The village will be connected to mains water, however the water pressure may not be adequate for hydrants. If water pressure is adequate, hydrants will be extended as required within the site to provide water for fire fighting purpose. Fire hydrant spacing design and size will comply with the relevant clauses of AS 2419.1:2005. If water pressure is not adequate for hydrants, a water tank of 20,000L is required on site, with suitable access for a Category 1 fire appliance to within 4m of the static water supply, in accordance with PBP

14. Gas and electrical supplies

The electrical supply will comply with PBP 2019. Gas and electricity services are located so as not to contribute to the risk of fire to a building. Any gas services are to be installed and maintained in

accordance with AS/NZS 1596:2014 *The storage and handling of LP gas* (Standards Australia, 2014). Electrical supply within the site will be reticulated.

15. Evacuation and emergency management

A comprehensive Bushfire Emergency Management and Evacuation Plan will need to be completed for the construction and operational phase of the project. The bushfire evacuation procedures will be completed in accordance with NSW Rural Fire Service *Guide to Developing A Bushfire Emergency Management Plan* and will meet the requirements of *Australian Standard AS 3745-2010 – Planning for Emergencies in facilities*. On-site and off-site evacuation procedures will need to be included. However, the risk of bushfire to the site is considered low.

16. Bush Fire Protection Measures

The specifications and requirements for Bush Fire Protection Measures are to:

minimise the risk of bush fire attack and provide protection for emergency services personnel, residents and others assisting firefighting activities.

The performance requirements and acceptable solutions are provided in Table 3 which are taken from Table 7.4a of PBP. The acceptable solutions are provided below.

Table 3 Bushfire Protection Measures

Bushfire Protection Measure	Performance Criteria	Acceptable Solution	Evidence
The intent may be achieved where:			
Asset Protection Zones	APZs are provided commensurate with the construction of the building	an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.	• APZs are provided in accordance with table A1.12.3 in Appendix 1 for FFDI 80 areas. • APZs meet the acceptable solutions and have been determined using a Method 1 of PBP (no alternative solutions).
	A defendable space is provided.		• A defendable space and asset protection zone is able to be provided within the site. • The APZ incorporates Boundary Street and Hyde Street as perimeter roads
	APZs are managed and maintained to prevent the spread of a fire to the building.	APZs are managed in accordance with the requirements of Appendix 4 of PBP	• APZs within the site will be managed to Inner Protection Area Standards. • The APZ incorporates the defendable space. • The APZ incorporates Boundary Street and Hyde Street as perimeter roads.
	The APZ is provided in perpetuity.	APZs are wholly within the boundaries of	• The site will be managed to IPA Standards for the life of the mining

		the development site.	village.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised	APZ are located on lands with a slope less than 18 degrees.	• Section 9.5 provides evidence that the slopes are flat for assessment purposes.
Access	firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	property access roads are two-wheel drive, all-weather roads.	• The loop road within the site will be one way traffic in and out of the site.
	the capacity of access roads is adequate for firefighting vehicles.	the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	• NA. No bridges within the site
	there is appropriate access to water supply.	hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005; There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	• Where required, hydrants will be provided in accordance with the relevant clauses of AS 2419.1:2005 with access for fire appliances • If water pressure is not suitable for hydrants, there will be suitable access for a Category 1 fire appliance to within 4m of the static water supply
	firefighting vehicles can access the dwelling and exit the property safely.	at least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road.	• A internal loop road is provided within the site. Perimeter roads are available to the north, east and south of the site.
		There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	• NA
Water	an adequate water supply is provided for	reticulated water is to be provided to	• The village will be connected to mains

	firefighting purposes.	the development	water. • Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005. Hydrant are present within the existing subdivision. • If water pressure is not adequate for hydrants, a 20,000L static water supply will be provided within the site fire fighting purposes. The outlets and positioning of the tank will meet PBP requirements.
		fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; hydrants are not located within any road carriageway; and reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads	
Electricity Services	location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	where practicable, electrical transmission lines are underground; and where overhead, electrical transmission lines are proposed as follows: • lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and • no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines.	Can be provided
Gas Services	location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	• reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;	Can be provided

		• all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; connections to and from gas cylinders are metal; • polymer-sheathed flexible gas supply lines are not used; and • above-ground gas service pipes are metal, including and up to any outlets	
Construction Standards	the proposed building can withstand bush fire attack in the form of embers, radiant heat and flame contact.	BAL is determined in accordance with Tables A1.12.5 to A1.12.7; and construction provided in accordance with the NCC and as modified by section 7.5 (please see advice on construction in the flame zone).	The buildings are adequately setback from unmanaged areas. The required construction standards are shown in Figure 7.
	proposed fences and gates are designed to minimise the spread of bush fire.	fencing and gates are constructed in accordance with section 7.6.	Where a fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

17. Recommendations

The following recommendations have been made within this report to ensure the design of the proposed development is compliant with Section 4.14 of the EP&A Act and *Planning for Bush Fire Protection 2019*:

Recommendation 1 – Hydrants will be extended as required within the site to provide water for fire fighting purpose. Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005. If the mains water pressure is not suitable for hydrants, a 20,000L water tank is required in accordance with PBP with suitable access for a Category 1 fire appliance to within 4m of the static water supply.

Recommendation 2 - Any gas services are to be installed and maintained in accordance with AS/NZS 1596:2014 *The storage and handling of LP gas* (Standards Australia, 2014).

Recommendation 3 – The entire site is managed as an Asset Protection Zone. The *Standards for APZ* will provide:

- *raking or manual removal of fine fuels. Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis*
- *mowing or grazing of grass. Grass needs to be kept short and, where possible, green.*
- *removal or pruning of trees, shrubs and understorey. The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation prune or remove trees so that a continuous tree canopy leading from the hazard to the asset does not exist.*
- *separate tree crowns by two to five metres*
- *a canopy should not overhang within two to five metres of a dwelling*
- *native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.*

Recommendation 4 - The land between the site and Boundary Street is to be regularly mown to provide managed land. The maintenance regimen is to be documented in the Operational Management Plan for the site.

Recommendation 5 – Buildings are provided to meet minimum setback distances as per Figure 6. Construction of the manufactured buildings will be completed according to the Bushfire Attack Level nominated on Figure 7.

Recommendation 6 - Access will be provided in accordance with Section 12 of this report.

Recommendation 7 – A Bushfire Emergency Management and Evacuation Plan will need to be completed prior to occupation for the construction and operational phase of the project.

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TINTAGEL INVESTMENTS PTY LTD T/A BLACKASH BUSHFIRE CONSULTING ABN 99 000 704 861

18. Conclusion

This Bushfire Hazard Assessment has been completed for the CGO accommodation village as a multi-dwelling residential development under the Bland LEP and DCP. The site is partially mapped as within the 100m Category 1 buffer from the Category 1 vegetation to the south of the site. The site and surrounding areas have significantly modified the native vegetation. The site will be managed as an APZ and bushfire risk to the proposed development is considered low.

Bushfire impact has been a key design consideration to ensure bushfire risk is understood and mitigation measures are implemented to reduce the consequences of any bushfire impacts during the construction and operational phase of the accommodation village.

Section 4.14 of the EP&A Act requires compliance with the NSW Rural Fire Service document PBP for the multi-dwelling residential development. The requirements of PBP have been achieved by the proposal and demonstrated within this report.

Council as the consent authority, is required to consult with the RFS under section 4.14 of the EP&A Act when a proposal is BAL 40 or BAL Flame Zone. Given the size of the site, the buildings have been located to provide minimum separation distances to meet BAL 29. This has been demonstrated in this Bushfire Hazard Assessment. All proposed buildings will achieve setbacks to provide BAL 12.5 or lower construction.

Compliance with PBP can be achieved with a range of strategies for the proposed CGO Accommodation Village on Boundary Street, West Wyalong, NSW.

Recommendations have been provided that will provide compliance with PBP.

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Lew Short | Principal
BlackAsh Bushfire Consulting
B.A., Grad. Dip. (Design for Bushfires), Grad. Cert. of Management (Macq), Grad. Cert. (Applied Management)
Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373

Appendix 1 References

National Association of Steel Framed Housing (2014). *Steel Framed Construction in Bush Fire Areas. NASH*

NSW Rural Fire Service (RFS). 2019. *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.* Australian Government Publishing Service, Canberra

Standards Australia. 2005. *Fire hydrant installations - System design, installation and commissioning*, AS 2419.1, Fourth edition 2005, SAI Global, Sydney

Standards Australia. 2014. *The storage and handling of LP Gas, AS/NZS 1596:2014*, SAI Global, Sydney

Standards Australia. 2018. *Construction of buildings in bushfire-prone areas*, AS 3959-2009. SAI Global, Sydney

Appendix 2 Council support for APZ

From: Scott Steventon <ssteventon@currajong.com.au>
Sent: Thursday, 22 April 2021 11:45 AM
To: Paul Freeman <pfreeman@emmconsulting.com.au>; Lew Short <lew.short@blackash.com.au>
Cc: Adelaide Dalton <adalton@currajong.com.au>; Alek Marjanovic <amarjanovic@currajong.com.au>; council@blandshire.nsw.gov.au; Duane Maxwell <Duane.Maxwell@evolutionmining.com>
Subject: CGO Accommodation Village proposal - bushfire assessment

CAUTION: This email originated outside of the Organisation.

Hi Paul,

I met with Will Marsh (Director of Technical Services) yesterday in relation to civil, stormwater and sewer matters. In addition to these items I raised your query in relation to the maintenance of the crowns South Eastern portion adjacent to the cul-de-sac as depicted by a yellow strip in the attached.

Will had no objection to extending the roadside slashing regime in this area when undertaking their general slashing maintenance by arrangement between EVN and council. If and when the DA is approved the finer details of cost and invoicing can be determined however the position is that the land in yellow will be maintained.

Will is copied in this email as a reference to the discussion and file note as agreed with him yesterday.

Will, should you need any further clarification or wish to correct the above please copy in the attached team on this email.

With Thanks

Scott

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Scott Steventon
Principal
205A Clarinda St, Parkes, 2870
Suite 801, 185 Elizabeth St, Sydney, 2000
M: 0412 925 606

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Appendix G

Aboriginal heritage impact assessment

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Aboriginal Heritage Due Diligence Assessment

Cowal Gold Operations
Accommodation Village

Prepared for Evolution Mining (Cowal) Pty Limited
March 2021

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Aboriginal Heritage Due Diligence Assessment

Cowal Gold Operations Accommodation Village

Report Number

J190140A RP4

Client

Evolution Mining (Cowal) Pty Limited

Date

3 March 2021

Version

v2 Final

Prepared by

Taylar Reid
Archaeologist
3 March 2021

Approved by

Ryan Desic
Associate Archaeologist
3 March 2021

Executive Summary

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the study area), located immediately west of Boundary Street, West Wyalong.

EMM Consulting Pty Limited (EMM) has been engaged by Evolution to prepare a statement of environmental effects (SEE) and accompanying development application (DA) for the project under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This Aboriginal heritage due diligence assessment has been prepared by EMM in support of the SEE for the project.

The project would be located within the Bland Shire Local Government Area (LGA) and would be considered as a multi-dwelling residential development under the *Bland Local Environmental Plan 2011* (LEP) and *Bland Shire Development Control Plan 2012* (DCP).

The accommodation village would support the anticipated workforce associated with the construction and operation of the Cowal Gold Operations (CGO) Underground Development Project, located approximately 38 kilometres (km) north-east of West Wyalong. The CGO Underground Development Project is currently the subject of a State significant development (SSD) application (SSD 10367), under section 4.38 of the EP&A Act.

A visual inspection of the study area was conducted on 5 August 2020 by an EMM archaeologist, with the assistance of representatives from the West Wyalong Local Aboriginal Land Council (LALC) and Evolution. The study area was inspected for surface cultural material, the potential for buried materials, and/or previous disturbance.

No new Aboriginal objects were identified during the inspection, however a quandong tree was identified by the West Wyalong LALC. Though the quandong tree is not considered an Aboriginal object, its significance to the Wiradjuri people and being the only local fruiting tree in town, it is recommended the tree be left undisturbed if possible. If avoidance of the tree is not possible, further consultation should be undertaken with the West Wyalong LALC to determine appropriate management measures. Further recommendations are provided in Section 6 of this report.

Overall, the study area is considered to have low likelihood of Aboriginal objects being present, due to both the highly disturbed nature of the study area from the construction of the previous accommodation village as well as being situated over 200 m from a water source and on a flat plain landform, which typically only features sporadic and isolated Aboriginal objects in undisturbed contexts.

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1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the study area), located immediately west of Boundary Street, West Wyalong (see Figure 1.1 and Figure 1.2).

EMM Consulting Pty Limited (EMM) has been engaged by Evolution to prepare a statement of environmental effects (SEE) and accompanying development application (DA) for the project under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This Aboriginal heritage due diligence assessment has been prepared by EMM in support of the SEE for the project.

1.2 Project description

The project will be located within the Bland Shire Local Government Area (LGA) and is proposed as a multi-dwelling residential development under the *Bland Local Environmental Plan 2011* (LEP) and *Bland Shire Development Control Plan 2012* (DCP).

The village is being developed to house the anticipated workforce associated with the construction and operation of the Cowal Gold Operations (CGO) Underground Development Project, located approximately 38 kilometres (km) north-east of West Wyalong (see Figure 1.1). The CGO Underground Development Project is currently the subject of a State significant development (SSD) application (SSD 10367), under section 4.38 of the EP&A Act.

The project conceptually comprises the following key components:

- accommodation capacity for up to 176 people total supporting the CGO Underground Development Project, including:
    - temporary construction workforce accommodation modules to house 96 people;
    - semi-permanent operational workforce accommodation modules to house 72 people;
    - semi-permanent accessible accommodation modules to house 8 people, with facilities which are Commonwealth *Disability Discrimination Act 1992* (DDA) compliant;
- use of upgraded existing access points and on-site roads;
- administration buildings;
- communal facilities, including:
    - laundry units;
    - communal dining and kitchen building;
    - outdoor eating areas;
    - first aid and nursing room;
    - prayer room;

  - quiet room;
  - gymnasium;
  - multipurpose outdoor court; and
  - running track;
- undercover bus shelter and bus parking spaces;
- light vehicle car parking;
- fencing and lighting;
- reticulated services; and
- landscaping.

The village components will be modular in design with different layouts dependent on the workforce (construction, operational and accessible) supporting the CGO Underground Development Project. The development will be staged, with the construction workforce modules being constructed first to ensure this area of the village is ready to house the construction workforce as soon as possible. The operational workforce modules, including accessible modules, will be completed as soon as possible thereafter.

Approval is sought for all stages of development as part of the SEE and DA. Construction of the accommodation modules is expected to take approximately eight months total. Construction of additional amenities / facilities may take up to a further three years, post removal of construction accommodation modules. Minor earthworks will be required for site establishment activities, including vegetation clearing and grubbing, ground levelling and trenching for service installation. Any excavated topsoil will be stockpiled and reused on site where possible.

Appropriate security measures such as fencing, gates, cameras and night lighting will be installed. Site landscaping will be undertaken to increase visual amenity consistent with the surrounding neighbourhood and will incorporate water sensitive urban design practices. This includes maintaining existing native vegetation wherever possible.

1.3 Study area description

The study area is located between Boundary Street and Aleena Street in West Wyalong, in central west New South Wales (NSW), which is located approximately 360 km west of Sydney (see Figure 1.1). Under the Bland LEP (Land Zoning Map – Sheet LZN_007F), the study area is zoned as Zone R1 General Residential.

The study area is located on vacant freehold land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (see Figure 1.2), held by the West Wyalong Local Aboriginal Land Council (LALC) (subject to determination of native title). A native title claim (NN2020/007) was lodged on 21 August 2020 by the West Wyalong LALC over part of the study area. This claim was yet to be determined at the time of writing.

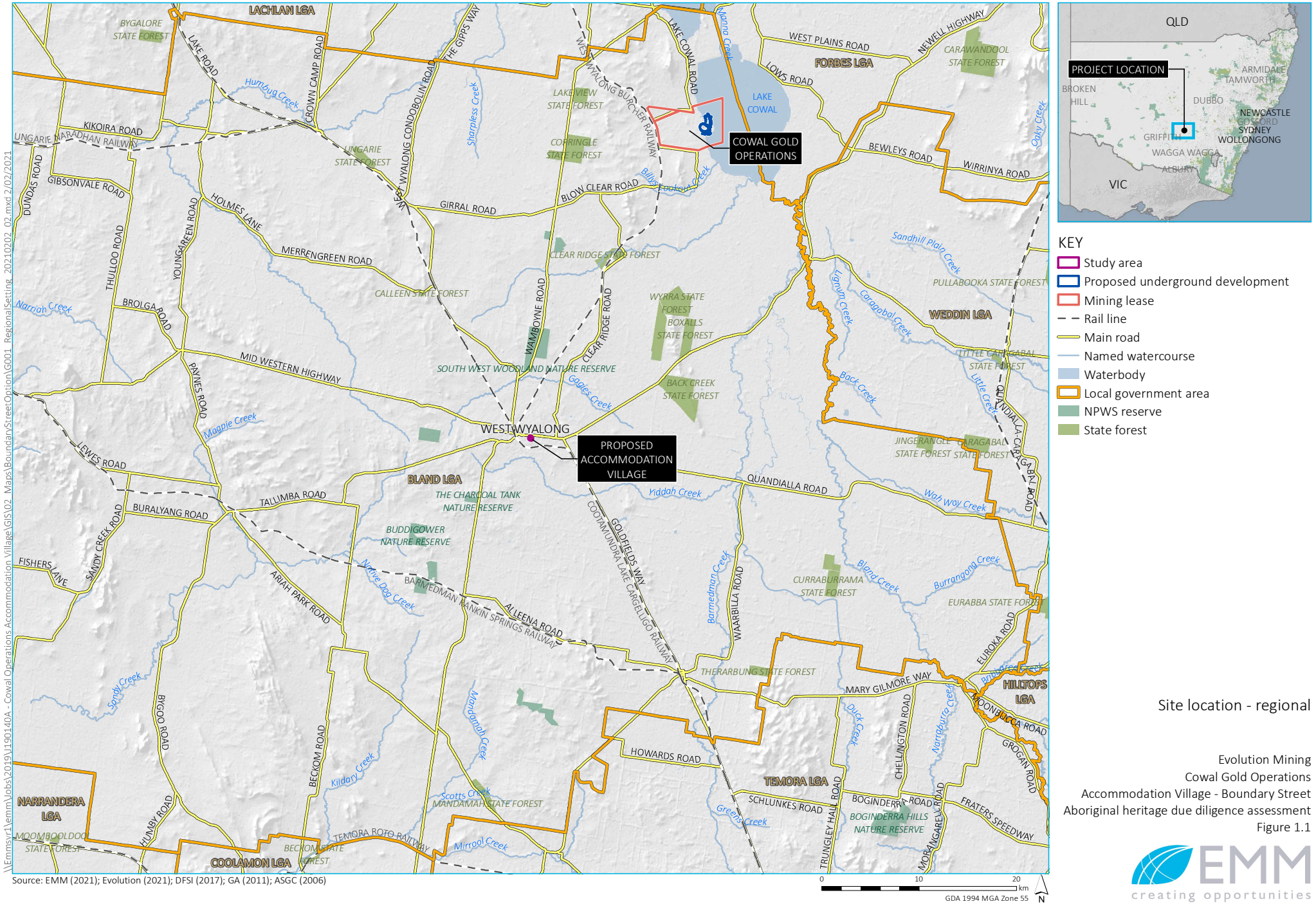
The study area has previously hosted Barrick Gold's CGO accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The Barrick Gold accommodation village was demolished between 2005-2006 and the study area is currently devoid of built structures. The study area is located within a larger area of relatively flat vacant land which contains fragmented native vegetation.

The study area is bordered by Hyde Lane and Cedar Street to the west and Hyde Street to the north. Other land uses surrounding the study area include residential, industrial and retail. The closest private residence is located immediately west of the study area on Hyde Lane.

1.4 Purpose of this report

This report has been prepared for the project in general accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects* (Department of Environment, Climate Change and Water (DECCW) 2010). This report supports the SEE and accompanying DA for the project under Part 4 of the EP&A Act.

The report includes a detailed review of the existing (pre-development) environmental and archaeological context of the study area, against which EMM has compared the project. EMM has concluded that the project is unlikely to harm Aboriginal objects and that the project may proceed with caution and in accordance with the recommendations described in Section 6.



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Site location - regional

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Aboriginal heritage due diligence assessment
Figure 1.1

EMM
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KEY

- Study area
- Cadastral boundary

Site location - local

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Aboriginal heritage due diligence assessment
Figure 1.2

Source: EMM (2021); Evolution (2021); DFSI (2017)

0 50 100 m
GDA 1994 MGA Zone 55

N

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\\Emmsvr1\emm\Jobs\2019\J190140A - Cowal Operations Accommodation Village\GIS\02 Maps\BoundaryStreetOption\G002 LocalSetting 20210202 02.mxd 2/02/2021

1.5 Assessment framework

In NSW, Aboriginal objects, whether recorded or yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974* (NPW Act). Under section 86 of the NPW Act, it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Department of Planning, Industry and Environment (DPIE). A breach of section 86 of the NPW Act could result in prosecution and fines in excess of $1 million. The DPIE provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts.

The due diligence process is the first step and is outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010) guidelines; and is intended to identify whether a proposed activity is likely to harm Aboriginal objects.

This report addresses only the project and the study area as described herein. The report represents an initial investigation of constraints and opportunities pertaining to identified existing and potential Aboriginal heritage sites and places on and/or in the immediate vicinity of the study area. This report does not represent an Aboriginal Cultural Heritage Assessment (ACHA) and is not sufficient to support an application for an Aboriginal Heritage Impact Permit (AHIP), should one be required, in accordance with section 90 of the NPW Act.

1.6 Authorship

This report was authored by Taylar Reid (EMM Archaeologist) and reviewed by Ryan Desic (EMM Associate Archaeologist and heritage team leader).

1.7 Assessment methods

The due diligence guidelines provide a generic code of practice used to determine whether activities will harm an Aboriginal object and, if so, what measures can be taken to avoid that harm. A summary of the due diligence is shown in Plate 1.1.

The advantages of undertaking due diligence for assessing potential harm to Aboriginal objects are that it:

- provides a defence against prosecution for inadvertent impacts if the process is followed;
- assists in avoiding unintended harm to Aboriginal objects;
- provides certainty to land managers and developers about appropriate measures for them to take;
- encourages a precautionary approach; and
- results in more effective conservation outcomes for Aboriginal cultural heritage.

If the due diligence assessment determines that Aboriginal objects or places are likely to be harmed, an AHIP is required to manage harm as defined by part 6, section 86 of the NPW Act.

This report follows the process outlined in the due diligence guidelines. In summary, the assessment involves:

- a search of the Aboriginal Heritage Information System (AHIMS) database;
- consideration of existing Aboriginal cultural heritage studies in the area and region for the presence of Aboriginal objects or places;
- consideration of the environmental context for the presence of Aboriginal objects or places;

- an inspection of the study area undertaken by an EMM archaeologist to identify any Aboriginal objects or areas of potential archaeological deposit (PAD); and
- determination of whether further heritage investigation and impact assessment is required prior to the project going ahead.

The basic steps of a due diligence assessment are set out in section 8 of the due diligence guidelines (refer Plate 1.1).

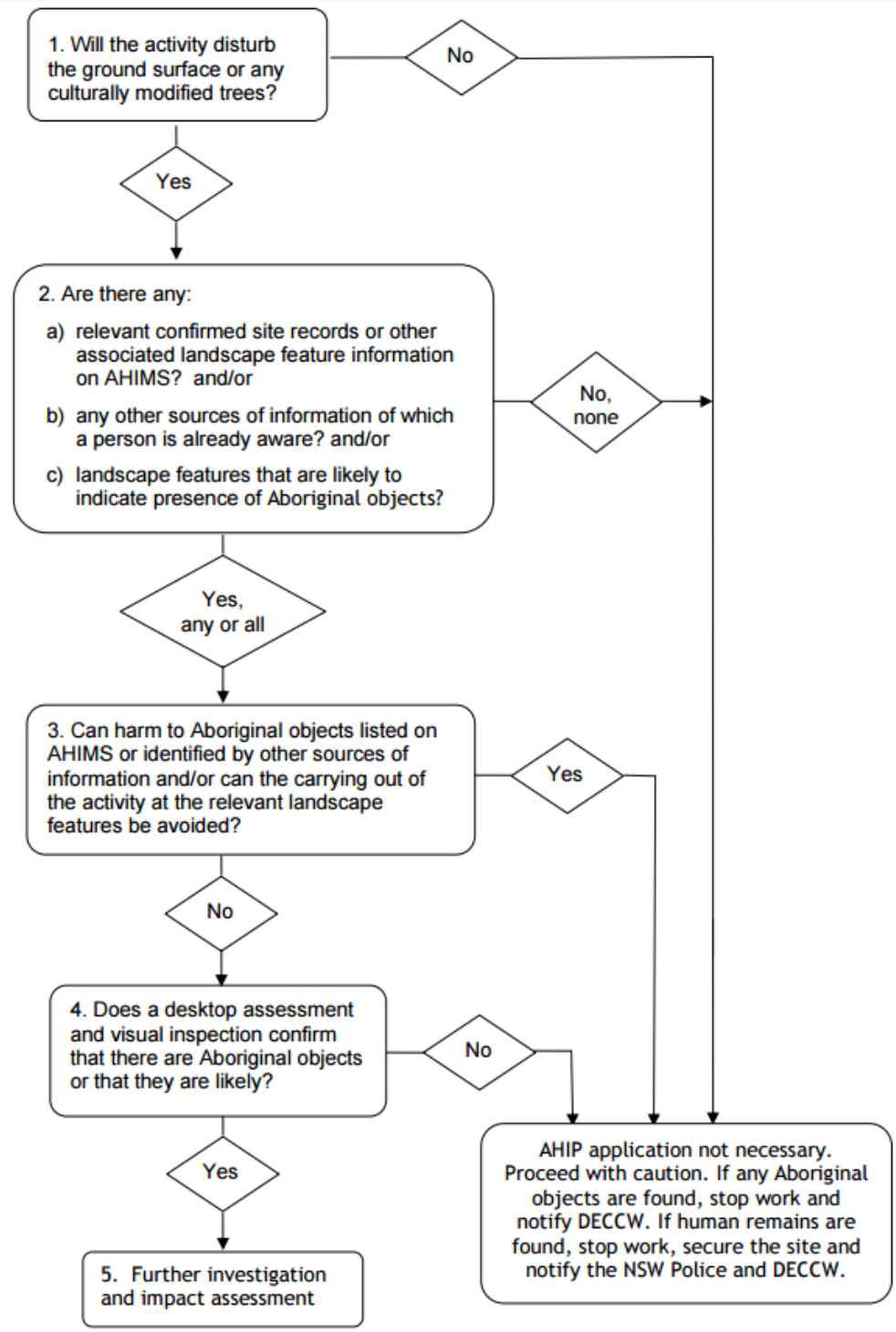


Plate 1.1 Due diligence summary process

2 Environmental context

2.1 Rationale

The environmental context is used to predict the spatial distribution, preservation and likelihood of archaeological material occurring within an area. Landscape features were an important factor for the choice of camping, transitory and ceremonial areas used in the past by Aboriginal people. Natural resources, including raw stone materials and local flora and fauna, would have provided food, tools and material resources. These resources are linked to the topography, hydrology, geology and soil types in the region. Additionally, natural and cultural (human-made) site formation processes influence the present location of archaeological material (eg if moved through disturbance), along with its archaeological integrity.

2.2 Environmental features

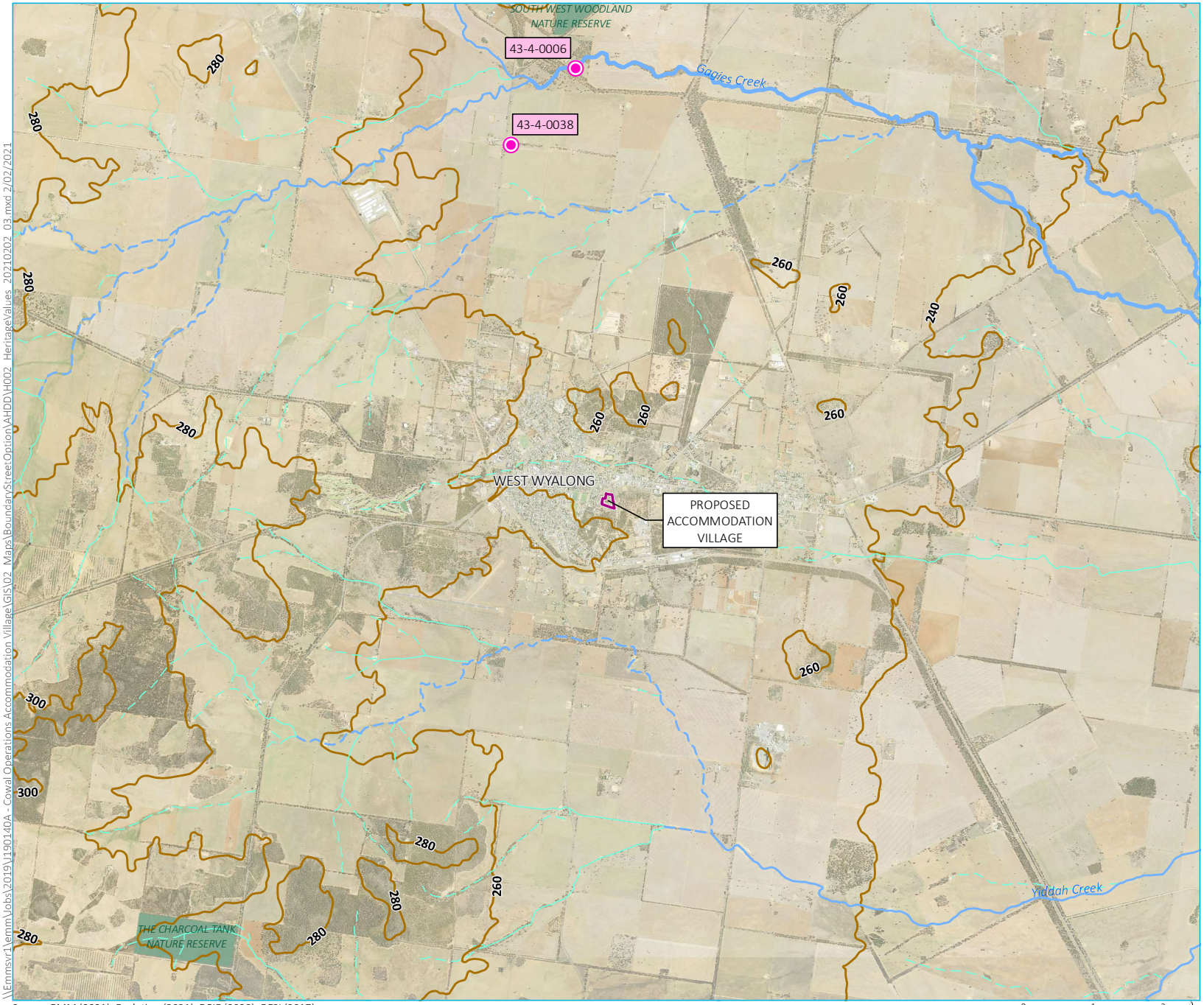
The study area is situated within the NSW South Western Slopes (NSS) Bioregion within the Lower Slopes subregion and is comprised wholly of the Mildil soil landscape (eSpade, State of NSW and Department of Planning, Industry and Environment 2019). This landscape unit is characterised by gently undulating slopes, plains, and drainage lines on Quaternary alluvium and colluvium (King 1998:98). The study area is in a flat plain landform context with level to gently inclined slopes (<4%) at elevations of 260 m to 310 m Australian Height Datum (AHD).

The study area is in the Lachlan River catchment within the broader Murray-Darling Basin within the upper reaches of Humbug Creek and Sandy Creek. A 1st order stream (according to the Strahler Order of Streams) flows east to west and situated 405 m north of the study area (refer Figure 2.1). Other more established watercourses in proximity to the study area include the Yiddah Creek (3rd order stream) situated 1.8 km south of the study area and Gagies Creek (5th order stream) situated 6.2 km north of the study area. There are no watercourses within 200 m of the study area.

The geology of the study area features Tertiary highly weathered granite with scattered ferruginous lag deprived from mottled saprolite with colluvial sediments on plains and rises (Mitchell 2002). There is the potential for phyllites, schists, sandstones, siltstones and occasional volcanics to be present in the study area (King 1998). The soils of the Midil soil landscape, which applies to the study area are deep (>100 cm) well-draining red and brown solodic soils on side slopes and drainage depressions.

This type of landscape restricts several archaeological site types, such as rock shelter and rock engravings, which require exposed sandstone relief not common in these areas. Conversely, exposed surface artefact scatters are likely to be more prevalent depending on the nature and extent of previous disturbance.

The study area has been subjected to high levels of ground disturbance from the construction and development of the previous accommodation village at the study area (developed by Barrick Gold). Visual inspection of the study area revealed bitumen roads, soil stockpiling, rubbish heaps, and access tracks. The study area is situated within a wholly disturbed landscape, which is described further in Section 5 of this report (refer Plate 4.1 to Plate 4.6).



KEY

- Modified Tree (carved or scarred)
- Study area
- NPWS reserve
- Contour (20 m interval)

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Source: EMM (2021); Evolution (2021); DPIE (2020); DFSI (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

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Heritage values

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Aboriginal heritage due diligence assessment
Figure 2.1

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3 Archaeological context

3.1 Ethno-historical context

The study area falls within the traditional country of the Wiradjuri peoples, the largest language group in NSW, which extends west from the Great Dividing Range to Hay in the west, Nyngan in the north and south as far down as Albury (Tindale 1940; Tindale 1974; Attenbrow 2010).[1] Kabaila (2005) notes that the Wiradjuri were not territorial in the sense of maintaining property, rather the boundaries with their neighbours would have shifted and changed with the seasons and circumstance.

The Wiradjuri are amongst some of the oldest cultures that lived in Australia, thriving on Country as early as 45,000 years ago (Pardoe 2013). Large gatherings for ceremonies, initiation, and trade would have also fostered social and cultural exchange amongst different groups, which would have been paramount for the social and cultural stability of the Wiradjuri (Kabaila 2005).

Wiradjuri country was highly sought after by European colonialists who were drawn to the area in search of fertile soils for agriculture and farming, which lead to open conflict for several years during the early 1800s (Niche 2018a). Read (1983) and Gammage (1983) report that the Wiradjuri were in conflict with settlers until about 1840 (Cane 1994, p. 23). Ethnohistorical information indicates that despite this period of upheaval, the Wiradjuri still maintained strong kinship ties with their neighbours, reinforced through trade, economy, movements and participating in ceremonies (Kabaila 2005). The Wiradjuri maintain strong cultural connections to, and knowledge of, their land.

3.2 Review of previous archaeological investigations

There have been limited Aboriginal heritage studies in West Wyalong specifically, but there is a wealth of research for the Lake Cowal area (35 km north-east of the study area) in the past 30 years, including surveys, salvage excavation and collections which can assist in characterising the archaeological landscape of the study area. Most investigations have been compliance based, completed for mining and ongoing modification approvals for the Cowal Gold Operation (CGO), which operates adjacent to Lake Cowal.

Initial archaeological investigations of Lake Cowal were conducted by Paton in 1989 who sought to develop a predictive model of the likely type and distribution of Aboriginal sites in comparison to other lake regions in Wiradjuri country. He was followed by Scott Cane who conducted archaeological surveys in 1994 as part of a feasibility study for development of the lake shore for mining infrastructure (Cane 1994, as cited in Niche 2003). This study resulted in the identification of 10 Aboriginal sites on the western and southern margins of the lake. Site types included one scarred tree and nine open artefact scatters, some of which contained over 100 artefacts and others which represented very low-density assemblages (Cane 1994). Cane identified regionally unique stone artefacts recorded in many of these sites, with one area dominated by quartz artefacts and another area that contained many micro blade/backed artefacts.

The back plain on the western side of the lake is characterised by a ‘continuous background scatter of artefacts’, though there is a distinct difference between the sites recorded on the margins of the lake, which consist primarily of backed-blade artefacts. Artefact scatters are also more substantial in size than those recorded further away, which are of lower density.

[1] It is important to note that information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. Most ethnographical accounts of Aboriginal life during contact were written in the context of a period of immense change through death and disease, displacement, and a loss of culture, country and knowledge. As a result, this information is often limited and contentious.

Cane interpreted this as the difference between more habited sites or 'base camps' to those further from the lake as more characteristic of opportunistic hunting and woodworking activities on the plains (Cane 1994, p.49). Specifically, the majority of previously recorded sites are located within along the lake edge and extending onto the back plains, predominantly in close association with gilgai or drainage lines (Niche 2019, Pardoe 2002).

EMM conducted an Aboriginal heritage due diligence assessment on behalf of Evolution in November 2019 for exploration activities within Exploration Licence (EL) 8524 at East Girral, part of the CGO located 35 km north-east of the study area. The proposed activity involved drilling 61 geotechnical borehole locations on the Noel and Jean Ridley property. The property is characterised by a plains landscape with ephemeral creeklines and sporadic gilgai that have been disturbed by historic and modern agricultural practices. The results of the visual inspection confirmed the location of 12 new Aboriginal artefact sites, which consisted of four isolated finds and eight artefact scatters. The four isolated finds and an artefact scatter were situated within the plains landscape, five artefact scatters were located amongst gilgai terrain and two artefact scatters were located on the banks of ephemeral creeklines. Artefact types consisted of silcrete flakes, while several sites included sandstone grinding plates, hammerstones, hearths, heat retainers, culturally modified glass, a quandong hammerstone, and a potential axe-head blank. The findings from this assessment indicate that Lake Cowal is not the sole influence of Aboriginal occupation in the region. Although Lake Cowal represents a focus of past Aboriginal activity, archaeological surveys away from the lake also feature numerous archaeological traces which appear to be influenced by either ephemeral water systems or gilgai country that have natural features to retain water to sustain Aboriginal occupation in the semi-arid environment.

3.3 Aboriginal Heritage Information Management System

A search of the AHIMS database completed on 10 July 2020, which identified two Aboriginal sites within a 10 kilometre (km) x 10 km area centred on the study area (refer Figure 2.1 and Appendix A). AHIMS data best reflects the extent of previous archaeological assessments having the opportunity to identify Aboriginal sites, as opposed to the extent/presence of Aboriginal objects in a given search area.

The two AHIMS sites that were identified in the search are both culturally modified trees (see Figure 2.1). AHIMS #43-4-0038 is located 5 km north of the study area and situated within a paddock in an open plain landscape context. It has been listed as partially destroyed. AHIMS #43-4-0006 is situated 6 km north of the study area in paddock adjacent to Gagies Creek. There are no AHIMS sites located within the study area itself nor will any of the AHIMS sites in the search results be at risk of inadvertent impacts from the project.

3.4 Native Title Claims and Indigenous Land Use Agreements

A search of the National Native Title Tribunal (NNTT) Register of Native Title Applications, Registration Decisions and Determinations completed on 1 January 2021, identified a native title claim (NN2020/007) was lodged on 21 August 2020 by the West Wyalong Local Aboriginal Land Council (LALC) over part of the study area, which remains active, however no determination had been made at time of writing.

A search of the NNTT Register of Indigenous Land Use Agreements (ILUAs) completed on 1 January 2021 identified no ILUAs over the study area.

The study area is situated within the jurisdiction of the West Wyalong LALC.

3.5 Implications for archaeology

Particular landforms are known to have been favoured locations for repeated or long-term occupation and are therefore more likely to retain archaeological evidence of past Aboriginal use. Within the due diligence guidelines, DEECW specifies five landscape features which are likely to indicate the presence of Aboriginal objects: i) within 200 m of waterways; ii) within a sand dune system; iii) on a ridge top, ridge line or headland; iv) within 200 m below or above a cliff face; and v) within 20 m of or in a cave, rock shelter, or a cave mouth.

Due to the extensive amount of survey and archaeological assessments performed within the broader Lake Cowal and East Girral areas, it is possible to extrapolate how Aboriginal people used the land and where Aboriginal sites may have occurred within the study area.

Artefact scatters and isolated finds have been found in plains landscape contexts often in association with ephemeral creeklines and gilgai terrain, though stone artefacts can occur sporadically as surface objects across almost all landforms in low densities. Scar trees have been found next to more established watercourses, such as the two AHIMS sites located north of the study area. Overall, at one point in time the study area likely contained a sporadic scatter of Aboriginal artefacts representing transient use of the landscape, however the high levels of disturbance from the previous accommodation village have significantly decreased this sensitivity.

4 Visual inspection results

4.1 Overview

EMM archaeologist Taylar Reid, with the assistance of Linton Howarth (West Wyalong LALC), and Delice Aird and Tammy Rawson (Evolution), conducted a visual inspection of the study area on 5 August 2020. The aims of the visual inspection were to confirm that the proposed development was unlikely to impact Aboriginal objects and verify the predictions of archaeological potential through visual observation and pedestrian sampling of the study area. The study area was inspected for surface cultural material, the potential for buried materials, and/or previous disturbance.

4.2 Results

An overview of the visual inspection results is presented in Plate 4.1 to Plate 4.6 and shown on Figure 4.1.

The entire study area was sampled via pedestrian traverses by the survey team, which targeted areas of higher exposure and visibility. The results of the visual inspection conformed to the predictive model and findings of previous archaeological assessments in similar environment and land use histories. The plains landscape context of the study area has the potential for low densities of isolated finds on the ground surface. The visibility was quite low (<15%) for the majority of the study area except where natural erosion has increased the soil exposure and visibility (ie refer Plate 4.3). There are high levels of disturbance throughout the study area from the construction of asphalt roads, stockpiles of imported fill materials (inferred to be imported as no significant excavations/borrow pits were observed in the study area). Despite most of the study area possessing low visibility and exposure, the high levels of disturbance and the location of the study area being over 200 m from the nearest water source, considerably decreases the likelihood of Aboriginal objects being present.

No new Aboriginal objects were identified during the inspection, however a quandong tree was identified by Linton Howarth of the West Wyalong LALC. The quandong tree is unique to this area and influenced the town's name of West Wyalong, which Mr Howarth noted 'Wyalong' is derived from the Wiradjui word for *quandong*. The Wiradjuri used specialised stone tools to crack open the hard shell of the nuts without crushing the fruit inside (pers. Comm. Linton Howarth).

Plate 4.1 Linton (WWLALC) showing Delice Aird (Evolution) a quandong nut located in the centre of the study area, view north-west.

Plate 4.2 View from stockpile on northern portion of study area, showing high levels of ground disturbance from established road and previous accommodation village, view north.

Plate 4.3 Photograph from the south-west portion of the study area showing visibility, exposure and ground disturbance, view west.

Plate 4.4 Photograph showing team inspecting ground surface for artefacts on the southern portion of the study area, view south.

Plate 4.5 **Showing low visibility and ground disturbance from stockpile in north-western portion of study area, view west.**

Plate 4.6 **Showing ground disturbance from construction of bike jumps with imported materials in the south-western portion of study area, view east.**

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Source: EMM (2021); Evolution (2021); DFSI (2017)

Visual inspection results

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Aboriginal heritage due diligence assessment
Figure 4.1

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5 Conclusions

Based on a review of previous archaeological investigations in the region, the local archaeological record of West Wyalong is likely to be dominated by stone artefact sites of varying densities. These would be found on the surface – frequently as a palimpsest (lag deposit) on truncated subsoil (B2 horizon) surfaces – or buried in the upper 20–50 centimetres (cm) of the soil profile where deeper aggrading topsoil is present (for example alluvial plains). A site inspection was undertaken of the study area, and a summary of the findings is presented in Section 4. The site inspection did not identify any Aboriginal objects or areas of potential archaeological sensitivity, notably due to existing disturbance levels.

Overall, the study area is considered to have low likelihood of Aboriginal objects being present, due to both the highly disturbed nature of the study area from the construction of the previous accommodation village as well as being situated over 200 m from a water source and on a flat plain landform, which typically only features sporadic and isolated Aboriginal objects in undisturbed contexts.

A summary of the due diligence assessment and outcomes are provided in Table 5.1.

Table 5.1 Summary of the due diligence assessment process and results

Step	Results	Section in this report
STEP 1: Will the activity disturb the ground surface or any culturally modified trees?	The project will disturb the ground surface through the construction of the accommodation village structures and underground services. No potential Aboriginal culturally modified trees will be disturbed	Section 1
STEP 2: Check for records of Aboriginal objects and places in area of the project.	A search of the AHIMS database was conducted on 10 July 2020 which did not identify any previously recorded Aboriginal objects at or in the vicinity of the study area.	Section 3.3
STEP 3: Is the activity a 'Low Impact Activity', as defined in the NPW Regulation?	No, the project will disturb the ground surface through construction of permanent dwellings, landscaping, parking lots, and underground services.	Section 1.5
STEP 4: Are there any landscape features on undisturbed land that are likely to indicate the presence of Aboriginal objects?	No, the study area exists largely within a disturbed landscape and over 200 m from the nearest watercourse. However, as Aboriginal stone artefacts and modified trees have the potential to occur sporadically over plain landscapes, a site inspection was undertaken to verify if the study area is of low archaeological potential.	Section 2 and Section 4
STEP 5: Does a desktop assessment and visual inspection confirm that there are Aboriginal objects present or likely to be present?	The desktop assessment and visual inspection confirm that Aboriginal objects are unlikely to be present in the study area. No, Aboriginal objects were observed during the visual inspection (acknowledging the limited visibility in some locations), and the levels of existing disturbance at these locations further reduce the likelihood of Aboriginal objects being present.	Sections 2 to Section 5
STEP 6: Can the activity be relocated away from the known/likely area for Aboriginal objects?	Not applicable. There are no known Aboriginal objects located within the study area, which has been assessed as having low archaeological potential.	Section 3
STEP 7: Commence investigation for an AHIP.	No, an AHIP is not currently required as no harm to Aboriginal objects is proposed.	Section 5 and Section 6

6 Recommendations

Based on the information presented in this report, it is considered that the study area is unlikely to feature Aboriginal objects, and any future development of the study area should proceed with caution and in accordance with the following recommendations:

- Though the quandong tree is not considered an Aboriginal object, its significance to the Wiradjuri people and being the only local fruiting tree in town, it is recommended the tree be left undisturbed if possible. If avoidance of the tree is not possible, further consultation should be undertaken with the West Wyalong LALC to determine appropriate management measures.

- This assessment indicates that there is a low risk of Aboriginal objects being present within the study area. However, the nature of disturbance does not preclude the potential for isolated finds, which is a common site type across the region, even in disturbed contexts. In the event of unexpected Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) being discovered during construction, all works in the vicinity should cease and Evolution should determine the subsequent course of action in consultation with a heritage professional and/or the relevant State government agency, as appropriate.

- This report may be summarised within and/or appended to a development application, statement of environmental effects (SEE) or review of environment factors (REF). If any Aboriginal objects are later identified within the study area, this report cannot be used to support an application for an Aboriginal Heritage Impact Permit (AHIP). Such an application would require more detailed investigation involving a formal process of Aboriginal community consultation and the preparation of an Aboriginal Cultural Heritage Assessment (ACHA).

- If suspected human skeletal material less than 100 years old is discovered, the *Coroners Act 2009* requires that all works should cease, and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification to Heritage NSW and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

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Appendix A

AHIMS extensive search

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : J190140A -West Wyalong

Client Service ID : 519370

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
43-4-0006	TU 3;	AGD	55	519500	6251800	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1273
	Contact	**Recorders**	Rex Silcox					**Permits**		
43-4-0038	West Wyalong Scar Tree	GDA	55	518345	6251228	Open site	Partially Destroyed	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Miss.Cortney Biles					**Permits**		

Report generated by AHIMS Web Service on 10/07/2020 for Ryan Desic for the following area at Datum :GDA, Zone : 55, Eastings : 513158 - 523199, Northings : 6242627 - 6252500 with a Buffer of 0 meters. Additional Info : Due diligence. Number of Aboriginal sites and Aboriginal objects found is 2


VR
1871



Appendix H

Historical heritage impact assessment

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Evolution
MINING

Memorandum

3 March 2021

To: Guy Hamilton
Environmental Support
Project Approvals
Evolution Mining (Cowal Pty Limited)
From: Taylar Reid
Subject: Historical Heritage Due Diligence Assessment - Cowal Gold Operations Accommodation Village

Dear Guy,

Please see the following for insertion into the Cowal Gold Operations Accommodation Village SEE.

1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the study area), located immediately west of Boundary Street, West Wyalong (see Figure 1.1 and Figure 1.2).

EMM Consulting Pty Limited (EMM) has been engaged by Evolution to prepare a statement of environmental effects (SEE) and accompanying development application (DA) for the project under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This historical heritage due diligence assessment has been prepared by EMM in support of the SEE for the project.

1.2 Project description

The project will be located within the Bland Shire Local Government Area (LGA) and is proposed as a multi-dwelling residential development under the *Bland Local Environmental Plan 2011* (LEP) and *Bland Shire Development Control Plan 2012* (DCP).

The village is being developed to house the anticipated workforce associated with the construction and operation of the Cowal Gold Operations (CGO) Underground Development Project, located approximately 38 kilometres (km) north-east of West Wyalong (see Figure 1.1). The CGO Underground Development Project is currently the subject of a State significant development (SSD) application (SSD 10367), under section 4.38 of the EP&A Act.

The project conceptually comprises the following key components:

- accommodation capacity for up to 176 people total supporting the CGO Underground Development Project, including:
    - temporary construction workforce accommodation modules to house 96 people;
    - semi-permanent operational workforce accommodation modules to house 72 people;

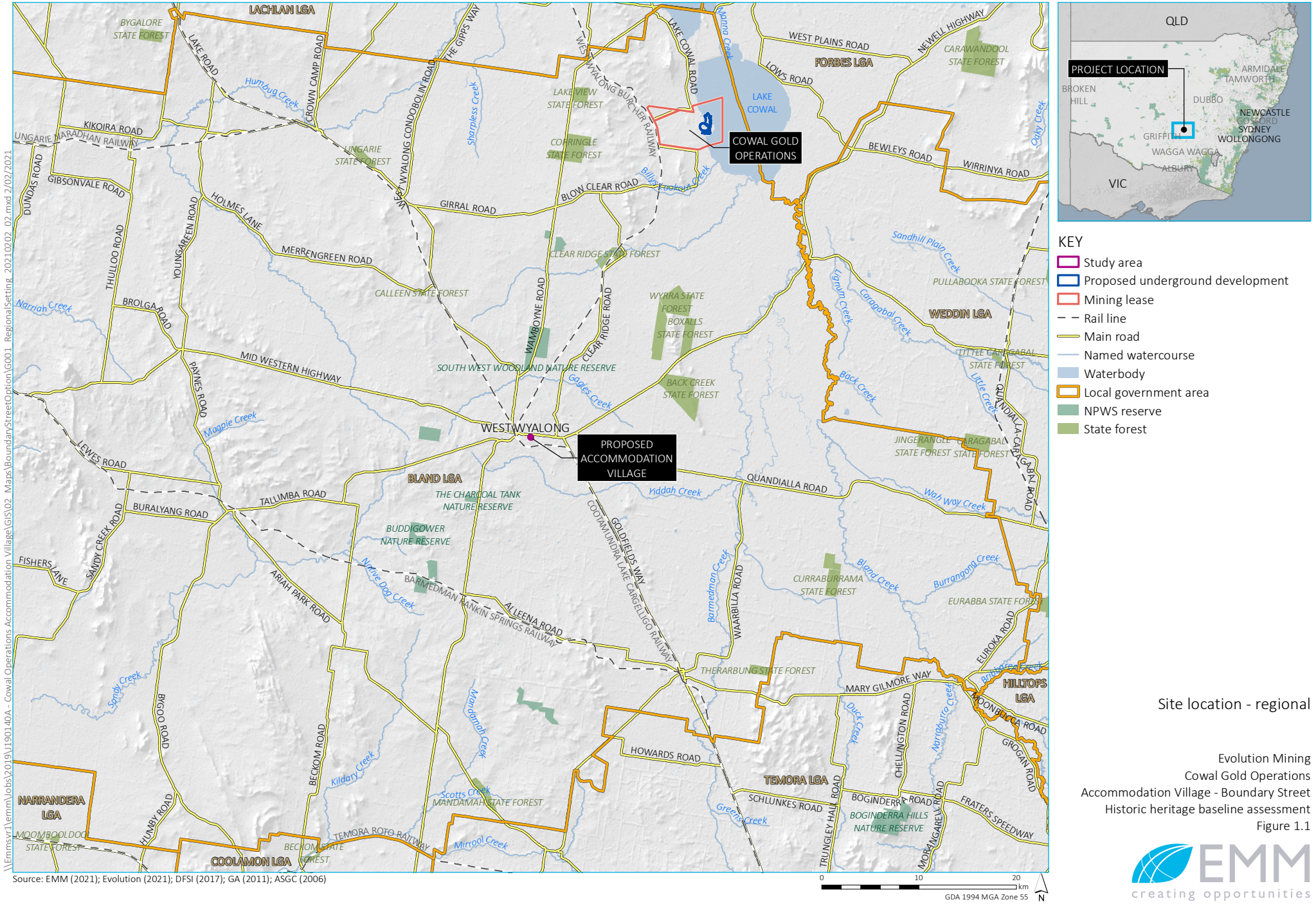
  - semi-permanent accessible accommodation modules to house 8 people, with facilities which are Commonwealth *Disability Discrimination Act 1992* (DDA) compliant;

- use of upgraded existing access points and on-site roads;
- administration buildings;
- communal facilities, including:
  - laundry units;
  - communal dining and kitchen building;
  - outdoor eating areas;
  - first aid and nursing room;
  - prayer room;
  - quiet room;
  - gymnasium;
  - multipurpose outdoor court; and
  - running track;
- undercover bus shelter and bus parking spaces;
- light vehicle car parking;
- fencing and lighting;
- reticulated services; and
- landscaping.

The village components will be modular in design with different layouts dependent on the workforce (construction, operational and accessible) supporting the CGO Underground Development Project. The development will be staged, with the construction workforce modules being constructed first to ensure this area of the village is ready to house the construction workforce as soon as possible. The operational workforce modules, including accessible modules, will be completed as soon as possible thereafter.

Approval is sought for all stages of development as part of the SEE and DA. Construction of the accommodation modules is expected to take approximately eight months total. Construction of additional amenities / facilities may take up to a further three years, post removal of construction accommodation modules. Minor earthworks will be required for site establishment activities, including vegetation clearing and grubbing, ground levelling and trenching for service installation. Any excavated topsoil will be stockpiled and reused on site where possible.

Appropriate security measures such as fencing, gates, cameras and night lighting will be installed. Site landscaping will be undertaken to increase visual amenity consistent with the surrounding neighbourhood and will incorporate water sensitive urban design practices. This includes maintaining existing native vegetation wherever possible.



Source: EMM (2021); Evolution (2021); DFSI (2017); GA (2011); ASGC (2006)

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Site location - regional

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Historic heritage baseline assessment
Figure 1.1

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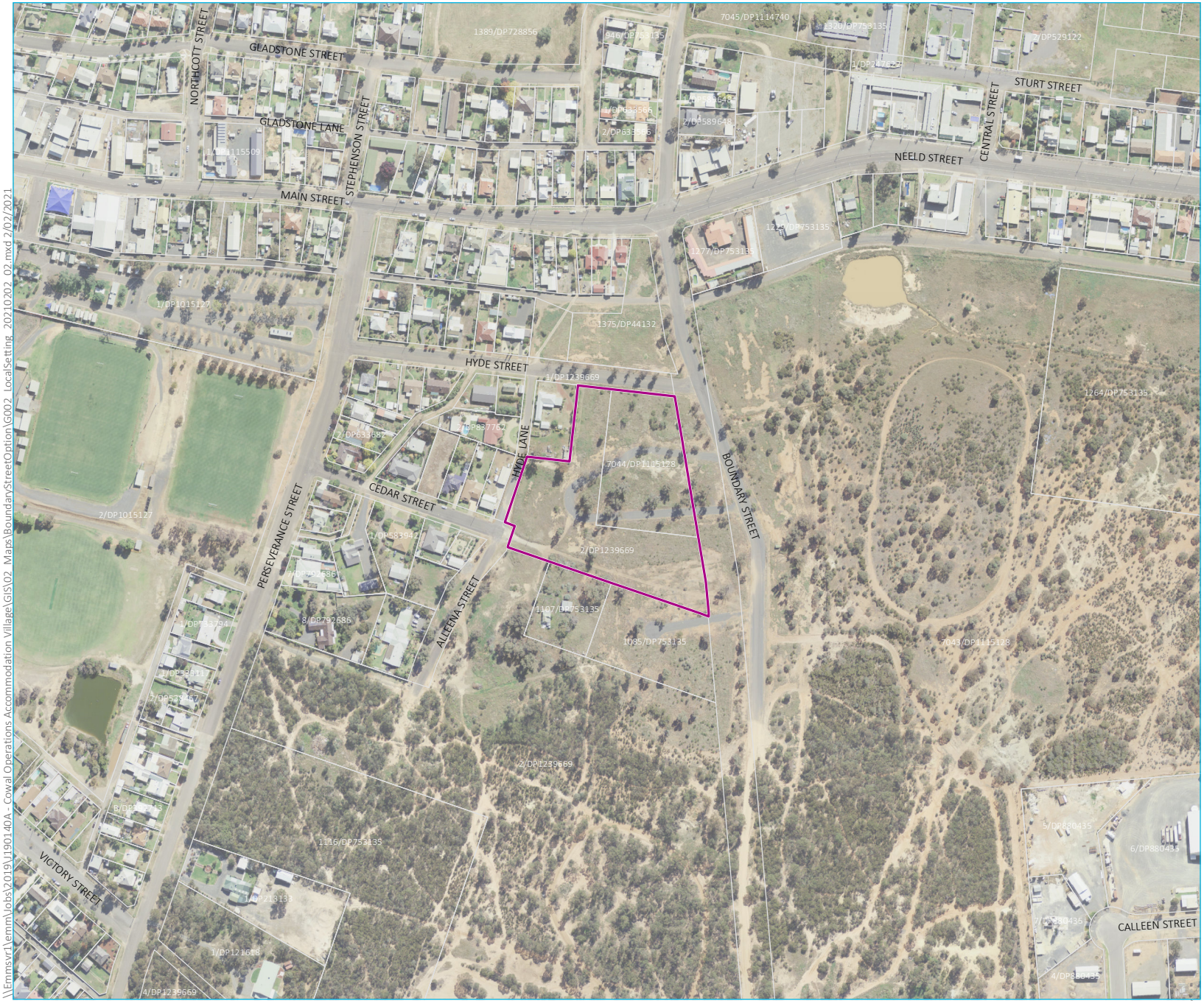

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Site location - local

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Historic heritage baseline assessment
Figure 1.2

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1.3 Study area description

The study area is located between Boundary Street and Aleena Street in West Wyalong, in central west New South Wales (NSW), which is located approximately 360 km west of Sydney (see Figure 1.1). Under the Bland LEP (Land Zoning Map – Sheet LZN_007F), the study area is zoned as Zone R1 General Residential.

The study area is located on vacant freehold land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (see Figure 1.2), held by the West Wyalong Local Aboriginal Land Council (LALC) (subject to determination of native title). A native title claim (NN2020/007) was lodged on 21 August 2020 by the West Wyalong LALC over part of the study area. This claim was yet to be determined at the time of writing.

The study area has previously hosted Barrick Gold's CGO accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The Barrick Gold accommodation village was demolished between 2005-2006 and the study area is currently devoid of built structures. The study area is located within a larger area of relatively flat vacant land which contains fragmented native vegetation.

The study area is bordered by Hyde Lane and Cedar Street to the west and Hyde Street to the north. Other land uses surrounding the study area include residential, industrial and retail. The closest private residence is located immediately west of the study area on Hyde Lane.

1.4 Purpose

The purpose of the historical heritage due diligence assessment was to identify if any statutory listed historical heritage items, or other historical heritage items of significance have the potential to be affected by the project.

1.5 Methods

The historical heritage assessment included the following steps:

- a review of historical heritage registers relevant to the study area;
- a site inspection undertaken by an EMM archaeologist to investigate if any previously unrecorded heritage items or areas of archaeological potential are visually conspicuous in the study area; and
- impact assessment and management recommendations.

1.6 Statutory context

1.6.1 Environmental Planning and Assessment Act (NSW)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in planning and development consent process. The EP&A Act requires that environmental impacts are considered before land development; this includes impacts on cultural heritage items and places as well as archaeological sites and deposits. The EP&A Act also requires that local governments prepare planning instruments, such as local environmental plans (LEPs) and development control plans (DCPs) to provide guidance at the local level of environmental assessment required. The study area is within the Bland Shire local government area (LGA) and is subject to the *Bland Local Environmental Plan 2011*.

Part 1 Section 1.2 of the Bland LEP states the aims of the plan, which includes:

(i) to value, protect and promote the natural, cultural and archaeological heritage of West Wyalong by careful management.

1.6.2 Heritage Act 1977 (NSW)

The *Heritage Act 1977* (Heritage Act) is the primary piece of State legislation affording protection to items of environmental heritage (natural and cultural) in NSW that have been formally placed on the State Heritage Register (SHR). Under the Heritage Act, 'items of environmental heritage' include places, buildings, works, relics, moveable objects and precincts identified as significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. State significant items are listed on the SHR and are given automatic protection under the Heritage Act against any activities that may damage an item or affect its heritage significance.

The Heritage Act also protects 'relics', regardless of their listing status. It applies to all land in NSW, except Commonwealth land. Section 4(1) of the Heritage Act (as amended 2009) defines a 'relic' as follows:

> A "relic" means any deposit, artefact, object, or material evidence that:
>
> (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
>
> (b) is of State or local heritage significance."

Section 139(1) of the Heritage Act states that:

> "A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit."

Permits to disturb or excavate relics are issued by the NSW Heritage Council or a delegate of the NSW Heritage Council under Section 140 (for relics not protected by an SHR listing) or Section 60 (for relics protected by an SHR listing) of the Heritage Act. Exceptions or exemptions to these permits are applicable under certain conditions.

The Heritage Act identifies the category of 'works', which refers to past evidence of infrastructure, and is viewed as separate to that of archaeological relics under the Heritage Act. Works may be buried, and are therefore archaeological in nature, but exposing a work does not trigger reporting obligations under the Heritage Act unless it is considered that the item is of State significance.

The Heritage Act also requires government agencies to identify and manage heritage assets in their ownership and control. Under Section 170 of the Heritage Act, government agencies must establish and keep a register which includes all items of environmental heritage that have been identified by the agency, or that are listed on the SHR, an environmental planning instrument, or which may be subject to an interim heritage order that are owned, occupied, or managed by that government body. Under Section 170A of the Heritage Act all government agencies must also ensure that items entered on its register are maintained with due diligence in accordance with State Owned Heritage Management Principles approved by the NSW Minister for Planning, Industry and Environment (DPIE) on advice of the NSW Heritage Council.

2 Historical context

2.1 Overview

The Wiradjuri people are likely to have inhabited the West Wyalong area as early as 45,000 years ago (Pardoe 2013). The first European to travel through the area was explorer and surveyor John Oxley in 1817 during his Lachlan River expedition, followed by the colony's Surveyor-General Thomas Mitchell in 1827. By 1833 squatters were beginning to settle the district, which they called 'The Blands' (West Wyalong 2020). It was not until 1893 when gold was discovered in the district by Joseph Neeld that government started planning the town of Wyalong in 1894 (Dow et al. 1995). However, by this point the miners had already migrated and created a settlement 5 km to the west called 'Main Camp', which eventually became known as West Wyalong. This settlement prospered as a result of the White Tank, the only reliable water source in the area, while the population of Wyalong dwindled. In 1895 the town of West Wyalong was laid out along the original stockman's track that connected the two camps. Resulting from a lack of town planning, the Main Street in West Wyalong is nicknamed the Crooked Mile where the road bent around gold mining pits and trees (West Wyalong 2021).

Wyalong became a municipality in 1899 with the erection of a council chambers, a courthouse, police station, post office and a school of arts (West Wyalong 2020). The railway arrived in Temora in 1903 a town 70 km south-east of West Wyalong, and a decision was unable to be reached regarding which town would have the station, so the Wyalong Central station was erected in the mallee scrub between the two towns. Alongside the goldrush, large pastoral holdings of mixed farming developed, which saw West Wyalong become the largest cereal-growing centre in NSW (West Wyalong 2020). Eucalyptus oil production began in 1907, of which West Wyalong was a major exporter. Since the 1970s the two towns have effectively become one, with Wyalong expanding westwards and joining West Wyalong.

The study area is situated on the eastern fringes of the early layout of West Wyalong in 1880 (refer Plate 2.1) and was previously the location of Cowal Gold Operations (Barrick Gold) accommodation village (see Plate 2.2), built in 2004 and in operation for approximately 15 months as a temporary residential village for employees working for the CGO who were unable to find accommodation in town. Google aerial imagery demonstrates that the village was demolished between 2005-2006 and currently exists as bushland, bitumen roads, and private sheds (refer Plate 3.1 to Plate 3.4). Based on a preliminary review of Parish plans from 1880, with several editions in the 1920s-30s, no buildings or other structures were identified within the study area. Although no other primary resources were utilised, EMM is not aware of any historically significant developments occurring here.

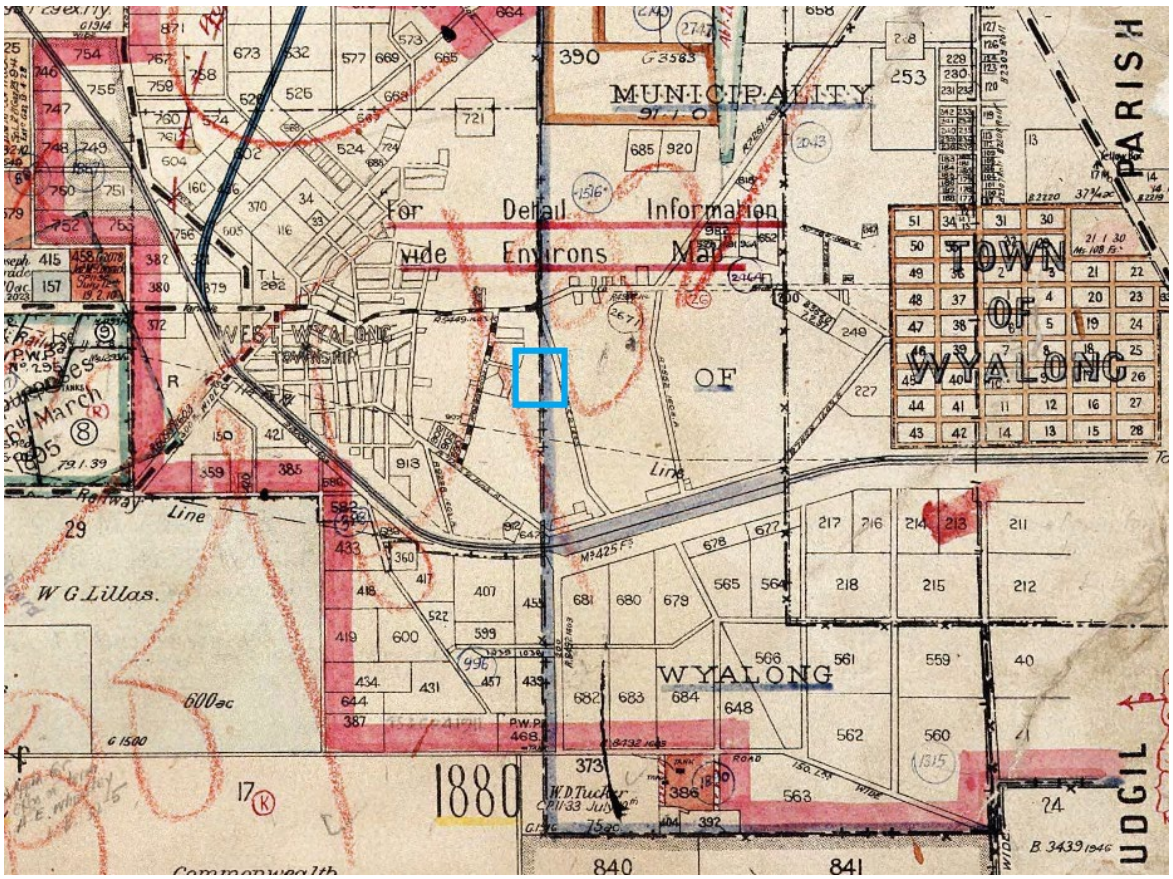

Plate 2.1 **Historical map (1880) of West Wyalong and Town of Wyalong, featuring the study area within the blue box (Edit. #5, 1923).**

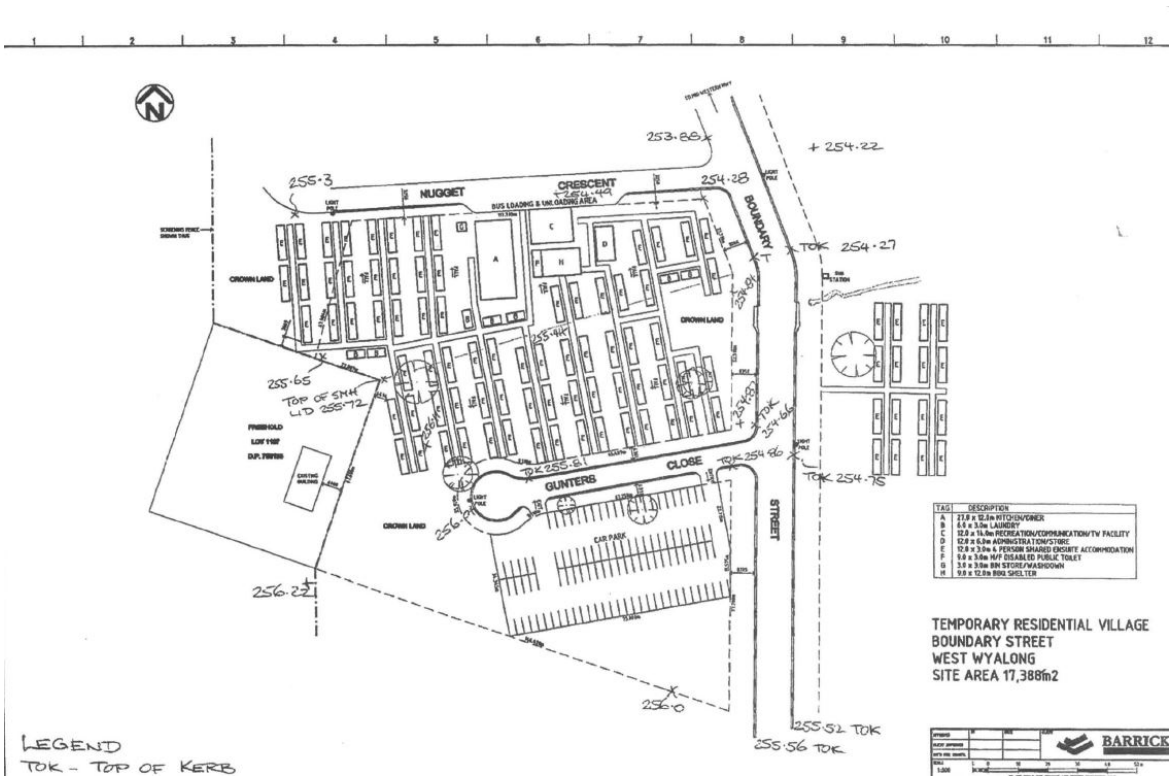

Plate 2.2 **Original Barrick Gold Temporary Residential Village site plan (Barrick 2004).**

Plate 2.3 **Image of the Barrick Gold Temporary Residential Village site in 2005 (Google Earth).**

2.2 Historical heritage register searches

A number of historical heritage registers were reviewed for the study area. No statutory or non-statutory historical heritage items were identified in the study area. Table 1 provides the results of historical heritage register databases.

Table 1 **Historical register search for items within the study area (14 January 2021)**

Register	Register listings relevant to the study area
National Heritage List (NHL)	No listings
Commonwealth Heritage List (CHL)	No listings
State Heritage Register (SHR)	No listings
Schedule 5 of the Bland LEP	No listings
Register of the National Estate (RNE)	No listings
Register of the National Estate (RNE) – Non-statutory	No listings

3 Site inspection

EMM archaeologist Taylar Reid, with the assistance of Linton Howarth (West Wyalong LALC), and Delice Aird and Tammy Rawson (Evolution), conducted a visual inspection of the study area on 5 August 2020. The aims of the visual inspection were to confirm that the proposed development was unlikely to impact historical relics or cultural landscapes and to verify the predictions of archaeological potential through visual observation and pedestrian sampling of the study area. The study area was inspected for surface cultural material, the potential for buried materials, and/or previous disturbance.

The site inspection did not locate any previously unidentified relics or cultural landscapes within the study area, and confirmed the high levels of ground disturbance from the previous accommodation village rendering it unlikely any subsurface relics or cultural material exist (refer Plate 3.1 to Plate 3.4).

Plate 3.1 View from imported stockpile on northern portion of study area, established road from previous accommodation village, view north.

Plate 3.2 Photograph from the south-west portion of the study area showing visibility, exposure and ground disturbance, view west.

Plate 3.3 Showing ground disturbance from construction of bike jumps with imported materials in the south-western portion of study area, view east.

Plate 3.4 Showing vegetation and ground disturbance from stockpile in north-western portion of study area, view west.

4 Conclusions and recommendations

The historical heritage assessment found that no statutory listed or non-listed historical heritage items occur within the study area. Furthermore, it is highly unlikely for archaeological relics to occur within the study area for the following reasons:

- preliminary desktop review did not identify any historical items previously recorded in the study area; and
- regardless of the above, the extent of previous ground disturbance from the construction of the original Barrick Gold Temporary Accommodation Village is highly likely to have removed any archaeological potential.

In summary, no impacts to historical heritage items are anticipated by the project and works and works may proceed with caution though Evolution must adhere to the following unexpected finds protocol during construction works:

- if unanticipated finds, including potential relics, are found during project activities, work in the vicinity (ie within 10 m) will cease and the site supervisor will be informed;
- an archaeologist will be contacted to assess the find, where relevant, and determine if it is clearly a relic or has moderate to high potential to be a relic (this may require additional research);
- if the find is determined to be a relic, a s146 notification (of the Heritage Act) is to be forwarded to the NSW Heritage Council who will be consulted on the appropriate management measure; and
- if the find is assessed and is not a relic, work inside the area that was made a no-go area can re-commence.
- The discovery of human remains including skeletal material will halt work in a 10 m radius and the remains will not be tampered with. Personnel with the appropriate level of authority will contact the police and the coroner for investigation, which may include the involvement of Heritage NSW and advice from a physical anthropologist.

Yours sincerely,

Taylar Reid
Archaeologist
treid@emmconsulting.com.au

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Appendix I

Visual impact assessment

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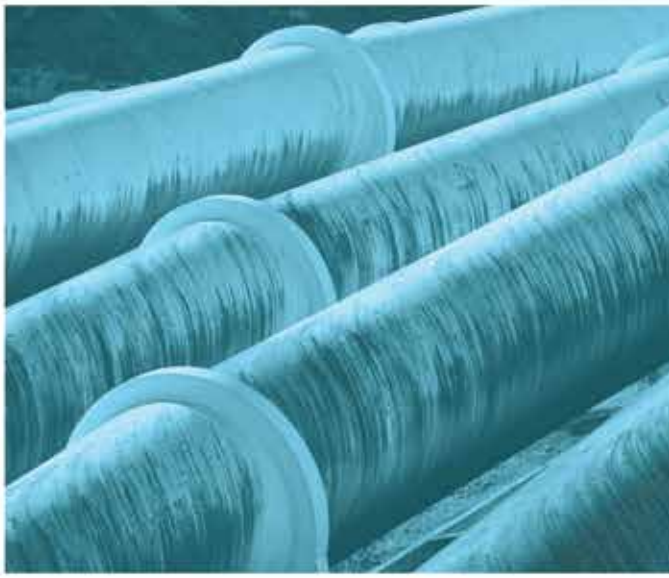
Visual Impact Assessment

Cowal Gold Operations Accommodation Village

Prepared for Evolution Mining (Cowal) Pty Limited
April 2021

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Visual Impact Assessment

Cowal Gold Operations Accommodation Village

Report Number

J190140A #8

Client

Evolution Mining (Cowal) Pty Limited

Date

13 April 2021

Version

v2 Final

Prepared by

Paul Freeman
Associate Director
13 April 2021

Approved by

Rob Morris
Associate Director
13 April 2021

Executive Summary

Evolution Mining (Cowal) Pty Limited (Evolution) is proposing to develop an accommodation village to support its intended workforce during the construction and operational phases of the Cowal Gold Operations (CGO) Underground Development Project. The CGO Underground Development Project represents an extension to the existing CGO, which is an open-cut gold mine operational since 2004, located approximately 38 kilometres from West Wyalong in the NSW central west region.

The accommodation village is proposed to house around 176 people and will contain varying types of modular accommodation according to whether the workers are part of the construction or operational phase workforce. In addition to modular accommodation, the village will also include communal facilities, such as administration building, a commercial kitchen and dining area, laundry units and outdoor eating areas.

The village is proposed to be developed on the same site which previously housed an accommodation village when the CGO was first developed in the early 2000s by Barrick Gold.

Assessment of the visual impact of the proposed development is an important consideration, as the location of the site is on the fringe of the urban area of West Wyalong and as such, residential sensitive receptors are present.

A detailed analysis of visual impacts on identified sensitive receptors finds that the proposed development:

- will not visually impact tourist destinations or heritage sites;
- will be obscured from the primary view line of most potential sensitive receptors due to local existing mature vegetation and structures;
- will have a moderate visual impact on one residential sensitive receptor (14 Hyde Street); and
- will have a low visual impact on two others residential receptors (1 Hyde Lane and 26 Cedar Street).

The visual impact for all sensitive receptors is, however, mitigated by existing vegetation and structures, complimented by proposed new fencing and site landscaping, which will largely obscure external views of built structures within the site. As part of proposed site landscaping, new native screening trees and shrubs will be planted along the northern and western perimeters of the site, between existing residential sensitive receptors and the village.

The design of the village, which is expected to be a pleasing aspect in the viewshed, will also be key to further reducing the visual impact. The village will be designed to have an aesthetic of similar character to other developments in West Wyalong.

The proposed accommodation village will be different to the previous Barrick Gold accommodation village, with greater focus on urban design and integration into the surrounding area, both visually and functionally.

The layout of the village, design of modules and site landscaping are aligned with local planning controls and guidance. Therefore, while the proposed development represents a change, it is a change that will be well integrated into the existing visual setting.

A suite of mitigating measures, including perimeter screening trees and shrubs, and general landscaping, is expected to reduce the visual impact to acceptable levels for all sensitive receptors.

Table of Contents

Figures

Photographs

1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) proposes to construct and operate an accommodation village (the project) on vacant land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (the site), located on Boundary Street, West Wyalong (refer Figure 2.1 and Figure 2.2).

EMM Consulting Pty Limited (EMM) has been engaged by Evolution to prepare a statement of environmental effects (SEE) and accompanying development application (DA) for the project under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This visual impact assessment (VIA) has been prepared by EMM to inform the SEE and DA for the project.

1.2 Project description

The project will be located within the Bland Shire Local Government Area (LGA) and will be considered as a multi-dwelling residential development under the *Bland Local Environmental Plan 2011* (LEP) and *Bland Shire Development Control Plan 2012* (DCP).

The village is being developed to house the anticipated workforce associated with the construction and operation of the Cowal Gold Operations (CGO) Underground Development Project, located approximately 38 kilometres (km) north-east of West Wyalong (refer Figure 2.1). The CGO Underground Development Project is currently the subject of a State significant development (SSD) application (SSD 10367), under section 4.38 of the EP&A Act.

Approval is sought for all stages of development of the village. The conceptual design comprises the following key components:

- accommodation capacity for up to 176 people total supporting the CGO Underground Development Project, including:
  - temporary construction workforce accommodation modules to house 96 people;
  - semi-permanent operational workforce accommodation modules to house 72 people;
  - semi-permanent accessible accommodation modules to house 8 people, with facilities which are Commonwealth *Disability Discrimination Act 1992* (DDA) compliant;
- use of existing access points from Boundary Street and upgraded on-site roads;
- administration buildings;
- communal facilities, including:
  - laundry units;
  - communal dining and kitchen building;
  - outdoor eating areas;
  - first aid and nursing room;

- prayer room;
- quiet room;
- gymnasium;
- multipurpose outdoor court; and
- running track;

- undercover bus shelter and bus parking spaces;
- light vehicle car parking;
- fencing and lighting;
- reticulated services; and
- landscaping.

The village components will be modular in design. There will be three types of accommodation module, each with a different layout dependent on whether the worker is a construction worker, an operational worker or they require accessible accommodation.

The development will be staged, with the operations workforce and accessible modules being constructed first. This area of the village will initially house the construction workforce. The construction workforce modules will be completed as soon as possible thereafter.

Construction of the accommodation modules is expected to take approximately eight months in total. Construction of additional amenities/facilities may take up to a further three years once construction accommodation modules have been removed. Minor earthworks will be required for site establishment activities, including vegetation clearing and grubbing, ground levelling and trenching for service installation. Any excavated topsoil will be stockpiled and reused on site where possible.

Appropriate security measures such as fencing, gates, cameras and night lighting will be installed. Site landscaping will be undertaken to increase visual amenity consistent with the surrounding neighbourhood and will incorporate water sensitive urban design practices. This includes maintaining existing native vegetation wherever possible.

1.3 Purpose and study method

1.3.1 Purpose of this report

This VIA has been prepared to address the project's impact upon the visual character of the surrounding landscape.

There is a need to consider the extent to which a proposed development integrates or contrasts with the local landscape, and the extent to which sensitive receptors, in particular residences in the vicinity, will be affected by the proposed development. The purpose of this VIA is therefore to understand the likely interactions between the village and visual receptors in its vicinity.

The visual setting of the proposed village is the key reference point for adjoining residents to any changes to the viewshed and their reaction to that change. The village is designed to be inviting, engaging and attractive and should enhance the value of the local area. This will also influence the attitudes and perceptions of future residents.

The village will incorporate contemporary urban design and environmentally sustainable features which will result in buildings and internal spaces that are aesthetically appealing and able to retain their appearance over time, through appropriate selection and application of materials, detailing, fenestration and weather protection.

1.3.2 Method

The visual impacts of the proposed village have been assessed in a manner consistent with the *Guidelines for landscape and visual impact assessment* (Landscape Institute and Institute of Environmental Management & Assessment 2013). The Guideline is not a formal statutory document and does not prescribe mandatory assessment methods. However, it represents good practice when assessing visual impacts.

The assessment approach broadly included the following steps:

- a desktop study to assess the visual character of the surrounding local area;
- photography of the site and surrounds;
- assessment of the impact of the village on nearby sensitive receptors (residences); and
- identification of mitigation measures to alleviate impacts, where necessary.

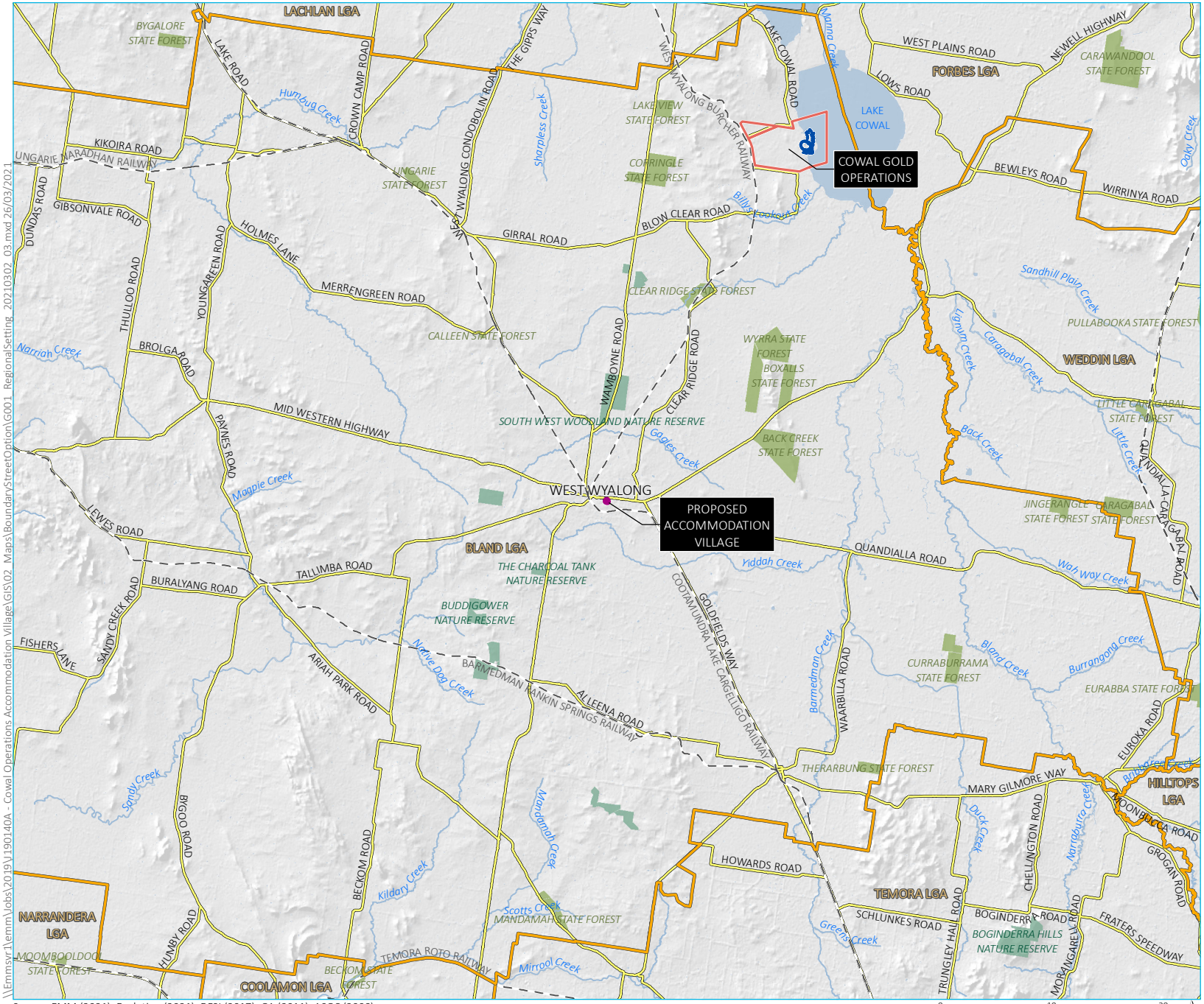
Given the location on the urban fringe of West Wyalong and its position on a large area of vacant land with little development in its surrounds, photo-montages pre- and post-development were not deemed necessary. However, conceptual 3D visualisations of the village are presented from relevant vantage points to show what the village is expected to look like in its finished form.

2 The site

2.1 Location relative to West Wyalong

The site is located between Boundary Street and Aleena Street in West Wyalong (refer Figure 2.1 and Figure 2.2). The site is approximately 900 m southeast of West Wyalong central business district (CBD).

The site occupies an area of approximately 2.5 hectares.



KEY

- Site boundary
- Proposed underground development
- Mining lease
- Rail line
- Main road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest

Source: EMM (2021); Evolution (2021); DFSI (2017); GA (2011); ASGC (2006)

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Regional context

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Visual impact assessment
Figure 2.1

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Source: EMM (2021); Evolution (2021); DFSI (2017)

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Local context

Evolution Mining
Cowal Gold Operations
Accommodation Village - Boundary Street
Visual impact assessment
Figure 2.2

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2.2 Site zoning and status

Under the Bland LEP (Land Zoning Map – Sheet LZN_007F), the site is zoned as Zone R1 General Residential. The village is being considered as multi-dwelling residential development, which is permissible in the R1 zone.

The site is located on vacant freehold land comprising the whole of Lot 7044 DP1115128 and a portion of Lot 2 DP1239669 (refer Figure 2.2), held by the West Wyalong Local Aboriginal Land Council (LALC) (subject to determination of native title). A native title claim (NN2020/007) was lodged on 21 August 2020 by the West Wyalong LALC over part of the site. This claim was yet to be determined at the time of writing.

2.3 Topography

The site is essentially flat and located within a larger area of vacant land which contains fragmented native vegetation. The topography of the site itself has a central topographic highpoint at approximately 846 m Australian Height Datum (AHD), with a slight slope to approximately 850 m AHD towards the eastern and southern boundaries. The site is generally flatter in its western portion.

2.4 Site history

The area within and surrounding the site hosted a number of small gold mines which were prevalent in the mid-late 19th century in West Wyalong.

The site was formerly the location of Barrick Gold's accommodation village, constructed in 2004 for use as a temporary residential village to support employees working at the CGO. The Barrick Gold accommodation village was demolished between 2005-2006. The site has been vacant since then.

2.5 Site features

The site is largely cleared of vegetation, however there are patches of remnant native vegetation across the site (refer Photograph 2.1 and Photograph 2.2). The vegetation and plant community types (PCTs) across the site have been assessed by EMM and are described in detail in the Biodiversity Development Assessment Report (BDAR) prepared for the project (EMM 2021). There is a cluster of quandong trees in the centre of the site which have significance to the local Aboriginal community.

The site contains an existing loop road which was constructed to service an undeveloped residential subdivision. The road has a kerb and gutter, and there is a catch drain on Boundary Street. The site is accessed via the loop road.

The site forms part of a larger contiguous area of vacant Crown land which shows evidence of goldrush-era mining activities. Beyond this is a light industrial estate and rail corridor. The site has been used by trail bike riders and contains two earthen stockpiles that are used as jumps.

The site is currently unfenced, which has allowed an informal access from 20 Cedar Street to Boundary Street. This is a private land parcel immediately south of the site.

The site has access to existing services, including mains supplied potable water, sewer and electricity.

Photograph 2.1 **Remnant vegetation, looking west across the site from Boundary Street**

Photograph 2.2 **Quandong trees (centre of photograph)**

3 Landscape setting

3.1 Local setting

Immediately north and west of the site are low density residential developments. To the east and south there is open space. The site is accessed via Boundary Street, which is a street off Main Street (Newell Highway) (refer Photograph 3.1).

The surrounding area is characterised by vacant land and the low density urban fringe of West Wyalong. The following land uses are adjacent to the site:

- North – Hyde Street, and beyond that an area of vacant land between Hyde Street and an unnamed lane which allows vehicular access to the rear of residences on Main Street.
- South – vacant private property at 20 Cedar Street, vacant Crown land and beyond that, a light industrial estate.
- East – Boundary Street road reserve, Boundary Street, vacant Crown land.
- West – the back yard of 14 Hyde Lane, the frontage of 1 Hyde Lane, the back yard of 25 Cedar Street and beyond that the frontage of 26 Cedar Street.

In total, there are three residences which will have a partial view of the village once constructed (14 Hyde Street, 1 Hyde Lane and 26 Cedar Street) (refer Photograph 3.2 and Photograph 3.3).

The True Blue Motor Inn is on the corner of Main Street and Boundary Street, and views of the village from this establishment are expected to be obstructed by its perimeter wall and fencing of the village site.

Photograph 3.1 Looking east at the intersection of Main Street and Boundary Street

Photograph 3.2 Street frontage of 14 Hyde Street

Photograph 3.3 Unnamed lane with rear gardens of Main Street residences (right)

Photograph 3.4 Boundary Street looking southwest towards vacant Crown land

3.2 Regional setting

West Wyalong is the largest town in Bland Shire and is home to over 3,000 people.

It has been known as a gold mining area since gold was first discovered there in 1893. The historic streets of the town contain a mixture of late 19th and early 20th century buildings featuring vintage shop facades and wrought iron verandas (refer Photograph 3.5).

Main Street in West Wyalong is nicknamed the 'Crooked Mile' as it was built around gold diggings and tree stumps. The street was famously sketched by Russell Drysdale in 1949 during a visit with a friend and a bronze sculpture of an easel now stands tall at the spot on the corner of the Tatts Hotel.

Photograph 3.5 Architecture of West Wyalong town (Source: aussietowns.com.au)

The town is home to the West Wyalong General Hospital, which is a regional health care facility with a range of services.

There is a variety of accommodation in and around West Wyalong, including hotels, motels and caravan parks, which have been developed for agricultural and mining personnel working in the surrounding area. The closest to the site are the True Blue Motel (200 m north) and the West Wyalong Caravan Park (400 m west).

The presence of accommodation facilities is therefore, consistent with the character of this part of West Wyalong.

4 Sensitive visual receptors

4.1 Receptor type

Visual impacts have been evaluated in relation to the sensitivity of the viewpoint and the perspective of the viewer. The locations which are generally considered to be potentially sensitive include:

- residential dwellings;
- tourist accommodation; and
- secondary roads.

Residential dwellings are considered sensitive to the extent that they are in occupation during construction and operation of the development.

Tourist accommodation is considered sensitive to the extent that it faces the site, and in relation to the extent of occupation (i.e the length of stay of the occupant).

Secondary roads are only considered as sensitive receptors where views are altered for vehicle occupants. As a result, visual impacts as viewed from roads, are generally considered minimal and confined to the duration of time that the object is in the view of the occupant.

4.2 Visual receptors

The potential sensitive receptors identified near the site are:

- 14 Hyde Street;
- 25 Cedar Street;
- 26 Cedar Street;
- 1 Hyde Lane; and
- Boundary Street.

Details of each of the potential sensitive receptors and their visibility of the proposed site pre-development is provided in the following sub-sections.

There is one tourist destination (True Blue Motor Inn) within the viewpoint of the project, however it is surrounded by a brick fence which restricts views from the rooms into the site and has therefore not been considered further in this assessment. There are no other tourist destinations or heritage sites within close proximity to the site that could be visually impacted by the development.

There is no urban development on the northern side of Hyde Street which faces the northern boundary of the site. There is also no urban development on the adjacent eastern and southern land. As such, there are no identified potential sensitive receptors to the east or south of the site, other than users of Boundary Street.

The potential sensitive receptor locations are shown in Figure 4.1.

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Source: EMM (2021); Evolution (2021); DFSI (2017)

Assessment viewpoints

Evolution Mining - Cowal Gold Operations
Accommodation Village - Boundary Street
Visual impact assessment
Figure 4.1

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4.2.1 14 Hyde Street

The residence at 14 Hyde Street has partial views of the site from the rear garden where it shares a portion of the western boundary of the site. The view from the rear garden is partially obscured by existing vegetation on the boundary (refer Photograph 4.1). As there will be operations accommodation modules within 5 m of the rear garden, this view will be mitigated by the installation of a 1.8 m high 'good neighbour' style fence and by landscaping. This will also reduce the noise levels at the residence.

Photograph 4.1 View looking west-northwest towards 14 Hyde Street from western site boundary

Note: views toward the site from the eastern boundary of 14 Hyde Street are obscured by existing vegetation.

4.2.2 25 Cedar Street

The rear garden of 25 Cedar St is adjacent to Hyde Lane. Views of the site from this rear garden will be obscured by gates, vegetation and a boundary fence (refer Photograph 4.2). Views east from the garden are obscured by vegetation in the rear garden and the shed of 14 Hyde Street. However, views from the garden directly east will be evident, although the viewer will need to be standing close to the fence to see the view from the garden (refer Photograph 4.3).

Photograph 4.2 View looking west towards 25 Cedar Street from western boundary of site

Note: views toward the site from rear garden are obscured by gates, vegetation and boundary fence.

Photograph 4.3 View looking east across site adjacent to eastern boundary of 25 Cedar Street

Note: this photo is taken from within the site boundary.

4.2.3 26 Cedar Street

The residence at 26 Cedar Street is set back from the street, and views of the site from the residence looking east-northeast are obscured by vegetation and fencing (refer Photograph 4.4).

Photograph 4.4 View looking west towards 26 Cedar Street from corner of Cedar Street / Alleena Street

Note: views of the site are shielded by vegetation and fencing.

4.2.4 1 Hyde Lane

The residence of 1 Hyde Lane has partially obstructed views of the site (looking east). This view is obstructed by the rear garden of 14 Hyde Street.

Photograph 4.5 View looking north on Hyde Lane

Note: The driveway of 1 Hyde Lane is shown on the left of Hyde Lane.

4.2.5 Boundary Street

Boundary Street is a 'No Through Road' which would only be trafficked by the residents of the village, service personnel, worker bus drivers and deliveries to the village. As such, there will be no transitory visual impact for other motorists or users of Boundary Street.

Hyde Street is accessed via Perseverance Street to its west and observations from site visits show that there is little through traffic which uses the eastern end of Hyde Street that would pass by the northern boundary of the site that would experience visual impacts.

There are no residences on Boundary Street that could be visually impacted by the village (refer Photograph 4.6).

Photograph 4.6 **View looking south towards the site from corner of Boundary Street**

5 Visual effect

5.1 Effect level

Visual effect is a measure of the level of visual contrast and integration of the proposed development with the existing landscape setting.

The proposed village is considered to be moderately integrated with the existing residential development. The visual impacts are not expected to be significant and will be minimised primarily through the following design measures:

1. The design, external materials and finishes of buildings and other infrastructure within the site.

2. The setbacks applied from the property boundaries (primary and secondary street setbacks).

3. Retention of existing established vegetation wherever possible, complimented by additional strategic landscaping.

Details of these measures and how they have been applied to the development are discussed in the following sub-sections. Through the design iteration process, Evolution has incorporated a range of design measures with the intention that the village complement the local area and not be visually obtrusive.

The village is being developed adjacent to an established residential area, located to the north and west of the site. As such, it will be noticeable to adjacent residents, mainly because it will be a new element in the landscape. The visual impacts to the south and east of the site will be minor to negligible. This is due to the location of the site being on the urban fringe of West Wyalong, and the absence of sensitive receptors (residences) to the south and east of the site.

5.2 Development controls

The village is being considered as a multi-dwelling residential development in accordance with the Bland LEP. Therefore, the Bland DCP applies and this provides guidance on the urban design and acceptable outcomes for the village.

The DCP states in its objectives that residential development should be of high visual quality and amenity, while minimising amenity impacts on surrounding development. The design of the village will ensure these objectives are met.

The key guidance measures related to visual impact outlined in the Bland DCP include restrictions on building heights, bulk and form (clause PD3) setbacks from site boundaries (clause PD10.4) and tree protection (clause PMD1.3)

The Bland DCP restricts buildings to two storeys or 8 m above ground. All buildings in the village will be single storey constructions and no structure is expected to be greater than 7 m in height.

Setback requirements include a 5 m setback to primary street frontages (i.e Hyde Street and Boundary Street) and 3 m setbacks to secondary frontages (i.e Hyde lane and the southern boundary).

Existing trees on the site range in heights from 5 – 15 m high. The majority of trees will be retained at the site for shade and to provide some visual screening.

5.3 Village design

The visual effects will largely be dictated by the overall village layout, placement and style of the built structures. The placement and style of built structures will be generally respectful of the architecture of the local area, the existing vegetation and local streetscapes. While the proposed development represents a change in the current viewshed which is predominately vacant with some vegetation, it is not considered to be a radical change and delivers a visual impact which can be partly integrated into the existing visual setting.

The village will have three types of modules: operational workforce modules, construction workforce modules and accessible modules (refer Appendix A). Each will be designed to incorporate architectural motifs which complement building types and structures in surrounding streets.

The operational workforce and accessible modules will be present on the site for a longer period than the construction workforce modules and have therefore been placed at locations within the site which will have greatest street appeal (i.e on the northern and western extents of the site). The finishes of the modules will have a greater emphasis on urban design, and will include louvered windows and pitched roofline, balustrading and decking. As they will remain at the site for a longer period of time, there is a greater focus on the urban design required to help blend these modules into the surrounding streetscape.

The construction workforce modules will be located in the southern portion of the site where there are no adjoining residences. The temporary nature of the construction workforce modules and their proposed placement within the site requires less focus on the urban design. These modules will incorporate design elements to ensure consistency with the surrounding streetscape and in harmony with the urban setting.

The main administration building and communal facilities will be located within the central portion of the site, and will be surrounded by existing trees and vegetation. The buildings will be designed for their functionality and will be constructed with similar materials as the operational and accessible modules. The decking around the dining hall will be constructed with natural materials.

The materials will include a combination of natural and man-made materials, to ensure that bushfire risk requirements are met and that the structures have a contemporary look. The key material that will be used in the modules will be powder-coated corrugated iron (Colrbond® or similar), with two contemporary colours of this material proposed to be used to provide contrast in the colour scheme applied across the site. The colour palette will be in keeping with the colours of the surrounding environment so as to not be visually obtrusive.

Overall, the village will not look materially different to other modular residential accommodation which exists in West Wyalong (the Ace Caravan Park being one example) or that which is common across NSW.

The 3D visualisations of the village are shown in Figure 5.1, Figure 5.2 and Figure 5.3.

Source: Nettleton Tribe

Figure 5.1 **3D visualisation of the village looking southwest from the intersection of Hyde Street and Boundary Street**

Source: Nettleton Tribe

Figure 5.2 **3D visualisation of the village looking northeast from the southwestern corner of the site**

Source: Nettleton Tribe

Figure 5.3 3D visualisation of the village looking south from Hyde Street

5.4 Setbacks

All modules will be appropriately setback from site boundaries in accordance with the Bland DCP requirements. A minimum 5 m setback will be applied from the primary street (Boundary Street) frontage and a minimum 3 m setback applied from the secondary street frontages of Hyde Street (north) and Hyde Lane (west).

5.5 Landscaping

In terms of preserving established trees, there are 27 mature trees at the site, of which 5 trees will require to be removed to facilitate development of the village. The remaining mature trees will be complemented by the proposed landscaping of the site, which will provide some view shielding for adjacent residences.

A conceptual landscaping plan has been prepared for the site which shows the planting and native species that will be used at the site. In general, the planting will be undertaken to provide shading to the structures (in particular outdoor eating spaces) and as infill planting between the structures, subject to meeting bushfire planning guidelines. The landscaping concept plan for the village, prepared by Arcadia, is shown in Figure 5.4.

The landscaping will soften the appearance of the structures and provide visual impact shielding from neighbouring viewpoints.

Source: Arcadia

Figure 5.4 Conceptual landscaping plan

6 Analysis

Analysis of the visual impact at each of the identified sensitive receptors has been undertaken and is detailed in the following sub-sections, considering the visual effects of the proposed development described in Chapter 5. Visual impacts have been separated into two distinct phases of development, being construction and operations phase impacts.

As described in Section 4, there is no urban development on the northern side of Hyde Street which faces the northern boundary of the site. There is also no urban development on the adjacent eastern and southern land. As such, views into the site from residential properties are restricted to only three residences on the west of the site (ie 14 Hyde Street, 1 Hyde Lane and 26 Cedar Street). Views of the site from 25 Cedar Street will be obscured due to the intervening gates, vegetation and a boundary fence and this residence has therefore not been considered further in the analysis.

6.1 Construction phase impacts

During the approximate eight-month construction period of the village, the visual impact will not be any different to other construction activities which may occur in the area, in that sensitive receptors may have views of construction crews working and materials being delivered to the site.

The visual impacts of the construction stage will be mitigated in a relatively straightforward manner by installing temporary construction site fencing on the boundaries to shield views of construction works from sensitive residential receptors. Construction plant and equipment will be housed on site and not parked on local roads.

The visual impact to sensitive receptors at all locations is therefore considered to be low during the construction period with proposed mitigation measures in place.

6.2 Operations phase impacts

6.2.1 14 Hyde Street

This residence will have a view across the village site once it is built. The site will be evident from the rear garden due to the shared part of the western boundary of the site however, the visual impacts of the village from this garden will be minimised by existing structures within the garden, existing trees on the boundary, the installation of ‘good neighbour’ style fencing and the implementation of an appropriate setback from the fence to the closest accommodation module.

Due mainly to the proximity to the development, the visual impact at 14 Hyde Street is considered to be moderate with the proposed mitigation measures in place.

6.2.2 26 Cedar Street

The residence at 26 Cedar Street will have views from the front garden of the southwestern corner of the site. These views will be restricted to three of the modules and the southern asset protection zone (APZ), which will be kept clear to allow emergency vehicle access and may be used from time to time for car parking. There is intervening vegetation at the property which restricts views to the site as well as the physical distance from site.

The visual impact at 26 Cedar Street is considered to be low with the proposed mitigation measures in place.

6.2.3 1 Hyde Lane

The residence at 1 Hyde Lane will have an obstructed view of the modules located on the western boundary. However, the residence is set back from Hyde Lane and looks out into the rear garden of 14 Hyde Street. Therefore, the views into the site will be restricted by the mitigation measures implemented for 14 Hyde Street.

The visual impact at 1 Hyde Lane is considered to be low with the proposed mitigation measures in place.

7 Visual mitigation

The accommodation village has been designed to limit the visual impacts from nearby sensitive receptors. The village will be able to be seen from a limited number of residences in its vicinity, however its structures will largely be shielded from view using a combination of fencing, retention of existing vegetation and additional strategic site landscaping.

The buildings will be architecturally designed, contemporary modular constructions, which will be coloured to complement the existing landscapes on and near the site. The visual impacts will be mitigated through a range of design features within the site.

The modules will be spaced so that there is a flow between the buildings and giving the opportunity for sympathetic landscaping. A range of design measures have been considered for the village to mitigate the visual impacts. The key design feature is to limit the height of the modules to single storey constructions. This will ensure that none of the modules exceeds the height of vegetation at the site.

The visual impacts at 14 Hyde Street are naturally mitigated by existing vegetation and structures in the garden. Potential impacts will be further mitigated by the installation of a 1.8 m high 'good neighbour' style fence in a colour which compliments the surrounds.

The visual impacts at 1 Hyde Lane and 26 Cedar Street are mitigated by intervening vegetation, existing fencing and distance from the site.

Existing vegetation will be retained as much as possible to shield structures and soften the appearance of the village. This will be complemented with planting of native vegetation species, which will be strategically placed to shield views of the modules from the surrounding streets. In summary, the following measures will be used to mitigate the visual impacts:

- restricting the modules and main/administration buildings to single storey construction;
- use of muted tones on the colour palette to blend structures into the surroundings;
- locating the village on a site which is on the urban fringe and is which is not densely populated, giving the opportunity for sympathetic placement of structures on the site;
- using the existing vegetation on the site to shield structures where possible; and
- landscaping other areas of the site to enhance the appearance from outside the site.

8 Conclusion

Evolution is proposing to develop an accommodation village to support the intended workforce for the construction and operation of the CGO Underground Development Project.

The site is located on the urban fringe of West Wyalong where there is established low density residential development. The site is owned by the West Wyalong LALC. It is vacant land and forms part of a large area of vacant land which has been undeveloped for some time. The site is the same location that once housed the Barrick Gold accommodation village which operated in the early 2000s.

The visual impacts of the proposed accommodation village have been assessed as moderate at one residential receptor and low from all other receptors, given the low number of residential sensitive residential receivers near the site that will have a direct view.

The assessment shows that the visual effects of the village are mitigated mostly by natural means (distance, intervening vegetation and structures) and will be further mitigated by secondary methods, including fencing and landscaping.

These mitigation measures are expected to be effective in shielding neighbouring residences from visual impact and will provide an increasingly pleasing aesthetic for neighbours as landscaping of the site becomes established.

References

EMM 2021, Biodiversity Development Assessment Report: Cowal Gold Operations Accommodation Village, prepared by EMM Consulting Pty Limited for Evolution Mining (Cowal) Pty Limited.

Landscape Institute and Institute of Environmental Management & Assessment 2013, Guidelines for Landscape and Visual Impact Assessment, Third edition.



Appendix J

Soil and Water Management Plan

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Report

SOIL & WATER MANAGEMENT PLAN

Prepared for EVOLUTION MINING

14 April 2021

Calibre Professional Services Pty Ltd
55 070 683 037

Turning Knowledge Into Value

QUALITY ASSURANCE STATEMENT

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DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
A	24/03/2021	Preliminary – For Coordination	CB		CB
B	31/03/2021	For final review	CB		CB
C	06/04/2021	For Development Application	CB		CB
D	15/04/2021	For Development Application	CB		CB

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Appendices

1. Introduction

This Soil and Water Management Plan has been prepared on behalf of Evolution Mining, in support of a submission for a new Development Application to Bland Shire Council for the proposed mining accommodation village located at the corner of Boundary Street and Hyde Street, West Wyalong.

The proposed development involves the construction of permanent and temporary accommodation buildings for mining and construction staff, a central kitchen, dining and administration building, a multi-purpose function space, as well as associated circulation roads, car parks, landscaped courtyards and services infrastructure.

Calibre has been engaged to prepare concept stormwater drainage plans and to report on the proposed stormwater management scheme for the site. This report addresses potential soil and stormwater management issues for the proposed development including:

- Erosion and sediment controls during construction;
- Site stormwater drainage; and
- On-site Stormwater Detention and Retention (OSD / OSR) and stormwater quality controls.

Concept plans for proposed civil works and stormwater drainage have been prepared and are included in Appendix A. This report and the concept plans are provided to demonstrate the intent of the proposed stormwater management system which is subject to further design development and detailing.

2. Site Description

The CGO Accommodation Village is in the eastern side of West Wyalong, NSW, approx. 800m north of the Wyalong train station. It is on the west side of the intersection of Boundary Street and Hyde Street. The real property description of the site is described as part of Lot 7044 in DP115128. It has a total property area of approx. 2.38ha.

The property is bound by Boundary Street to the east, Hyde Street to the north, Hyde Lane and a residential property to the west and a rural residential property to the south. It is currently vacant with sparse vegetation. An existing paved access road loops within the site and connects to Boundary Street. An informal gravel track also runs along the southern boundary connecting from Hyde Lane to Boundary Street.

The natural ground surface levels are relatively flat with levels ranging between RL255.80m to RL253.60m. The site generally falls from South to North with secondary falls from the middle of the site to the East and West. The main vehicular entry and exit is through the existing loop road off Boundary Street.

Figure 1: Locality Map (Image Source: Nearmap)

3. Construction Phase Soil and Water Management

During construction, soil erosion and sedimentation control measures will be installed in all areas disturbed and affected by construction activities to prevent silt and sediment from leaving the construction site. Details of these measures are described below and shown on the erosion and sediment control plans, drawings C1-10 and C1-15 in Appendix A. These plans will be included in the Construction Environmental management Plan (CEMP) for the project.

All construction phase erosion and sediment control measures will be designed and installed in accordance with Bland Shire Council's guidelines. These measures shall be kept in place and maintained in proper working order until their function is no longer required.

Site Disturbance

Surface disturbance shall be minimised and restricted to those areas required for the active stage of works. Surfaces shall be stabilised, paved, grassed or landscaped as soon as practicable.

Site Access for Construction

Construction vehicles can access the site from Boundary Street. Vehicle routes and areas for plant and construction material storage will be designated and marked out. A temporary stabilised shaker grid and washdown facility will be installed for construction vehicles leaving the main development site. Soil adhering to truck wheels will be prevented from leaving the site by the use of a shaker grid. This will be located at the construction exit so that all trucks leaving the site may be inspected and cleaned before leaving the site.

Upstream Runoff Drainage and Diversion

Stormwater runoff from upstream of the construction site will be drained into existing stormwater drains where possible or diverted around the site to reduce erosion. Diversion can be achieved by forming lined channels and embankments along the upstream edge of the site. These will be directed to the nearest downstream drainage points to ensure safe and controlled stormwater discharge.

Earthworks Batters

Temporary earthworks batters in cut and fill will be sloped at a maximum 1 vertical to 1 horizontal slope, unless specified otherwise in the geotechnical report.

Earthworks batters that will remain for extended periods due to staging considerations will be stabilised against erosion by wind and rain. Methods of stabilisation would include top-soiling and grassing, with or without the use of a biodegradable erosion blanket such as jutemesh or Enviromat. This type of blanket would provide protection against erosion until construction commences or vegetation becomes established, thereby minimising maintenance costs.

Perimeter Protection

Until all disturbed surfaces are stabilised, the transport of sediment will be minimised by the installation of sediment fences along all down-slope limit of works. Sediment collected by the fences will be removed regularly to prevent the fence from collapsing.

Site Runoff Treatment

Temporary sediment basin(s) will be constructed at the lowest points of the disturbed site. Stormwater runoff within the site will be directed to temporary sediment basin(s) for collection, treatment, and discharge. This water will typically contain silt and suspended soil particles, which must be removed before discharge from the site. Site runoff will initially be allowed to settle. Settlement of finer particles will be accelerated by the addition of a flocculating agent such as alum. The water will then pass through a filter medium before draining either by gravity or a pump to the nearest public drainage system.

Dust Control

Dust control measures are to be implemented during all periods of earth works, demolition, excavation and construction.

Airborne dust particles are generated in a construction site as a result of construction activity, vehicular and pedestrian traffic movements, or strong wind across bare earth or dusty surfaces. It is ultimately controlled by the completion of construction work, stabilisation of exposed earth surfaces (by paving, landscaping, etc.) and after final site clean-up.

During construction, dust generation can be minimised by applying the following dust control measures:

Bare Earth Surfaces

Bare earth surfaces will be kept damp during construction activity by spraying water from water trucks or hand-held hoses. Water for this purpose will be obtained under licence from street hydrants or from internal water supply.

Nominated site personnel will be assigned the task of monitoring the environmental conditions to determine the frequency of water application. Water is to be applied sufficiently to prevent dust particles becoming airborne but not enough to make the site muddy or to hamper free movement of vehicles.

At the end of each working day in dry conditions, a final application of water will be sprayed over bare earth surfaces to reduce dust transmission during the night.

Constructed Surfaces

Workplace Health and Safety regulations stipulate the regular collection of rubbish from site into skips for disposal to approved waste depots. As part of this operation, construction surfaces will be swept regularly (typically weekly, but as site conditions dictate).

Skips for the collection of rubbish will be located in areas with suitable truck access. If these areas are exposed to the wind, they will be kept covered to prevent dust (and other rubbish) from being picked up and conveyed by wind.

Transported Materials

Materials likely to generate dust will be transported to or from site under cover and dampened to prevent dust from being picked up and transported by wind.

4. Stormwater Drainage

Rainfall Terminology

Throughout this report, several terms are used to describe rainfall statistical data.

Rainfall intensities have been measured and collated by the Bureau of Meteorology over many years in order to determine the statistical relationship between rainfall of a particular intensity and the frequency of its occurrence. The probability that a particular intensity might be exceeded in a storm in any one year is denoted as its Annual Exceedance Probability (AEP). Thus an intensity which has an AEP of 1% has a probability of 0.01 of being exceeded in any one year. This may also be considered as the intensity that might be exceeded on average once every 100 years (the inverse of 0.01). This intensity can thus be termed as the 100-year Average Recurrence Interval (ARI) intensity, and the greatest rate of runoff generated from this rainfall would be termed the Q100 peak runoff.

The absolute worst-case flood risk does not rely on extrapolation of rainfall records, but on the physical capacity to generate rainfall based on climatic considerations. The Probable Maximum Precipitation (PMP) is defined by the Bureau of Meteorology as the greatest depth of rainfall that is physically possible according to meteorological constraints for a given duration for a given size storm area at a particular location at a particular time of year, with no allowance for long-term climatic trends. The most extreme flood generated by any storm duration at a particular site is called the Probable Maximum Flood (PMF).

This report does not consider PMF or PMP rainfall on the site.

General Design Principles

Stormwater drainage for the site will be designed generally in accordance with:

- Bland Shire Council's "West Wyalong Stormwater Management Plan" (2001);
- The Institution of Engineers' "Australian Rainfall and Runoff" (AR&R 2019);
- The relevant Australian Standards; and
- Accepted engineering practice.

It is noted that Council has not yet adopted the latest version of AR&R and their design guide: "West Wyalong Stormwater Management Plan" still refers to the previous version (AR&R 1987). However stormwater drainage for this site shall be designed using the latest version (AR&R 2019) considering that most of the relevant resources, including rainfall data and modelling software, have been updated to suit the latest version of AR&R. Council advised that they will accept designs based on either version as long as the design demonstrates that the post development flows do not exceed the pre-development flows for the site.

Stormwater drainage for the site shall be designed in accordance with the Major / Minor design concepts outlined in AR&R. The "minor" or low-flow elements of the stormwater drainage system shall be designed to convey the 1:20yr ARI storm (5% AEP). The "major" overland flow paths will be designed to convey runoff up to the 1:100yr ARI storm (1% AEP). Building drainage systems including downpipes from the roofs, verandas, pergolas and balconies will be designed to convey the 1% AEP as runoff from these catchments need to be directed into the On-site Stormwater Detention (OSD) systems which are designed to temporarily detain runoff for storms up to 1% AEP.

Flood Affectation

Council is currently carrying out a comprehensive flood study for West Wyalong. A flood map for the 1% AEP storm was obtained from Council's website and is shown below (see Fig. 2). It is noted that the extent and depth of flooding shown on this map is based on preliminary results only and should not be relied upon as being accurate. It is understood from inquiries to Council that they are still in the process of reviewing the preliminary results and are not prepared to share the model or any data contained within at this time. Council is unable to provide a timeframe on how long it would take for the final flood study to be adopted. According to Council's website, the flood study is currently going through community consultation which is only the second stage of a five-stage process.

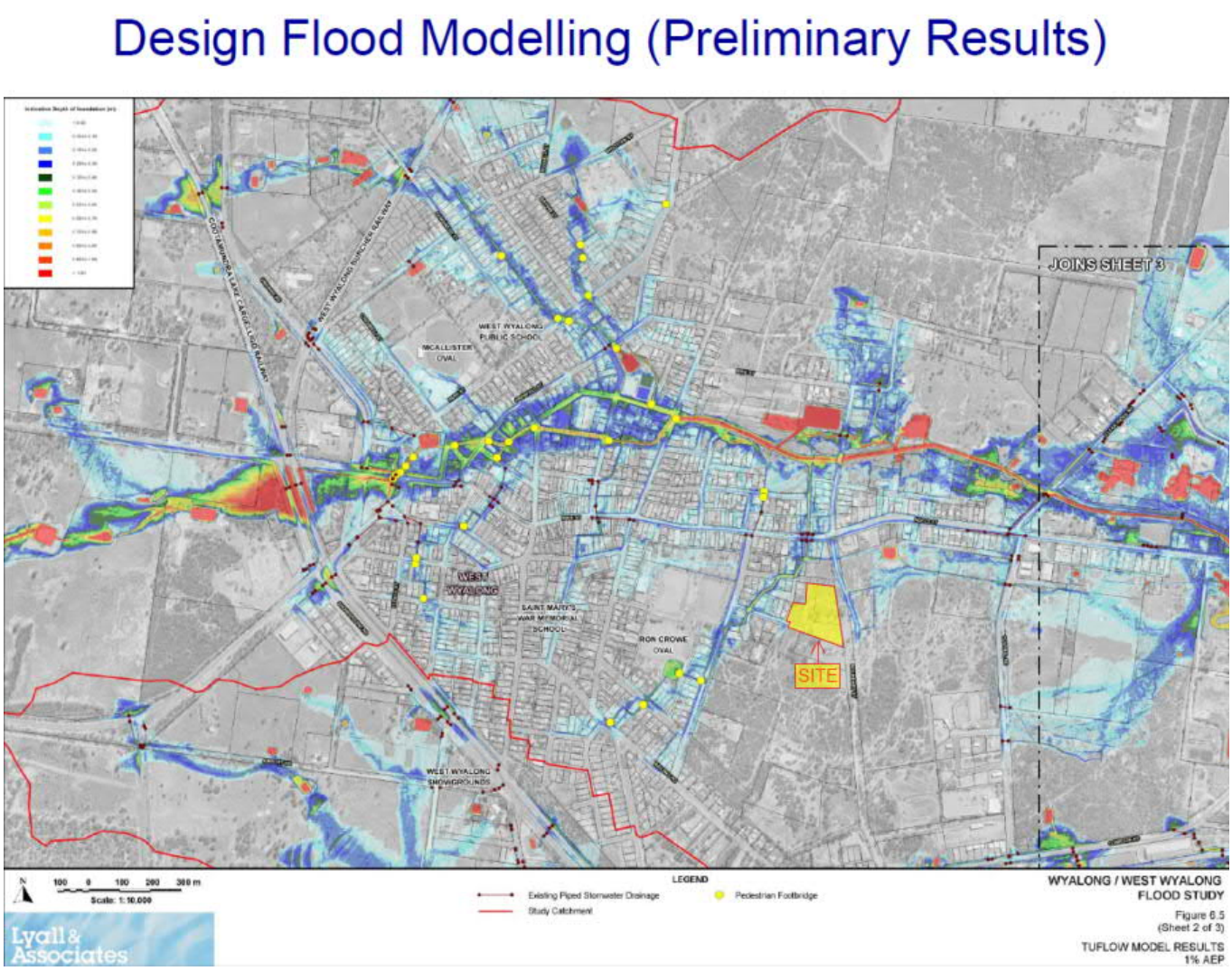


Figure 2: 1% AEP Flood Map

Image Source: Bland Shire Council

The flood map shows floodwaters extending southwards along Boundary Street and Hyde Lane up to the site's southern boundary. The map indicates flooding in front of the site reaching roughly 300mm deep but does not show any encroachment into the site.

In the absence of more accurate information and considering that flooding is expected on at least two of the main street frontages, we recommend to assume that the site may be flood affected and that the design should incorporate flood protection measures for all habitable floors as well as critical plant and equipment. Flood reference levels should be based on a flood water surface level 300mm above the existing Council road gutter levels.

Based on commonly accepted practice and services authority requirements, the following freeboard and flood protection measures should be applied.

Table 1: Flood Protection Measures

Structure	Freeboard Above Flood Water Surface
Habitable floors	300mm
Electrical transformer	600mm
Electrical switchboards	300mm
Hydrant pumps	300mm
Loop road	Overland flows max. 150mm deep

The proposed development is not expected to cause any significant adverse flood impact to the surrounding properties. The development is designed to maintain the existing surface levels and catchment flow regimes. On-site Stormwater Detention shall be provided and permeable pavements will be used to maintain or reduce peak runoff from the site to pre-development levels. Most of the proposed structures are also designed to be raised above ground, minimising any reduction in flood storage.

Existing Site Drainage

As described in Section 2, the site generally falls from South to North with secondary falls from the middle of the site to the East and West. Runoff from the site drains to all three roads surrounding the site.

Council advised during initial inquiries that there are no piped drainage networks servicing the area around the site. Further site investigations and the detail survey found limited drainage infrastructure in the form of kerb and gutters along both sides of Boundary Street and Hyde Street and an informal swale along the western side of Hyde Lane. Dish crossings were found across the intersections between Boundary St and the loop road, allowing flows to continue along the gutters. These gutters drain into a shallow open pit and pipe culvert that crosses Boundary Street to the north and south of the loop road discharging into bushland to the east of Boundary Street.

Proposed Site Stormwater Drainage Concept

The open pit and pipe culvert mentioned above are too shallow to drain an underground pipe drainage system. Considering this, it is proposed to drain all roofs into above ground detention and retention tanks which drains and overflows into vegetated gravel lined swales. These swales will then drain into collection swales and basins with flow spreaders and dissipaters before draining out of the site as either sheet flow or distributed pipe connections into the nearest road gutter or swale. If required, the collection wales and basins can be designed to act as bio-retention systems.

The current catchment flow regimes will be maintained by maintaining the current surface falls and avoiding any re-direction of flows from one catchment into another and to ensure that discharge from each catchment do not exceed pre-development conditions.

Stormwater drainage concept plans are enclosed in Appendix A. Detailed building and roof drainage and all connections into the detention and rainwater tanks will be designed by the building hydraulic engineer. Detailed design drawings of the building hydraulics will be made available during submission of documents for Construction Certificate approval.

On-site Stormwater Detention

In an email from Council's Lesley Duncan, dated 24/02/2021, Council advised that:

> *"All we require is that the current natural water flow from the site is not be exceeded, if to do this they need to place a detention/retention system then it is to be designed to current accepted standards and submitted Council for approval."*

The proposed development involves new buildings with associated courtyards, landscaping, footpaths and access roads. These works are expected to increase site runoff compared to the current site conditions. OSD and OSR will therefore be required to reduce the peak runoff from the site down to pre-development levels. However, considering that drainage from the site discharges into shallow gutters and swales, the development will have to use above ground OSD tanks. This means that only roof catchments can be drained into the tanks. Prefabricated plastic or metal tanks will be used for both stormwater detention and retention.

Each permanent accommodation unit and the multi-purpose building will be installed with detention tanks. The main kitchen, dining and administration building will be provided with both detention and retention tanks. Detention or retention is not proposed for the temporary accommodation units as these are only expected to be in place for a three year period only.

The site has been split into four main catchments. Catchments 1, 2 and 3 contain permanent accommodation units and the common facilities buildings. Each of these catchments will have a separate OSD system. Catchment 4 covers the temporary accommodation area and is not proposed to have a detention system as mentioned above.

Each OSD system has been designed to attenuate flows from the 20% to 1% AEP storms to below the pre-development conditions in accordance with Council's requirements. This is achieved by modelling the OSD system using the DRAINS software to determine the volume of stormwater to be stored and the peak flows discharging from the site. Since the tanks are all above ground, each OSD system is designed to freely discharge into the gravel lined swales with no backwater effect from tailwater downstream.

As shown in the DRAINS input data and modelling results enclosed in appendix B, each catchment was designed with its own OSD system to allow individual catchment analysis and ensure that the existing catchment flow regimes are maintained. The OSD storage calculated for each catchment is then split into smaller tanks spread across every building within each catchment as it is not feasible to provide a single central tank with piped drainage to pick up each building. Similarly, the permissible site discharge will also be divided accordingly to each tank but with the total discharge from each catchment still maintained at or below the predevelopment levels.

Below is a summary of flows and OSD volumes for each catchment. A copy of the site catchment plan, C4-60 is enclosed in Appendix A.

Table 2: Catchment 1

Catchment area = 0.53ha

Total volume required = 18.1m^3

Total volume provided = 20.0m^3

10 x 2,000L tanks (1x tank for each accommodation / laundry unit)

Storm Events (AEP)	Pre-development Flows (m^3/s)	OSD Discharge (m^3/s)	Flows Bypassing OSD (m^3/s)	Post Development Flows = OSD Discharge + Bypass (m^3/s)
1%	0.172	0.051	0.121	0.172
2%	0.147	0.045	0.099	0.144
5%	0.115	0.038	0.078	0.116
20%	0.051	0.015	0.036	0.051

Table 3: Catchment 2

Catchment area = 0.52ha

Total volume required = 21.4m^3

Total volume provided = 23.0m^3

3 x 5,000L tanks (eastern roof and bus shelter), 1 x 8,000L tank (western roof)

Storm Events (AEP)	Pre-development Flows (m^3/s)	OSD Discharge (m^3/s)	Flows Bypassing OSD (m^3/s)	Post Development Flows = OSD Discharge + Bypass (m^3/s)
1%	0.176	0.057	0.119	0.176
2%	0.148	0.048	0.1	0.148
5%	0.119	0.041	0.078	0.119
20%	0.057	0.013	0.044	0.057

Table 4: Catchment 3

Catchment area = 0.40ha

Total volume required = 6.2m^3

Total volume provided = 12.0m^3

6 x 2,000L tanks (1x tank for each accommodation / laundry unit)

Storm Events (AEP)	Pre-development Flows (m^3/s)	OSD Discharge (m^3/s)	Flows Bypassing OSD (m^3/s)	Post Development Flows = OSD Discharge + Bypass (m^3/s)
1%	0.129	0.032	0.097	0.128
2%	0.110	0.028	0.079	0.107
5%	0.086	0.025	0.062	0.087
20%	0.038	0.012	0.026	0.038

Table 5: Catchment 4

Catchment area = 0.925ha

Total volume required = N/A (temporary accommodation site)

Total volume provided = N/A (temporary accommodation site)

Storm Events (AEP)	Pre-development Flows (m^3/s)	OSD Discharge (m^3/s)	Flows Bypassing OSD (m^3/s)	Post Development Flows = OSD Discharge + Bypass (m^3/s)
1%	0.307	-	0.323*	0.323*
2%	0.263	-	0.272*	0.272*
5%	0.210	-	0.213*	0.213*
20%	0.096	-	0.123*	0.123*

* Post development flows will only exceed pre-development flows for the duration of the construction period. An OSD system for Catchment 4 shall be provided as part of any future permanent redevelopment of the catchment, if required.

5. Residual Impacts

The following table, prepared by EMM Consulting, is a summary of the potential surface water impacts, assessed using the risk framework presented in Appendix C, is presented in Table 6. The mitigated risk level is reduced to low for all potential impacts by the application of the proposed mitigation measures during construction and operational phases.

Table 6: Summary of Residual Impacts

Potential impact	Unmitigated risk			Mitigation measures	Mitigated risk		
	Likelihood	Significance	Risk		Likelihood	Significance	Risk
Erosion of disturbed surfaces and sedimentation of downstream receiving waterways	Likely	Minor	Medium	Appropriate erosion and sediment control measures	Unlikely	Minor	Low
Reduction in permeability of the site, leading to increased peak flow rates	Likely	Moderate	Significant	Onsite detention tanks to attenuate peak runoff rates to pre-development conditions	Rare	Minor	Low
Shallow overland flooding on site	Possible	Moderate	Significant	Flood protection measures incorporated into design	Rare	Moderate	Low
Elevated pollutant loads in stormwater runoff	Likely	Moderate	Significant	Stormwater quality improvement measures	Rare	Moderate	Low

6. Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design aims to minimise the impact of urbanisation on the environment and ecology around and downstream of developments. Its main objectives are to reduce demands on potable water, reduce stormwater runoff volume and peak flows whilst improving its quality and maximising re-use before it leaves the site.

Council's Stormwater Management Plan refers to the ANZECC water quality guidelines for stormwater quality requirements. However, the ANZECC guidelines relate to water quality improvements for natural and semi-natural water bodies and are not applicable for this development.

The lack of inground piped drainage system as well as latent site conditions and development constraints limits the type of WSUD measures that would be suitable for this site. However, it is proposed that WSUD measures be incorporated wherever possible. These initiatives are in addition to other Environmentally Sustainable Design (ESD) initiatives that are being investigated as part of the proposed development.

WSUD initiatives being implemented include:

Peak Runoff Reduction

As mentioned in the previous section, an OSD system will be provided to restrict the flow of stormwater runoff from the site to a manageable level.

Roofwater Harvesting and Re-use

As previously mentioned, rainwater tanks will be provided for the main kitchen, dining and administration building to collect runoff from the roof for irrigation of landscaped areas and reduce consumption of reticulated potable water. Overflows from the rainwater tank will drain into the OSD tank.

Stormwater Quality Improvement

The following stormwater quality improvement measures will be incorporated into the stormwater drainage system to capture pollutants prior to stormwater discharge into the Council drainage system.

- Primary stormwater treatment via first flush devices on roof gutters and rainwater tanks to capture gross pollutants, silt and sediment as well as sediment bound nutrients from roofs such as Nitrogen and Phosphorus. Each OSD and rainwater re-use tank will be fitted with a first flush device.
- Secondary stormwater treatment through the use of vegetated gravel swales to trap litter, gross pollutants, silt and sediment. These swales are used as the primary means of conveying stormwater runoff through the site.
- If required, tertiary stormwater treatment through bio-retention systems can be provided at those locations currently set aside for collection swales and basins. These are capable of screening gross pollutants, silt and sediments, as well as capturing and breaking down nutrients and hydrocarbons. More than 2% of the total site area has been allocated as potential locations for tertiary bio-retention swales and basins.

Potable Water Use Reduction

Potable water usage will be reduced through the use of water saving taps, showers and plumbing fixtures as well as installation of rainwater tanks for rainwater re-use.

7. Summary

This report addresses the issues relating to soil and water management for the proposed development as detailed in the introduction. These are summarised as follows.

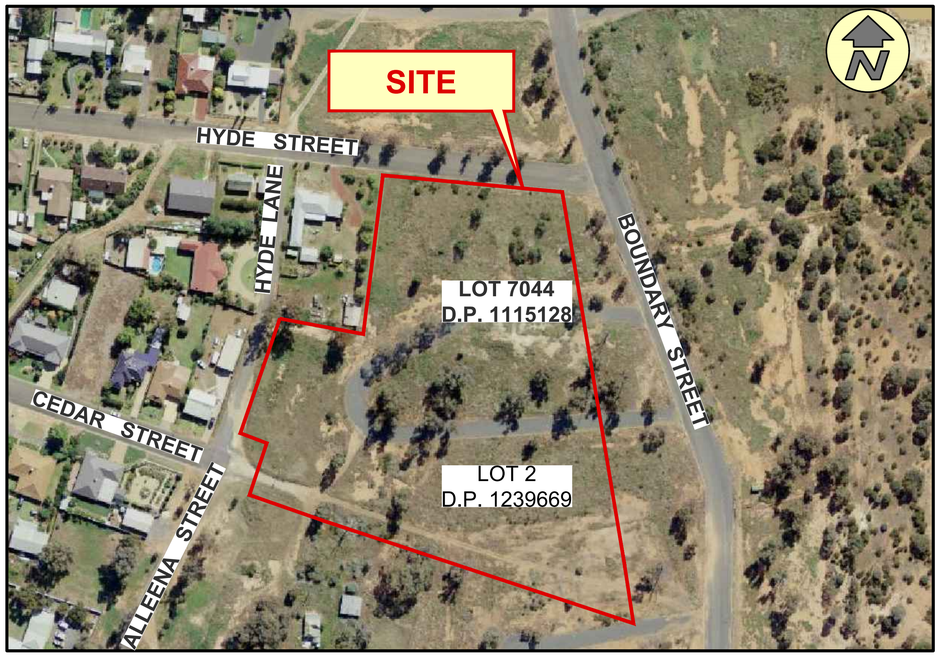
1) Soil erosion, sedimentation and dust controls will be implemented during construction in accordance with Bland Shire Council's guidelines.
2) The concept stormwater drainage for the proposed development is presented in the civil engineering drawings enclosed in Appendix A. It is proposed to drain the site through a network of vegetated gravel lined swales which drain into collection swales and basins with flow spreaders and dissipaters before draining to the nearest Council gutter and swale drains. It incorporates OSD and rainwater harvesting systems to store and reduce the site's runoff discharging into Council's stormwater drainage system in accordance with Council's requirements.
3) The site uses above ground pre-fabricated tanks as OSD systems. Each main catchment, except for the temporary accommodation area, has been provided a separate OSD system with the required storage volume and allowable discharge distributed across the main buildings within each catchment. The OSD systems have been sized to compensate for flows on the ground that are bypassing the OSD tanks. This is to ensure that the peak discharge from each catchment does not exceed the respective pre-development flows.
4) Stormwater quality treatment measures for the development include the provision of first flush devices, rainwater tanks, vegetated gravel lined swales and, if required, bio-retention swales and basins. These treatment measures are designed to trap gross pollutants, silts and sediments as well as hydrocarbons and nutrients.

Appendix A Civil Engineering Concept Plans

CGO ACCOMMODATION VILLAGE

WEST WYALONG N.S.W.

FOR DEVELOPMENT APPROVAL



LOCALITY PLAN
NTS

DRAWING LIST	
SHEET No.	SHEET TITLE
C0-00	COVER SHEET, LOCALITY PLAN AND DRAWING LIST
C0-01	GENERAL NOTES AND LEGEND
C1-00	SERVICES COORDINATION PLAN
C1-10	EROSION AND SEDIMENT CONTROL PLAN
C1-15	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
C2-01	GENERAL ARRANGEMENT PLAN (SHEET 1 OF 2)
C2-02	GENERAL ARRANGEMENT PLAN (SHEET 2 OF 2)
C2-50	VEHICLE TURING PATH ANALYSIS PLAN (SHEET 1 OF 2)
C2-51	VEHICLE TURING PATH ANALYSIS PLAN (SHEET 2 OF 2)
C3-01	PAVEMENT PLAN
C3-10	TYPICAL ROAD SECTIONS
C3-80	CIVIL WORKS DETAILS (SHEET 1 OF 2)
C3-81	CIVIL WORKS DETAILS (SHEET 2 OF 2)
C4-30	OSD TANK DETAILS
C4-60	STORMWATER CATCHMENT PLAN

LGA BLAND SHIRE COUNCIL

LOT 7044 D.P. 1115128

& LOT 2 D.P. 1239669

CLIENT: EVOLUTION MINING

	FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
		EO	NP	CB	CB	12/03/21	
AMENDMENTS	A	EO	BY	CB	CB	22/03/21	ISSUED FOR DEVELOPMENT APPROVAL
	B	EO	BY	CB	CB	31/03/21	ISSUED FOR REVIEW
	C		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE:

CLIENT: Evolution MINING

PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

DISCLAIMER
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.
NOT FOR CONSTRUCTION UNLESS STAMPED BY CERTIFYING AUTHORITY

DRAWING TITLE: COVER SHEET, SHEET LIST AND LOCALITY PLAN

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C0-00		C

FILE: \\STUMAS01\PROJECTS\21\050\03 CGO ACCOMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C0\C0.00.DWG LAST SAVED BY:MONA.ZAHABI PLOTTED: 15-Apr-21

GENERAL NOTES:

1. ALL WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS AND WORK SPECIFICATIONS.
2. ALL WORK WITHIN THE PUBLIC DOMAIN SHALL BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S STANDARDS AND SPECIFICATIONS, DETAILS SHOWN ON THE CONSTRUCTION DRAWINGS, AND TO THE REQUIREMENTS OF COUNCIL'S ENGINEER.
3. ALL LEVELS SHALL BE TAKEN FROM ESTABLISHED BENCH MARKS.
4. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE CONSTRUCTION DRAWINGS.
5. ANY DISCREPANCIES OR OMISSIONS WITH OTHER CONSULTANT'S DRAWINGS SHALL BE REFERRED TO THE SUPERINTENDENT FOR A DECISION BEFORE PROCEEDING WITH THE WORK.
6. VEHICULAR ACCESS AND SERVICES TO ADJOINING PROPERTIES TO BE MAINTAINED AT ALL TIMES.
7. WRITTEN PERMISSION SHALL BE OBTAINED FROM ADJOINING OWNERS PRIOR TO COMMENCEMENT OF ANY RELEVANT CONSTRUCTION AFFECTING ADJOINING LANDS.
8. THE CONTRACTOR SHALL TAKE ALL DUE CARE THAT ONLY THE ABSOLUTE MINIMUM OF AREA FOR CONSTRUCTION IS USED AND THAT NO UNDUE DAMAGE IS DONE TO THE EXISTING VEGETATION.
9. NO WORK TO BE CARRIED OUT IN SUNDAYS.
10. ALL RUBBISH, TEMPORARY OFFICES, SHEDS AND FENCES TO BE REMOVED AT THE COMPLETION OF ALL CONSTRUCTION ACTIVITY AND PRIOR TO SITE HANDOVER.

SURVEY INFORMATION:

ORIGIN OF LEVELS: PM 44456
E 519573.22 N 6245897.439
(GDA 2020, ZONE 56)
DATUM OF LEVELS: PM 44456
RL 255.496 (AHD)
SURVEY PREPARED BY: MONTEATH & POWYS PTY LTD

1. CALIBRE WILL NOT ACCEPT ANY LIABILITY FOR ANY INACCURACIES IN THE SURVEY INFORMATION SHOWN IN THE DRAWINGS FROM ANY CAUSE WHATSOEVER.
2. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT CALIBRE. THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM THE ORIGINAL SURVEY DOCUMENTS.

EXISTING SERVICES NOTES:

1. CALIBRE DOES NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THIS DRAWING SHOWS MORE THAN THE PRESENCE OR ABSENCE OF SERVICES, AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION FROM ANY CAUSE WHATSOEVER.
2. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM INFORMATION PROVIDED BY SERVICE AUTHORITIES AND THE SURVEYOR. THIS INFORMATION HAS BEEN PREPARED SOLELY FOR THE AUTHORITIES OWN USE AND MAY NOT NECESSARILY BE UPDATED OR ACCURATE.
3. THE POSITION OF SERVICES AS RECORDED BY THE AUTHORITY AT THE TIME OF INSTALLATION MAY NOT REFLECT CHANGES IN THE PHYSICAL ENVIRONMENT SUBSEQUENT TO INSTALLATION.
4. THE CONTRACTOR MUST CONFIRM THE EXACT LOCATION AND EXTENT OF SERVICES PRIOR TO CONSTRUCTION AND NOTIFY ANY CONFLICT WITH THE DRAWINGS IMMEDIATELY TO THE ENGINEER/SUPERINTENDENT.
5. ALL EXISTING SERVICES PITS, ENCLOSURES AND CONDUITS SHALL BE RELOCATED AND/OR ADJUSTED AS NECESSARY TO THE REQUIREMENTS OF THE RELEVANT AUTHORITY.
6. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA, AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.
7. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
8. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE. CONTRACTOR TO GAIN APPROVAL OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
9. THE CONTRACTOR SHALL TAKE ALL REASONABLE CARE TO PROTECT EXISTING SERVICES. DAMAGED SERVICES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

STORMWATER NOTES:

1. ALL EXPOSED SURFACES TO BE GRADED TOWARDS DRAINAGE INLETS AT MIN. 1.0% FALL (U.N.O).
2. ALL DRAINAGE PIPES UP TO AND INCLUDING 250 DIA. SHALL BE SEWER GRADE uPVC WITH RUBBER RING JOINTS LAID AT MINIMUM 1.0% GRADE (U.N.O.).
3. ALL COVER TO STORMWATER PIPES TO BE MIN. 300mm UNDER NON-TRAFFICABLE AREAS AND 600mm UNDER AREAS SUBJECT TO VEHICULAR LOADING (U.N.O).
4. ALL PIPE ENLARGERS, CONNECTIONS, JUNCTIONS AND ADAPTORS ARE TO BE MANUFACTURED FITTINGS. IN-SITU FITTINGS AND ADAPTORS ARE NOT ACCEPTABLE WITHOUT CIVIL ENGINEER'S APPROVAL.
5. ALL DOWN PIPE CONNECTIONS TO BE MINIMUM 150Ø.
6. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL. (GRADES SHOWN ARE ONLY NOMINAL).
7. ADEQUATE PROVISIONS TO BE MADE TO PREVENT SCOURING AND SEDIMENTATION TO SOFT-LINED STORMWATER DRAINAGE ELEMENTS AND AT DRAINAGE OUTLETS.

TREES NOTES:

1. ALL TREE PROTECTION REQUIREMENTS AS OUTLINED IN THE DA.
2. A TREE RETENTION PLAN AS PER THE THE DA IS TO BE KEPT ON SITE INDICATING TREES TO BE RETAINED AND AREAS LEFT UNDISTURBED, THAT ARE TO BE CORDONED OFF FROM CONSTRUCTION WORKS.
3. PRIOR TO WORK COMMENCING, TREE PROTECTION FENCING MUST BE ERECTED AROUND THE TREES THAT ARE TO BE RETAINED AT A 3m SETBACK. THE TREE FENCING MUST BE CONSTRUCTED OF 1.8m CYCLONE CHAINMESH FENCE. THE TREE PROTECTION FENCING MUST BE MAINTAINED IN GOOD WORKING ORDER UNTIL THE COMPLETION OF ALL BUILDING OR DEVELOPMENT WORKS. A STATEMENT OF COMPLIANCE FROM A QUALIFIED TREE SURGEON OR ENVIRONMENTAL CONSULTANT SHALL BE SUBMITTED TO COUNCIL PRIOR TO THE ISSUE OF THE CONSTRUCTION CERTIFICATE. PENALTIES APPLY FOR NON-COMPLIANCE.
4. TO PREVENT DAMAGE TO TREE ROOTS, EXCAVATION (FOR SERVICES AND OTHER WORKS), CHANGE OF SOIL LEVEL (CUT OR FILL), PARKING (VEHICLES OR PLANT), OR PLACEMENT OF BUILDING MATERIALS (INCLUDING DISPOSAL OF CEMENT SLURRY AND WASTE WATER) WITHIN THE SPECIFIED TREE PROTECTION ZONE SETBACKS, AND WITHIN 3m OF ALL OTHER TREES TO BE RETAINED ON SITE, IS STRICTLY FORBIDDEN. NO TREE ROOTS LOCATED WITHIN THE SPECIFIED TREE SETBACKS SHALL BE SEVERED OR INJURED IN THE PROCESS OF ANY SITE WORKS DURING THE CONSTRUCTION OR LANDSCAPING PHASES OF THE APPROVED PROJECT. THE APPLICANT SHALL ENSURE THAT ALL UNDERGROUND SERVICES (I.E. WATER, DRAINAGE, GAS AND SEWER) SHALL NOT BE LAID WITHIN 3m OF ANY TREE LOCATED ON THE PROPERTY PROTECTED UNDER COUNCIL'S TREE PRESERVATION ORDER OR LISTED FOR PROTECTION IN THE APPROVED PROJECT BCMP.

EARTHWORKS NOTES:

1. REFER TO THE GEOTECHNICAL INVESTIGATION REPORT "PROPOSED RESIDENTIAL DEVELOPMENT - 141 DARKES ROAD, KEMBLA GRANGE", PREPARED BY SMEC.
2. STRIP SITE OF ALL TOPSOIL, VEGETATION AND DELETERIOUS MATTER TO A MINIMUM DEPTH OF 100-150mm (U.N.O.).
3. PROOF ROLL SUBGRADE TO REVEAL SOFT SPOTS. SOFT SPOTS TO BE REMOVED AND BACKFILLED.
4. MATERIAL WON FROM THE SITE TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER FOR APPROVAL PRIOR TO USE AS FILL. ANY IMPORTED FILL TO HAVE A MINIMUM CBR VALUE OF 15%. SELECTED EARTH FILL SHALL BE APPROVED EXCAVATED SITE MATERIAL HAVING A MAXIMUM PARTICLE SIZE OF 75mm AND PLACED IN 200mm THICK LAYERS (LOOSE) AND COMPACTED TO ACHIEVE A MINIMUM OF 98% STANDARD MAXIMUM DRY DENSITY AT AN OPTIMUM MOISTURE CONTENT OF ±2% IN ACCORDANCE WITH AS.1289.5.1.1. EXCEPT FOR THE UPPER 500mm WITH SHOULD BE COMPACTED TO A MINIMUM 100% STANDARD MAXIMUM DRY DENSITY.
5. TEST CERTIFICATES ON THE FILL MATERIAL SHALL BE SUPPLIED TO THE SUPERINTENDENT FOR APPROVAL PRIOR TO THE USE OF THE FILL MATERIAL.
6. POSSIBLE CONTAMINATION OF THIS SITE HAS NOT BEEN INVESTIGATED. SUSPECT SOILS EXPOSED DURING EXCAVATION AND GROUND WORKS SHALL BE REPORTED TO THE SUPERINTENDENT.
7. GENERALLY ALL EARTHWORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE GUIDELINES FOR EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS AS SET OUT IN AS3798(2007).
8. SITE PREPARATION WORKS AND ALL FILLING WORKS IS TO BE UNDER LEVEL 2 CONDITIONS IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S REPORTS AND AS3798(2007).
9. THE CONTRACTOR SHALL PROGRAMME THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT THEIR COST.
10. EARTHWORKS SHALL INCLUDE THE EXCAVATION, PLACING AND COMPACTION OF CUT MATERIALS TO THE LEVELS AND PROFILES AS DETAILED ON THE BULK EARTHWORKS PLAN. EXCESS SPOIL IS TO BE MANAGED AS DIRECTED BY THE SUPERINTENDENT. BATTERS SHALL CONTINUE IN REGULAR LINES AROUND CURVES.
11. WHERE BATTERS ARE NOT DETAILED ON PLANS AND SECTION, AN EVEN GRADE BETWEEN NOMINATED LEVELS WILL APPLY. THE MAXIMUM UNSUPPORTED BATTER SHALL BE 1V:3H UNLESS NOTED OTHERWISE.
12. BATTERS SHALL BE FREE OF LOOSE MATERIAL AND SHALL BE NEATLY TRIMMED AND ROLLED TO SEAL THE SURFACE (PRIOR TO REVEGETATION AS REQUIRED IN ACCORDANCE WITH SITE VMP).
13. FILL BATTERS TO BE CONSTRUCTED BY OVER PLACEMENT OF ENGINEERED FILL AND TRIMMING BACK TO THE FINAL PROFILE.
14. EXCAVATED MATERIAL NOT MEETING THE SPECIFICATION FOR FILL MATERIAL AND CLASSIFIED AS UNSUITABLE SHALL BE DISPOSED OF IN AN APPROPRIATE MANNER AND AS DIRECTED BY THE SUPERINTENDENT.
15. ALL EXCAVATED MATERIAL REMOVED FORM THE SITE MUST BE CLASSIFIED IN ACCORDANCE WITH NSW DECC (2008) ENVIRONMENTAL GUIDELINES: ASSESSMENT, CLASSIFICATION AND MANAGEMENT OF LIQUID AND NON-LIQUID WASTES PRIOR TO DISPOSAL. ALL EXCAVATED MATERIAL MUST BE DISPOSED OF TO AN APPROVED WASTE MANAGEMENT FACILITY.
16. STRIPPED PAVEMENT SUB-GRADES MUST BE PROOF ROLLED (PRIOR TO ADDITION OF SUITABLE FILL) BY A MINIMUM 12 TONNE MASS SMOOTH DRUM ROLLER WITHOUT VIBRATION UNDER THE SUPERVISION OF THE GEOTECHNICAL TESTING AUTHORITY (GTA) AND/OR SITE ENGINEER.
17. TOPSOIL WHERE PLACED OR REQUIRED IS TO HAVE A MAXIMUM THICKNESS OF 300mm AND SHALL BE LIGHTLY ROLLED TO ACHIEVE A 'NATURAL IN-SITU' COMPACTION TO PREVENT EROSION BUT TO ACHIEVE THE REQUIRED GRADES AS SPECIFIED ON THE DESIGN DRAWINGS.
18. SURFACE RUNOFF AND SCOUR MUST BE CONTROLLED AND THE SURFACE BETWEEN LAYERS GRADED WITH A 1% MINIMUM FREE DRAINING SLOPE.
19. DURING CLEARING AND EXCAVATION FOR SLABS AND FOOTINGS CUT OUT SOFT SPOTS AND FILL AS ABOVE AND AS DIRECTED BY THE GTA.

CONCRETE NOTES:

GENERAL

1. CONCRETE WORK SHALL BE IN ACCORDANCE WITH AS3600 AND WITH THE PROJECT SPECIFICATIONS.
2. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN ON DRAWINGS OR SPECIFICALLY APPROVED BY THE ENGINEER.
3. ALL THICKNESSES SHOWN ARE MINIMUM STRUCTURAL REQUIREMENTS, NO REDUCTION IN THICKNESS DUE TO FALLS OR TOPPING IS PERMITTED. REFER CIVIL DRAWINGS FOR ALL SLAB FALLS AND CONFIRMATION OF SLAB STEPS.
4. THE FACE OF ALL CONCRETE AGAINST WHICH NEW CONCRETE IS TO BE CAST IS TO BE MATCHING EXISTING SURFACE.
5. CONDUITS GREATER THAN 25mm DIAMETER CAST INTO CONCRETE MEMBERS SHALL BE SPACED AT A MAXIMUM DISTANCE POSSIBLE AND UNDER NO CIRCUMSTANCES CLOSER THAN A CLEAR SPACING OF TWICE THE LARGER CONDUIT DIAMETER FROM PARALLEL REINFORCEMENT OR ANY OTHER CONDUIT.

CONCRETE

1. THE CHARACTERISTIC COMPRESSIVE STRENGTH (f'c) AT 28 DAYS OF IN PLACE CONCRETE SHALL BE AS NOTED ON THE DRAWINGS.
2. ALL UNFORMED SURFACES SHALL HAVE A STEEL TROWEL FINISH
3. MAXIMUM AGGREGATE SIZE.....20mm
4. CONCRETE SLUMP SHALL BE:

   (*) 80mm plus/minus 15mm FOR ALL CONCRETE EXCEPT WHERE OTHERWISE NOTED.

   (*) AS ADVISED BY STRUCTURAL ENGINEER
5. ALL CONCRETE SHALL BE VIBRATED.
6. ALL CONCRETE SHALL BE CURED IN ACCORDANCE WITH THE SPECIFICATION.
7. ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1012 AND THE PROJECT SPECIFICATION.
8. ALL FORM WORK SHALL COMPLY WITH AS3610

REINFORCEMENT

1. REINFORCEMENT IS TO BE MANUFACTURED IN ACCORDANCE WITH AS4671 AND SHALL BE FIXED AS SHOWN ON DRAWINGS.
2. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS.3600 AND OTHER RELEVANT CODES.
3. THE BAR SIZE IS INDICATED BY A NUMBER AFTER THE SYMBOL, WHICH INDICATES THE BAR DIAMETER IN MILLIMETRES.
4. REINFORCEMENT SPACING NOMINATED ON DRAWINGS IS TO ASSIST SCHEDULER AND STEEL FIXER TO ASSESS TOTAL NUMBER OF BARS REQUIRED. WHERE BARS PLACED IN ACCORDANCE WITH SPACING NOMINATED FOUL WITH OTHER STRUCTURAL REQUIREMENTS, PREFERENCE IS TO BE GIVEN TO RELOCATING BARS BY LOCALLY ADJUSTING SPACING TO ENABLE ASSEMBLY OF REINFORCEMENT TO BE COMPLETED. ENGINEER IS TO BE CONTACTED IN THE EVENT THAT REINFORCEMENT IS NEEDED TO BE CUT ON SITE PRIOR TO CONTINUING.
5. LAP LENGTHS TO REINFORCEMENT BARS TO BE AS NOTED ON THE RELEVANT DRAWINGS.
6. WELDING OF REINFORCEMENT BARS IS NOT PERMITTED UNLESS APPROVED BY DESIGN ENGINEER.
7. COVER SHALL BE AS NOTED ON THE RELEVANT DRAWINGS.
8. LAPPED SPLICE FOR FABRIC SHALL BE MADE SO THAT THE TWO OUTER MOST TRANSVERSE WIRES OF ONE SHEET OF FABRIC OVERLAP THE TWO OUTER MOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED.
9. CONCRETE COVERS NOTED ARE MEASURED FROM THE FORM WORK OR GROUND FACE TO THE OUTERMOST REINFORCEMENT COMPONENT.
10. COVER TO BE MAINTAINED DURING POURING BY THE USE OF PLASTIC CHAIRS OR PLASTIC TIPPED METAL CHAIRS.
11. WHERE NO REINFORCEMENT IS SHOWN ON THE DRAWING AT RIGHT ANGLES TO THE MAIN REINFORCEMENT DISTRIBUTION REINFORCEMENT IS TO BE PROVIDED.

GENERAL LEGEND:

SITE BOUNDARY
PROPOSED SURFACE LEVEL — P12.55
DOWNPIPE — DP SW SW
TANK OVERFLOW — OF SW SW
KERB ONLY — KO
KERB & GUTTER — K&G
TIMBER SLEEPER KERB — TS
PROPOSED 2,000L TANK
PROPOSED 5,000L TANK
PROPOSED 8,000L TANK
PROPOSED STORMWATER LINE — SW SW
PROPOSED SWALE — >
PROPOSED WATER — W W
PROPOSED SEWER — S S

EXISTING SERVICES LEGEND:

EXISTING SEWER — eS
EXISTING TELECOM — eT
EXISTING GAS — eG
EXISTING WATER — eW
EXISTING OVERHEAD / ELECTRICITY — E/OH

DIAL 1100 BEFORE YOU DIG

WARNING!

EXISTING SERVICES ON THESE PLANS ARE NOT GUARANTEED COMPLETE OR CORRECT. SERVICES ARE TO BE PHYSICALLY LOCATED ONSITE BY THE CONTRACTOR AND VERIFIED BY THE SERVICE AUTHORITY'S REPRESENTATIVE PRIOR TO CONSTRUCTION.

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
	EO	NP	CB	CB	12/03/21	
A		BY	CB		22/03/21	ISSUED FOR DEVELOPMENT APPROVAL
B		BY	CB		31/03/21	ISSUED FOR REVIEW
C		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION
D		MZ	CB		15/04/21	FOR DEVELOPMENT APPLICATION

AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE

CLIENT: Evolution MINING

PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

DISCLAIMER
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE.
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DRAWING TITLE: GENERAL NOTES AND LEGEND

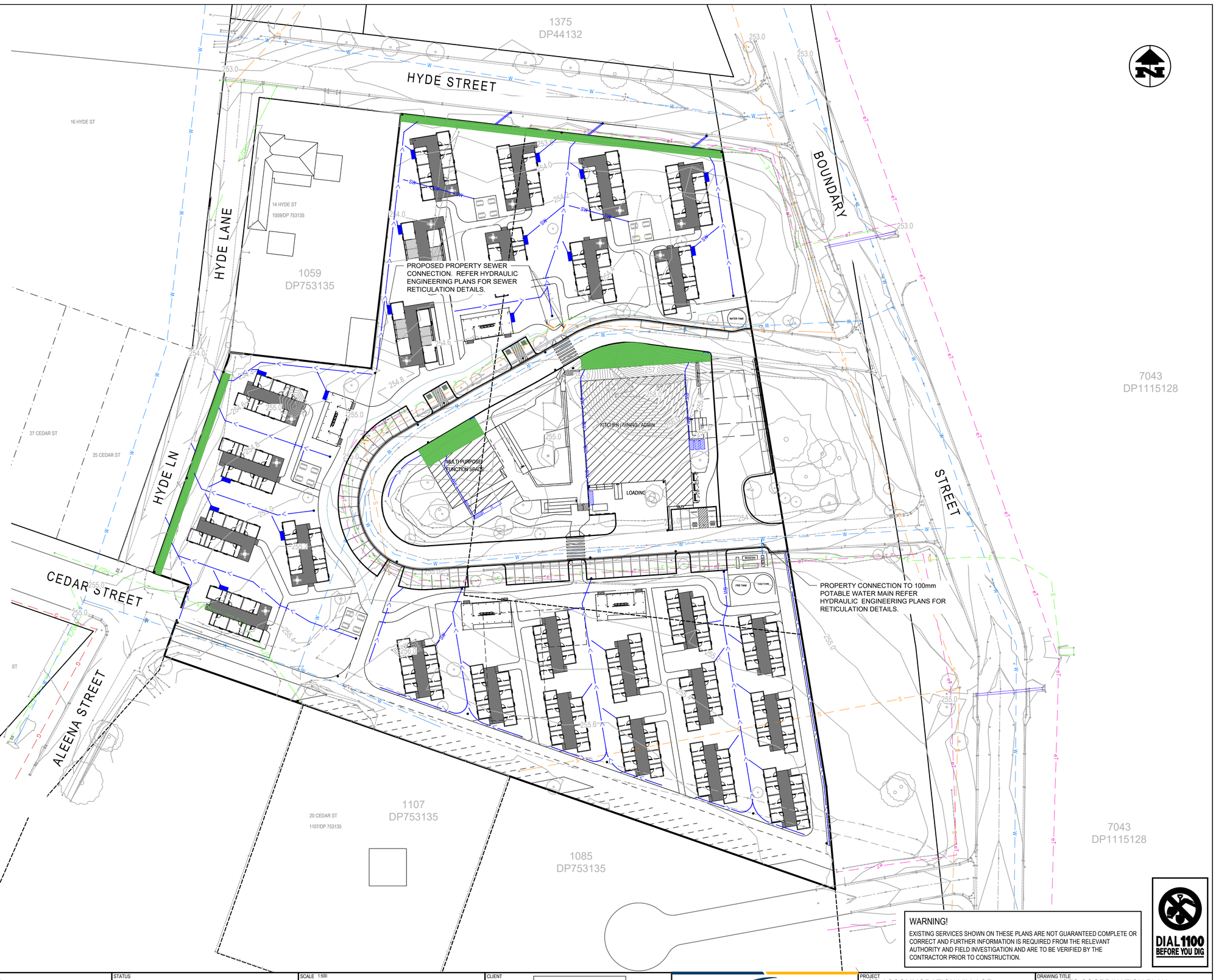
PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C0-01		D

EXISTING SERVICES NOTES

1. CALIBRE DOES NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THIS DRAWING SHOWS MORE THAN THE PRESENCE OR ABSENCE OF SERVICES, AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION FROM ANY CAUSE WHATSOEVER.
2. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM INFORMATION PROVIDED BY SERVICE AUTHORITIES AND THE SURVEYOR. THIS INFORMATION HAS BEEN PREPARED SOLELY FOR THE AUTHORITIES OWN USE AND MAY NOT NECESSARILY BE UPDATED OR ACCURATE.
3. THE POSITION OF SERVICES AS RECORDED BY THE AUTHORITY AT THE TIME OF INSTALLATION MAY NOT REFLECT CHANGES IN THE PHYSICAL ENVIRONMENT SUBSEQUENT TO INSTALLATION.
4. THE CONTRACTOR MUST CONFIRM THE EXACT LOCATION AND EXTENT OF SERVICES PRIOR TO CONSTRUCTION AND NOTIFY ANY CONFLICT WITH THE DRAWINGS IMMEDIATELY TO THE ENGINEER/SUPERINTENDENT.
5. ALL EXISTING SERVICES PITS, ENCLOSURES AND CONDUITS SHALL BE RELOCATED AND/OR ADJUSTED AS NECESSARY TO THE REQUIREMENTS OF THE RELEVANT AUTHORITY.
6. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA, AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.
7. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
8. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE. CONTRACTOR TO GAIN APPROVAL OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
9. THE CONTRACTOR SHALL TAKE ALL REASONABLE CARE TO PROTECT EXISTING SERVICES. DAMAGED SERVICES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

SERVICES LEGEND:

- EXISTING SEWER — eS
- EXISTING TELECOM — eT
- EXISTING GAS — G
- EXISTING WATER — W
- EXISTING OVERHEAD / ELECTRICITY — E/OH
- PROPOSED 2,000L TANK
- PROPOSED 5,000L TANK
- PROPOSED 8,000L TANK
- PROPOSED STORMWATER LINE — SW
- PROPOSED SWALE
- PROPOSED WATER — W
- PROPOSED SEWER — S
- PROPOSED COLLECTION SWALE / BASIN



WARNING!

EXISTING SERVICES SHOWN ON THESE PLANS ARE NOT GUARANTEED COMPLETE OR CORRECT AND FURTHER INFORMATION IS REQUIRED FROM THE RELEVANT AUTHORITY AND FIELD INVESTIGATION AND ARE TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

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FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
A	EO	NP	CB	CB	12/03/21	
A		BY	CB		31/03/21	ISSUED FOR REVIEW
A		BY	CB		31/03/21	ISSUED FOR REVIEW
B		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION
C		MZ	CB		15/04/21	FOR DEVELOPMENT APPLICATION

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE 1:500

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

CLIENT: Evolution MINING

calibre

PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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DRAWING TITLE: SERVICES COORDINATION PLAN

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C1-00		C

FILE: \\STLNAS01\BROWNCAN_LOCAL\PROJECTS\21\21-000050 CGO ACCOMMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C1-00.DWG LAST SAVED BY MONA ZAHABI PLOTTED: 15-Apr-21

LEGEND:

- CATCH DRAIN
- SHAKER GRID
- SEDIMENT FENCE
- SEDIMENT BASIN
- PROVIDE TEMPORARY SANDBAGS AROUND PITS:
  1. AFTER PAVEMENT WORKS IF CONSTRUCTION IS STILL ONGOING UPSTREAM.
  2. TO EXISTING GRATED PITS DOWNSTREAM OF CONSTRUCTION WORKS.

HYDE STREET
HYDE LANE
HYDE LN
CEDAR STREET
ALEENA STREET
BOUNDARY
STREET

1375 DP44132
1059 DP753135
7043 DP1115128
1107 DP753135
1085 DP753135
7043 DP1115128

INSTALL SAND BAGS DOWNSTREAM OF LIMIT OF WORKS
DISCHARGE TO ROAD
INSTALL TEMPORARY SILT FENCE ALONG DOWNSTREAM PERIMETER OF WORKS.
TEMPORARY SEDIMENT BASIN No.1
1.0m WIDE CATCH DRAIN @min 1%
INSTALL TEMPORARY SANDBAGS AROUND SAG INLETS
INSTALL TEMPORARY SHAKER GRID AND WASHDOWN FACILITY AT CONSTRUCTION SITE EXIT. FINAL LOCATION TO SUPERINTENDENT'S REQUIREMENTS.
DISCHARGE TO ROAD
EXISTING STOCKPILE TO BE REMOVED. FINAL LOCATION OF TEMPORARY STOCKPILE TO SUIT CONTRACTOR'S REQUIREMENTS
INSTALL SAND BAGS DOWNSTREAM OF LIMIT OF WORKS
DISCHARGE TO ROAD
TEMPORARY SEDIMENT BASIN No.3
TEMPORARY STOCKPILE
1.0m WIDE CATCH DRAIN @min 1%
SITE ENTRY ONLY
1.0m WIDE CATCH DRAIN @min 1%
1.0m WIDE CATCH DRAIN @min 1%
INSTALL SAND BAGS DOWNSTREAM OF LIMIT OF WORKS
DISCHARGE TO ROAD
INSTALL TEMPORARY SILT FENCE ALONG DOWNSTREAM PERIMETER OF WORKS.
TEMPORARY SEDIMENT BASIN No.2
TEMPORARY SEDIMENT BASIN
INSTALL TEMPORARY SANDBAGS AROUND SAG INLETS
1.0m WIDE CATCH DRAIN @min 1%

NOTES:

1. REFER TO DRAWING C1-15 FOR EROSION AND SEDIMENT CONTROL NOTES AND DETAILS.
2. ALL STORMWATER TO BE FILTERED TO EPA & COUNCIL REQUIREMENTS BEFORE DISCHARGE TO AN EXTERNAL STORMWATER DRAINAGE SYSTEM.
   - ALL SEEPAGE AND RUNOFF WATER FROM THE SITE TO BE COLLECTED INTO THE SEDIMENT BASIN FOR TREATMENT PRIOR TO DISCHARGE TO AN EXTERNAL STORMWATER DRAINAGE SYSTEM. WATER IN THE BASIN MUST BE CHECKED.
   - MEETS THE REQUIREMENTS OF ANZECC GUIDELINES; AND
   - ACHIEVES TSS LEVELS LESS THAN 50mg/L. (ie. WATER MUST NOT BE CLOUDY OR COLOURED).

   WHERE THE ABOVE CRITERIA CANNOT BE MET, WATER IS TO BE COLLECTED BY A LICENCED CONTRACTOR AND DISPOSED OF TO AN APPROVED WASTE MANAGEMENT FACILITY.

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AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION
AUTHORISED FOR ISSUE:

SCALE 1:500
0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

CLIENT: Evolution MINING

calibre
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PROJECT: CGO ACCOMMODATION VILLAGE WEST WYALONG N.S.W.

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DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C1-10		D

FILE: \\STLNAS01\ BROWNCAN\LOCAL\PROJECTS\21\21-000050 CGO ACCOMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C1-10.DWG LAST SAVED BY MONA.ZAHABI PLOTTED: 15-Apr-21

EROSION AND SEDIMENT CONTROL NOTES

1. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH:

   LOCAL AUTHORITY REQUIREMENTS,

2. EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES ARE PROVIDED FOR THE WHOLE OF THE WORKS. SHOULD THE CONTRACTOR STAGE THESE WORKS THEN THE DESIGN MAY REQUIRE TO BE MODIFIED. VARIATION TO THESE DETAILS MAY REQUIRE TO BE APPROVED BY THE RELEVANT AUTHORITIES. THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE IMPLEMENTED AND ADOPTED TO MEET THE VARYING SITUATIONS AS WORK ON SITE PROGRESSES.

3. MAINTAIN ALL EROSION AND SEDIMENT CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.

4. WHEN STORMWATER PITS ARE CONSTRUCTED PREVENT SITE RUNOFF ENTERING THE PITS UNLESS SEDIMENT TRAPS ARE ERECTED AROUND PITS.

5. MINIMIZE THE AREA OF SITE BEING DISTURBED AT ANY ONE TIME.

6. PROTECT ALL STOCKPILES OF MATERIALS FROM SCOUR AND EROSION. DO NOT STOCKPILE LOOSE MATERIAL IN ROADWAYS, NEAR DRAINAGE PITS OR IN WATERCOURSES.

7. ALL SOIL AND WATER CONTROL MEASURES ARE TO BE PUT BACK IN PLACE AT THE END OF EACH WORKING DAY, AND MODIFIED TO BEST SUIT SITE CONDITIONS.

8. CONTROL WATER FROM UPSTREAM OF THE SITE SUCH THAT IT DOES NOT ENTER THE DISTURBED SITE.

9. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE VIA THE APPROVED CONSTRUCTION ENTRY/EXIT ROUTE.

10. ALL VEHICLES LEAVING THE SITE SHALL BE CLEANED AND INSPECTED BEFORE LEAVING.

11. MAINTAIN ALL STORMWATER PIPES AND PITS CLEAR OF DEBRIS AND SEDIMENT. INSPECT STORMWATER SYSTEM AND CLEAN OUT AFTER EACH STORM EVENT.

12. CLEAN OUT ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH STORM EVENT.

SEQUENCE OF WORKS

1. PRIOR TO COMMENCEMENT OF EXCAVATION THE FOLLOWING SOIL MANAGEMENT DEVICES MUST BE INSTALLED.

   (i) CONSTRUCT SILT CONTROL DEVICES BELOW THE SITE AND ACROSS ALL POTENTIAL RUNOFF SITES.

   (ii) CO-ORDINATE CONSTRUCTION ENTRY/EXIT ROUTES WITH SITE SUPERINTENDENT. ARRANGE SUITABLE LOCATION FOR THE INSPECTION OF TRUCKS PRIOR TO LEAVING SITE AND DIVERT RUNOFF TO SUITABLE CONTROL SYSTEM.

   (iii) CONSTRUCT MEASURES TO DIVERT UPSTREAM FLOWS INTO EXISTING STORMWATER SYSTEM.

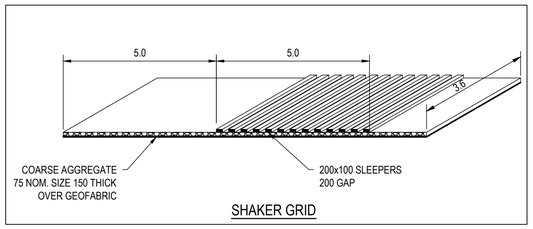
   (iv) PROVIDE SANDBAG SEDIMENT TRAPS UPSTREAM OF EXISTING PITS.

   (v) LOCATE A 1.8 METRE CHAIN WIRE FENCE AROUND THE BOUNDARIES AND ATTACH HESSIAN CLOTH TO IT ON THE WINDWARD SIDE (TIES AT THE TOP CENTER AND BOTTOM AND AT 1 METRE INTERVALS.

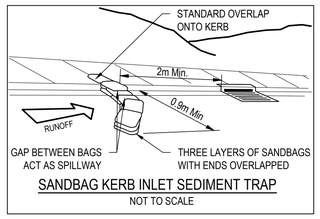
2. DISTURBED AREAS ARE REGULARLY WATERED TO REDUCE DUST POLLUTION.
3. CONSTRUCT GEOTEXTILE FILTER PIT SURROUND (SEDIMENT TRAP) AROUND ALL PROPOSED PITS AS THEY ARE CONSTRUCTED.
4. ON COMPLETION OF PAVEMENT PROVIDE SAND BAG SEDIMENT TRAPS AROUND PITS.
5. PROVIDE AND MAINTAIN A STRIP OF TURF ON BOTH SIDES OF ALL ROADS AFTER THE CONSTRUCTION OF KERBS.
6. REMOVE ALL TEMPORARY SOIL MANAGEMENT DEVICES AT THE COMPLETION OF ALL CONSTRUCTION ACTIVITY AND PRIOR TO SITE HANDOVER.

RETAINED TREES PROTECTION

1. ALL TREE PROTECTION REQUIREMENTS AS OUTLINED IN THE ARBORIST'S REPORT.
2. A TREE RETENTION PLAN AS PER THE ARBORIST'S REPORT IS TO BE KEPT ON SITE INDICATING TREES TO BE RETAINED AND AREAS LEFT UNDISTURBED, THAT ARE TO BE CORDONED OFF FROM CONSTRUCTION WORKS.

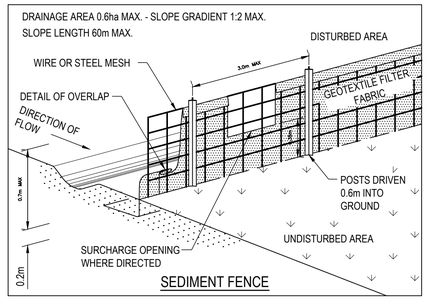


SHAKER GRID



SANDBAG KERB INLET SEDIMENT TRAP

NOT TO SCALE

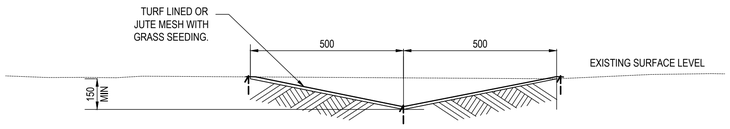


SEDIMENT FENCE

INSTALLATION

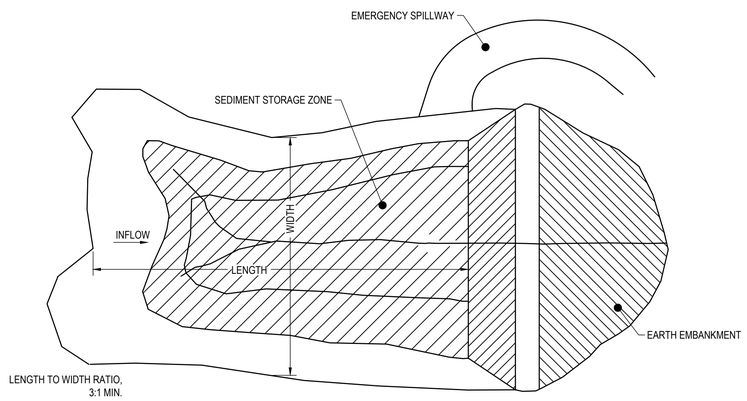
1. EXCAVATE A TRENCH 200mm DEEP.
2. DRIVE POSTS 500-700mm INTO GROUND AT A MAXIMUM SPACING OF 3.0m CENTRES.
3. PLACE AND FIX SUPPORT MESH (F52) TO POST.
4. LAY BIDIM GEOFABRIC (SF 2000) AGAINST THE SUPPORT MESH AND FIX BY TIE WIRE, STAPLES OR HOG RINGS.
5. PLACE BIDIM IN TRENCH AND BACKFILL WITH SOIL.

NOTE: POSITION OF SEDIMENT FENCE AS DIRECTED BY SUPERINTENDENT. FENCE TO REMAIN IN PLACE UNTIL EXCAVATION IS BELOW FOOTPATH LEVEL. PROVIDE 2m x2m TURFED AREA ON DOWNSTREAM SIDE OF FENCE AT SURCHARGE OPENINGS.

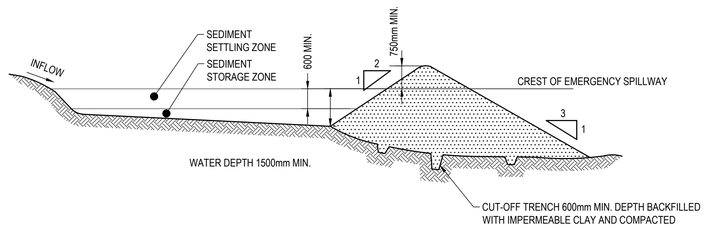


TYPICAL SECTION - 1.0m WIDE CATCH DRAIN

SCALE 1:20



PLAN VIEW



CROSS SECTION

TYPICAL EARTH BASIN - WET

CONSTRUCTION NOTES:

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT OFF TRENCH UNDER THE CENTRELINE OF THE EMBANKMENT 500mm DEEP AND 1200mm WIDE EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS TO 95% STANDARD DENSITY.
4. SELECT FILL ACCORDING THAT IS FREE FROM ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING AT LEAST 100mm DEEP TO HELP BOND COMPACTED FILL TO EXISTING SUBSTRATE.
6. SPREAD FILL IN 100mm TO 150mm LAYERS AND COMPACT AT OPTIMUM MOISTURE CONTENT.
7. FORM BATTER GRADES AT 2:1 UPSTREAM AND 3:1 DOWNSTREAM.
8. CONSTRUCT THE EMERGENCY SPILLWAY.
9. REHABILITATE STRUCTURE IN ACCORDANCE WITH THE ENGINEERING PLANS AND SPECIFICATIONS.

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AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE AS SHOWN

CLIENT: Evolution MINING

calibre

PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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DRAWING TITLE: EROSION AND SEDIMENT DETAILS AND NOTES

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C1-15		C

DP44132

HYDE STREET

HYDE LANE

BOUNDARY

14 HYDE ST

1059/DP 753135

1059
DP753135

NOTES:

1. THE STORMWATER DRAINAGE CONCEPT SHOWN AIMS TO REDUCE OR MAINTAIN STORMWATER RUNOFF VOLUMES AND IMPROVE RUNOFF QUALITY TO PRE-DEVELOPMENT LEVELS.
2. STORMWATER DISCHARGE FROM THE SITE HAVE BEEN DISTRIBUTED ACROSS EACH FRONTAGE IN KEEPING WITH THE PRE-DEVELOPMENT CATCHMENT FLOW REGIMES.
3. REFER TO ARCHITECT'S DRAWINHS FOR BUILDING AND OTHER ARCHITECTURAL DETAILS.
4. REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR DETAILS OF LANDSCAPE FEATURES.
5. REFER TO HYDRAULIC ENGINEERING PLANS FOR SEWER AND WATER RETICULATION DETAILS.

CONNECT 3 PAIRS OF 2-200x100x5 RHS FROM BIO-RETENTION TO HYDE STREET GUTTER.

GUT IL 253.46

GUT IL 253.23

GUT IL 253.16

P 253.60

COLLECTION SWALE

2,000L OSD TANK FOR EACH ACCOMMODATION & LAUNDRY UNITS (TYP.)

TYP 1.80m

1.0m WIDE GRAVEL LINED SWALE DRAIN @ MIN. 1% (TYP).

P 254.30

ENSURE SMOOTH TRANSITION TO MATCH EXISTING ROAD

COLLECTION SWALE TO OVERFLOW TO HYDE LANE.

PROPOSED PROPERTY SEWER CONNECTION. REFER HYDRAULIC ENGINEERING PLANS FOR SEWER RETICULATION DETAILS.

P 254.40

WATER TANK

CONNECT 2-200x100x5 RHS FROM COLLECTION BASIN TO KERB

P 254.20

2,000L OSD TANK (TYP.)

P 255.00

P 254.48

P 254.70

COLLECTION BASIN

6.20m

P 254.89

MULTI PURPOSE FUNCTION SPACE

KITCHEN / DINING / ADMIN

8,000L OSD TANK

3 x 5,000l OSD TANK.

P 254.52

P 254.95

LOADING

FOR CONTINUATION SEE SHEET C2-02

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
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A		BY	CB		22/03/21	ISSUED FOR DEVELOPMENT APPROVAL
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AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE 1:250

0 2.5 5 7.5 10 12.5 15 17.5 20

SCALE 1:500 (A3) SCALE 1:250 (A1)

CLIENT: Evolution MINING

calibre

PROJECT: CGO ACCOMMODATION VILLAGE WEST WYALONG N.S.W.

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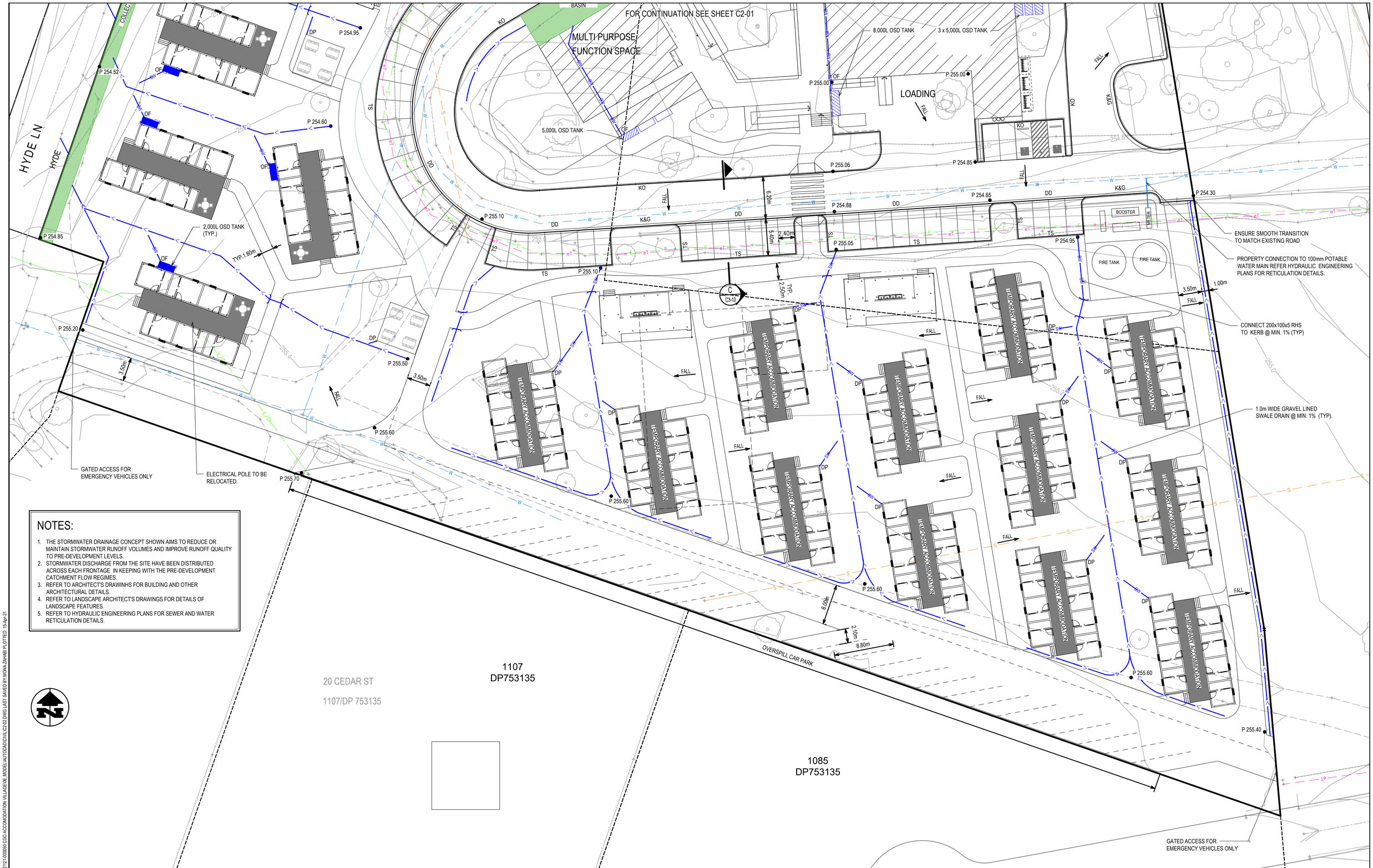
DRAWING TITLE: GENERAL ARRANGEMENT PLAN SHEET 1 OF 2

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C2-01		D

FILE: \\STL\NASP\ BROWNCAN LOCAL\PROJECTS\2121-000050 CGO ACCOMODATION VILLAGE\W_MODEL\AUTOCAD\CIVIL\C2-01.DWG LAST SAVED BY MONA ZAHAB PLOTTED: 15-Apr-21



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SCALE 1:250

0 2.5 5 7.5 10 12.5 15 17.5 20

SCALE 1:250 (A1) SCALE 1:500 (A3)

CLIENT: Evolution MINING

calibre

PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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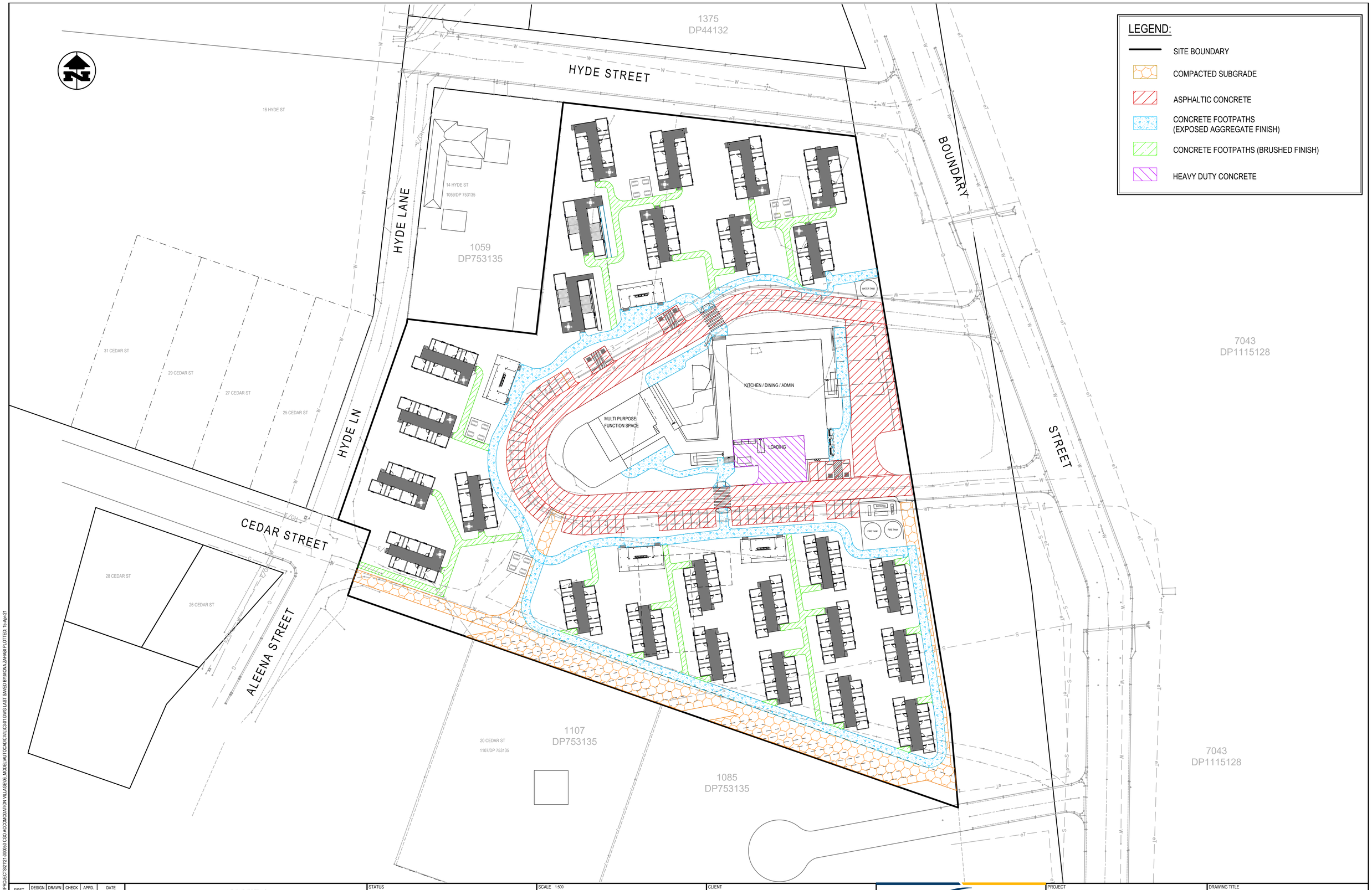
DRAWING TITLE: GENERAL ARRANGEMENT PLAN
SHEET 2 OF 2

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C2-02		D



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AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE 1:500

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

CLIENT: Evolution MINING

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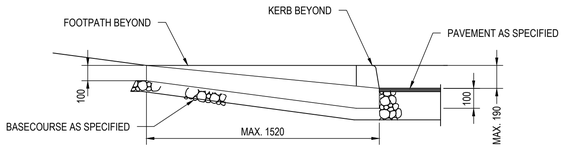
DRAWING TITLE: PAVEMENT PLAN

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C3-01		C

FILE: \\STLNAS01.BROWNCAN.LOCAL\PROJECTS\21\21-000050 CGO ACCOMMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C3-01.DWG LAST SAVED BY:MONA.ZAHABI PLOTTED: 15-Apr-21



SECTION 2
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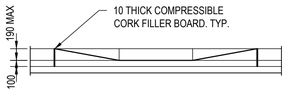

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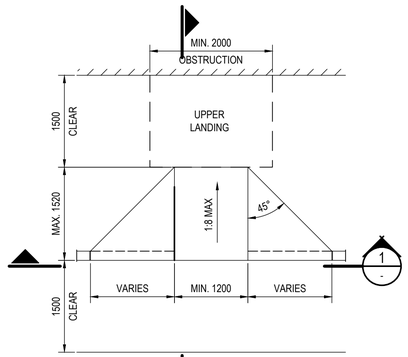

PLAN
SCALE 1:50

TYPICAL PEDESTRIAN KERB RAMP DETAIL
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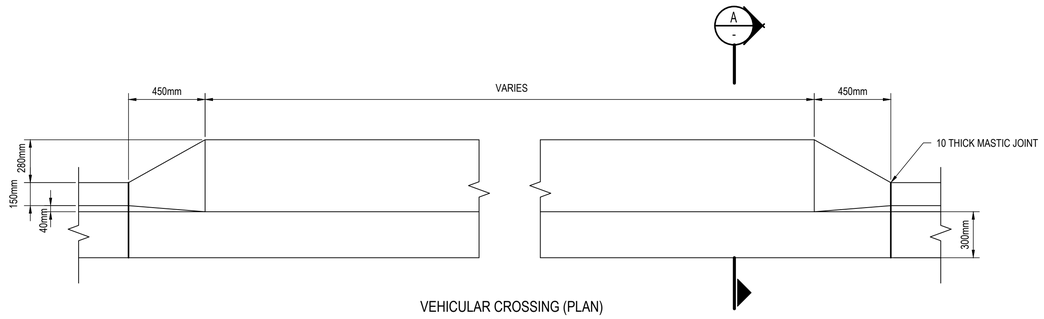
TO COMPLY WITH AS 1428.1 & 1428.4



VEHICULAR CROSSING (PLAN)
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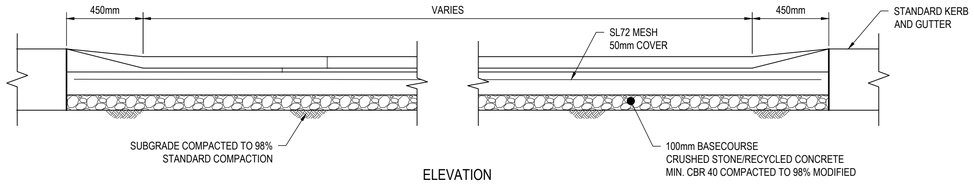

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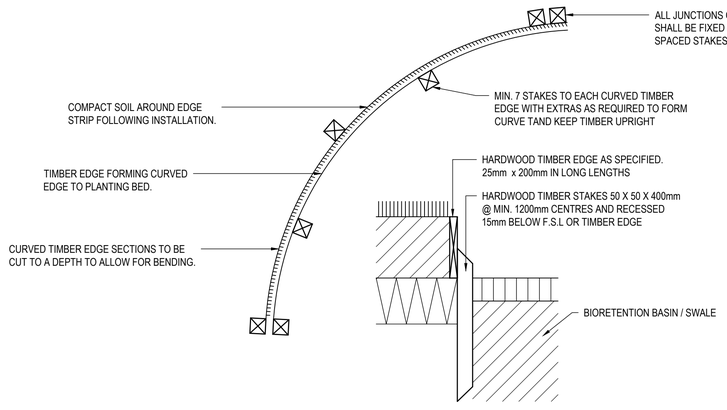
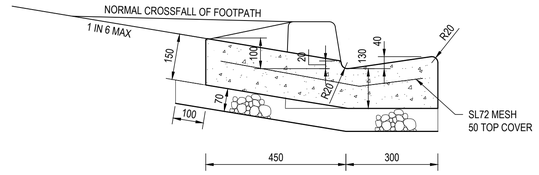


TIMBER EDGE - PLAN & SECTION
SCALE 1:10



DETAIL SECTION A
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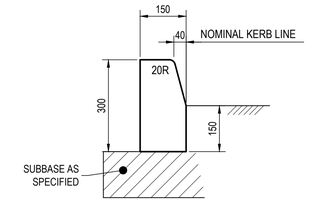

KERB ONLY (KO)
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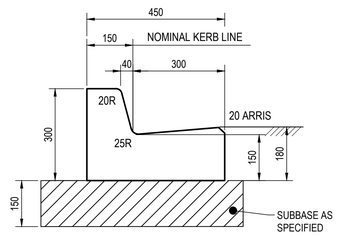

KERB & GUTTER (K&G)
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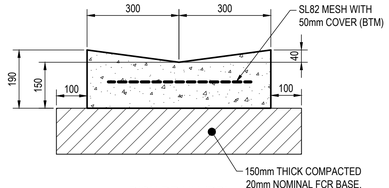

DISH DRAIN (DD)
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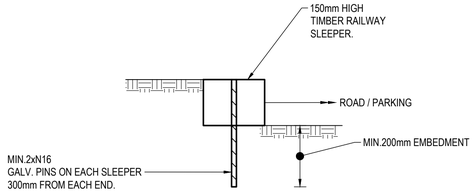

TIMBER SLEEPER KERB
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	FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
AMENDMENTS	A	EO	NP	CB	CB	12/03/21	
	B		BY	CB		22/03/21	ISSUED FOR DEVELOPMENT APPROVAL
	C		BY	CB		31/03/21	ISSUED FOR REVIEW
	D		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION
			MZ	CB		15/04/21	FOR DEVELOPMENT APPLICATION

STATUS
FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

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SCALE 1:50 (A1) SCALE 1:100 (A3)

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PROJECT
CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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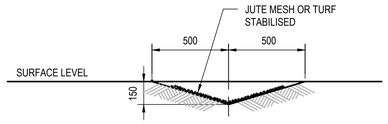
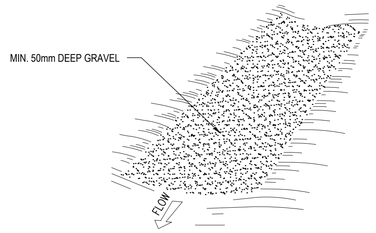
DRAWING TITLE
CIVIL WORKS DETAILS
SHEET 1 OF 2

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C3-80		D

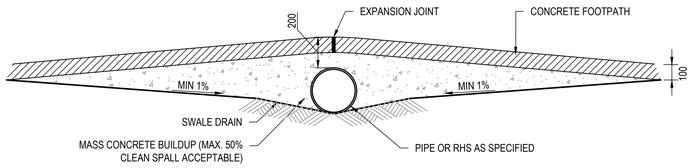
FILE: \STUNASD1\BROWNCAN LOCAL\PROJECTS\21\21-000050 CGO ACCOMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C3-80.DWG LAST SAVED BY MONA.ZAHABI PLOTTED: 15-Apr-21



TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1:20



'GRAVEL' STABILISED SWALE DRAIN DETAIL
NTS



SECTION A
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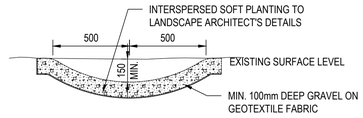
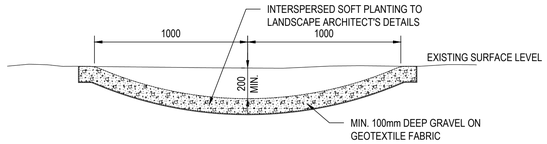


TYPICAL SECTION - 1.0m WIDE 'GRAVEL' STABILISED SWALE DRAIN
SCALE 1:20



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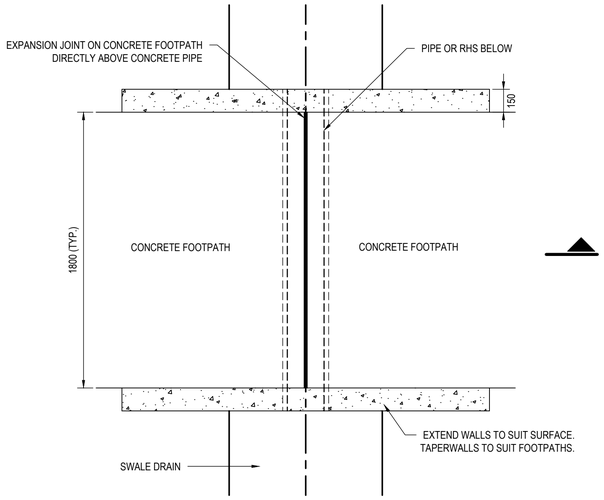
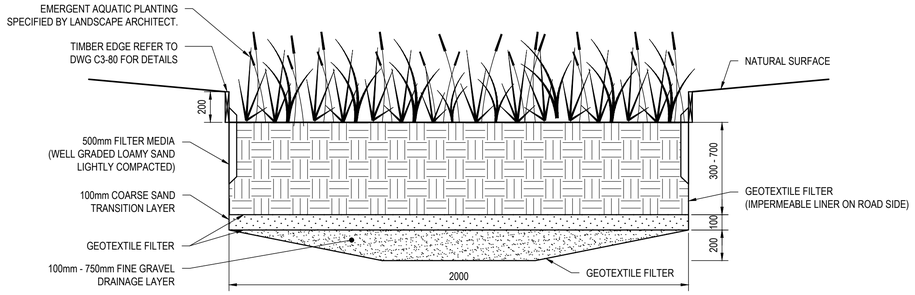
SCALE 1:20



PLAN
SCALE 1:20

PIPE CULVERT UNDER FOOTPATH
SCALE 1:20



BIORETENTION SWALE TYPICAL SECTION
NTS

FILTER MEDIA SPECIFICATION

THE FILTER MEDIA SHALL GENERALLY BE A LOAMY SAND AND BE FREE OF CONTAMINANTS SUCH AS RUBBISH, DELETERIOUS MATERIAL, TOXICANTS, DECLARED PLANTS AND WEEDS AND SHOULD NOT BE HYDROPHOBIC.

THE FILTER MEDIA SHALL BE WELL GRADED.

1. pH BETWEEN 5.5 TO 7.5
2. ELECTRICAL CONDUCTIVITY (EC) < 1.2 dS/m
3. ORGANIC MATTER CONTENT< 5% w/w
4. PHOSPHOROUS CONTENT < 35 mg/kg
5. TOTAL SILT & CLAY CONTENT (<0.05mm) < 3% w/w
6. HYDRAULIC CONDUCTIVITY BETWEEN 100 & 300 mm/h

THE COARSE SAND TRANSITION LAYER SHALL BE OF A CLEAN WELL GRADED SAND/COARSE SAND MATERIAL CONTAINING LITTLE OR NO FINES.

THE DRAINAGE LAYER SHALL BE OF A CLEAN FINE GRAVEL CONSISTING OF 2-5mm WASHED SCREENINGS.

CONSTRUCTION NOTES

1. FILTER MEDIA SPECIFICATION & GRADING IS TO BE VERIFIED BY THE SUPERINTENDENT PRIOR TO PLACEMENT. RELEVANT MATERIAL SPECIFICATION SHEETS ARE TO BE PROVIDED BY THE CONTRACTOR.
2. SUBSOIL DRAINAGE PIPES WITHIN THE BIORETENTION SYSTEM ARE TO BE SLOTTED 100mm uPVC CONSISTENT WITH AS/NZS 1254. JOINTS ARE TO BE SOLVENT CEMENT GLUED AND BENDS ARE TO BE 45° TO MINIMISE BLOCKAGE.
3. FILTER MEDIA TO BE LIGHTLY COMPACTED USING A SINGLE PASS VIBRATING PLATE OR ROLLER (ETC. DRUM LAWN ROLLER). UNDER NO CIRCUMSTANCES SHOULD HEAVY COMPACTION OR MULTIPLE PASSES BE MADE.
4. FILTER MEDIA TO BE INSTALLED IN TWO LIFTS UNLESS DEPTH OF MEDIA IS < 500mm.
5. LINER IS TO BE A 0.75mm (30 mil) POLYETHYLENE PRODUCT OR EQUIVALENT.
6. PLANTING DENSITIES AND SPECIES ARE TO BE PLANTED TO THE LANDSCAPE ARCHITECT REQUIREMENTS.

FIRST ISSUE		DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
	A	EO	NP	CB	CB	12/03/21	ISSUED FOR DEVELOPMENT APPROVAL
AMENDMENTS	B		BY	CB		31/03/21	ISSUED FOR REVIEW
	C		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION
	D		MZ	CB		15/04/21	FOR DEVELOPMENT APPLICATION

STATUS: FOR DEVELOPMENT APPLICATION
AUTHORISED FOR ISSUE:

SCALE AS SHOWN
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SCALE 1:20 (A1) SCALE 1:40 (A3)

CLIENT: Evolution MINING

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PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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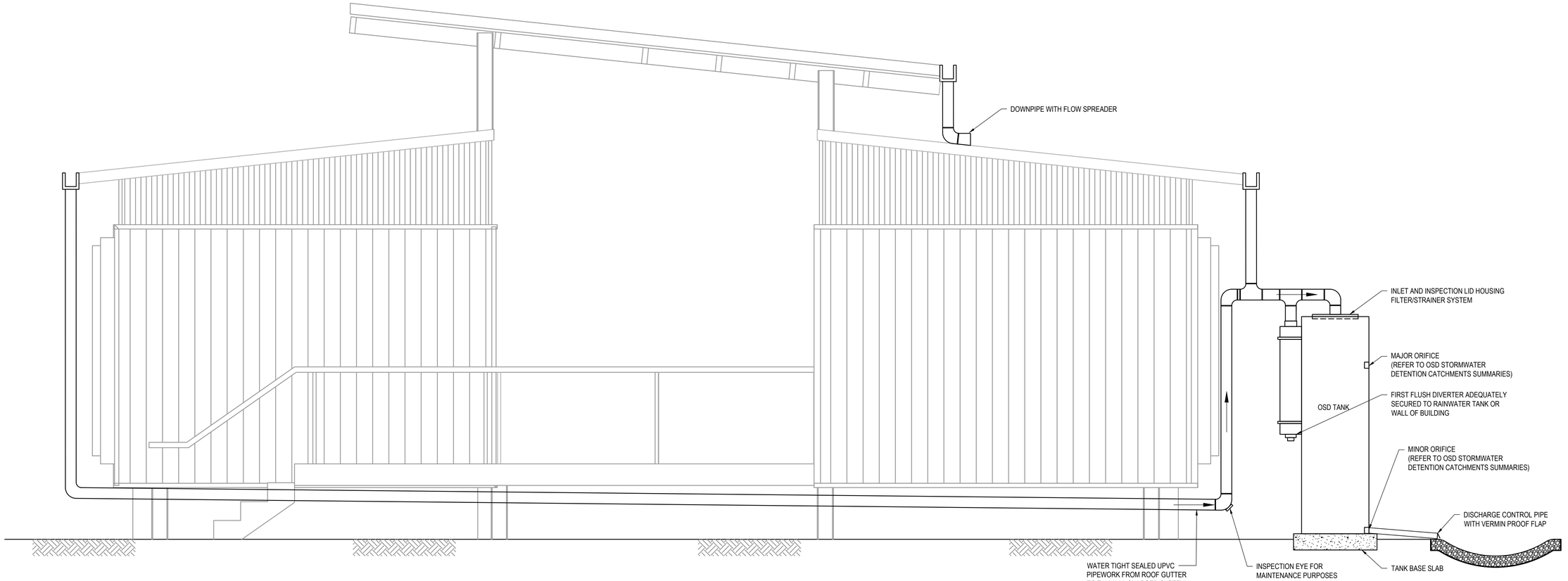
DRAWING TITLE: CIVIL WORKS DETAILS
SHEET 2 OF 2

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C3-81		D



ON-SITE STORMWATER DETENTION (OSD) AND FIRST FLUSH DEVICE
TYPICAL INSTALLATION DIAGRAM
N.T.S.

ON-SITE STORMWATER DETENTION CATCHMENT 1
SUMMARY

CATCHMENT AREA	0.5333 ha
TOTAL VOLUME REQUIRED	18.1 m^3
TOTAL VOLUME PROVIDED	20.0 m^3
10x2000L WATER TANK (1xEACH ACCOMMODATION / LAUNDRY UNIT)	
MAJOR ORIFICE LEVEL	1.356 m
MINOR ORIFICE LEVEL	0.14 m
MINOR ORIFICE DIAMETER	Ø25mm
MAJOR ORIFICE DIAMETER	Ø51mm

PRE-DEVELOPMENT FLOWS

1:5yr ARI	0.051 m^3/s
1:20yr ARI	0.115 m^3/s
1:50yr ARI	0.147 m^3/s
1:100yr ARI	0.172 m^3/s

POST-DEVELOPMENT FLOWS

1:5yr ARI	0.051 m^3/s
1:20yr ARI	0.116 m^3/s
1:50yr ARI	0.144 m^3/s
1:100yr ARI	0.172 m^3/s

ON-SITE STORMWATER DETENTION CATCHMENT 2
SUMMARY

CATCHMENT AREA	0.5200 ha
TOTAL VOLUME REQUIRED	21.4m^3
TOTAL VOLUME PROVIDED	23.0m^3
MAJOR ORIFICE LEVEL	1.80 m
MINOR ORIFICE LEVEL	0.1375 m
KITCHEN/DINING BUILDING 2x5000L WATER TANK (EAST)	
MINOR ORIFICE DIAMETER	Ø49mm
MAJOR ORIFICE DIAMETER	Ø115mm
8000L WATER TANK (WEST)	
MINOR ORIFICE DIAMETER	Ø47mm
MAJOR ORIFICE DIAMETER	Ø113mm
MULTI PURPOSE BUILDING 5000L WATER TANK	
MINOR ORIFICE DIAMETER	Ø34mm
MAJOR ORIFICE DIAMETER	Ø81mm

PRE-DEVELOPMENT FLOWS

1:5yr ARI	0.057 m^3/s
1:20yr ARI	0.122 m^3/s
1:50yr ARI	0.151 m^3/s
1:100yr ARI	0.176 m^3/s

POST-DEVELOPMENT FLOWS

1:5yr ARI	0.057 m^3/s
1:20yr ARI	0.119 m^3/s
1:50yr ARI	0.148 m^3/s
1:100yr ARI	0.176 m^3/s

ON-SITE STORMWATER DETENTION CATCHMENT 3
SUMMARY

CATCHMENT AREA	0.4000 ha
TOTAL VOLUME REQUIRED	6.2 m^3
TOTAL VOLUME PROVIDED	12.0 m^3
MAJOR ORIFICE LEVEL	0.83 m
MINOR ORIFICE LEVEL	0.1425 m
6x2000L WATER TANK (1xEACH ACCOMMODATION / LAUNDRY UNIT)	
MINOR ORIFICE DIAMETER	Ø31mm
MAJOR ORIFICE DIAMETER	Ø37mm

PRE-DEVELOPMENT FLOWS

1:5yr ARI	0.038 m^3/s
1:20yr ARI	0.086 m^3/s
1:50yr ARI	0.110 m^3/s
1:100yr ARI	0.129 m^3/s

POST-DEVELOPMENT FLOWS

1:5yr ARI	0.038 m^3/s
1:20yr ARI	0.087 m^3/s
1:50yr ARI	0.107 m^3/s
1:100yr ARI	0.128 m^3/s

ON-SITE STORMWATER DETENTION CATCHMENT 4
SUMMARY

CATCHMENT AREA	0.9252ha

PRE-DEVELOPMENT FLOWS

1:5yr ARI	0.096 m^3/s
1:20yr ARI	0.210 m^3/s
1:50yr ARI	0.263 m^3/s
1:100yr ARI	0.307 m^3/s

POST-DEVELOPMENT FLOWS (TEMPORARY CONSTRUCTION SITE)

1:5yr ARI	0.123 m^3/s
1:20yr ARI	0.213 m^3/s
1:50yr ARI	0.272 m^3/s
1:100yr ARI	0.323 m^3/s

RAINWATER TANK NOTES:
A) REFER TO HYDRAULIC ENGINEERING DRAWINGS FOR RAINWATER RE-USE TANK PIPE. PUMP AND ELECTRICAL SYSTEMS DETAILS.
B) RAINWATER TANK OVERFLOW TO BE DIRECTED TO OSD TANK

OSD NOTES:
A) CALCULATIONS AND MODELING ARE BASED ON ABOVE GROUND PRE-FABRICATED TANKS (PLASTIC / METAL)
B) A FIRST FLUSH DEVICE MUST BE INSTALLED UPSTREAM OF EACH TANK INLET
C) ALL OSD DISCHARGE PIPES MUST BE DIRECTED INTO A GRAVEL LINED SWALE OR GRAVEL BED FLOW DISSIPATER AND FITTED WITH A VERMIN PROOF FLAP.
D) TANK BASE TO STRUCTURAL ENGINEER'S REQUIREMENTS.

THIS IS AN
ON-SITE STORMWATER DETENTION SYSTEM

REQUIRED BY BLAND SHIRE COUNCIL

IT IS AN OFFENCE TO REDUCE THE VOLUME OF THE TANK OR BASIN OR TO INTERFERE WITH THE ORIFICE PLATE THAT CONTROLS THE OUTFLOW

THE BASE OF THE OUTLET CONTROL PIT AND THE DEBRIS SCREEN MUST BE CLEANED OF DEBRIS AND SEDIMENT ON A REGULAR BASIS BY THE OWNER

THIS PLATE MUST NOT BE REMOVED

OSD SIGN

SIGN	: 110mm x 80mm
CORNERS	: SQUARE
COLOUR	: ETCHED AND FILLED BLACK LEGEND ON NATURAL SILVER BACKGROUND
MATERIAL	: ALUMINIUM 0.9mm MILL
LOCATION	: FIXED TO THE TOP OF THE OUTLET CONTROL PIPE

CONFINED SPACE DANGER SIGN

A CONFINED SPACE DANGER SIGN SHALL BE POSITIONED IN A LOCATION AT ALL ACCESS POINTS. SUCH THAT IT IS CLEARLY VISIBLE TO PERSONS PROPOSING TO ENTER THE BELOW GROUND TANKS/S CONFINED SPACE.

COLOURS:	'DANGER' AND BACKGROUND	- WHITE
	ELLIPTICAL AREA	- RED
	RECTANGLE CONTAINING ELLIPSE	- BLACK
	OTHER LETTERING AND BORDER	- BLACK

MINIMUM DIMENSIONS: - 300mm x 450mm (LARGE ENTRIES. SUCH AS DOORS)
- 250mm x 180mm (SMALL ENTRIES SUCH AS GRATES & MANHOLES)

MATERIAL: COLOUR BONDED ALUMINUM OR POLYPROPYLENE.

FIXING: USE SCREWS AT EACH CORNER AND/OR SUITABLE EPOXY GLUE/CEMENT.

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	AMENDMENT DETAILS
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B		BY	CB		22/03/21	ISSUED FOR DEVELOPMENT APPROVAL
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		BY	CB		06/04/21	FOR DEVELOPMENT APPLICATION

AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION
AUTHORISED FOR ISSUE:

SCALE AS SHOWN

CLIENT: Evolution MINING

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PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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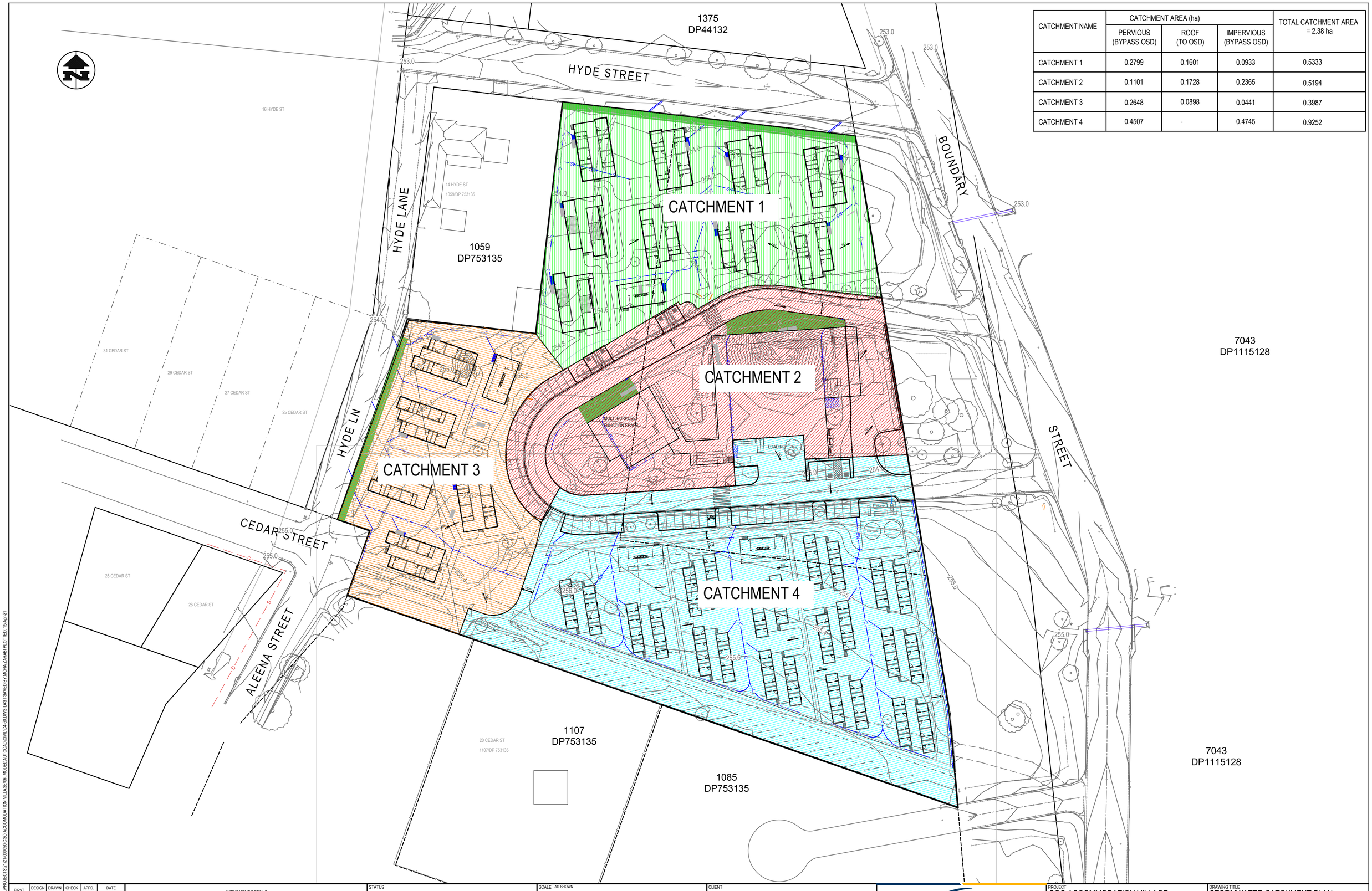
DRAWING TITLE: OSD BASIN DETAILS AND STORMWATER DRAINAGE DETAILS

PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C4-30		C

FILE: \\STDVMS01\BROWNCAN_LOCAL\PROJECTS\21\21-000050 CGO ACCOMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C4-30.DWG LAST SAVED BY MONA.ZAHABI PLOTTED: 15-Apr-21

CATCHMENT NAME	CATCHMENT AREA (ha)			TOTAL CATCHMENT AREA = 2.38 ha
	PERVIOUS (BYPASS OSD)	ROOF (TO OSD)	IMPERVIOUS (BYPASS OSD)	
CATCHMENT 1	0.2799	0.1601	0.0933	0.5333
CATCHMENT 2	0.1101	0.1728	0.2365	0.5194
CATCHMENT 3	0.2648	0.0898	0.0441	0.3987
CATCHMENT 4	0.4507	-	0.4745	0.9252



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AMENDMENTS

STATUS: FOR DEVELOPMENT APPLICATION

AUTHORISED FOR ISSUE:

SCALE AS SHOWN

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SCALE 1:500 (A1) SCALE 1:1000 (A3)

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PROJECT: CGO ACCOMMODATION VILLAGE
WEST WYALONG N.S.W.

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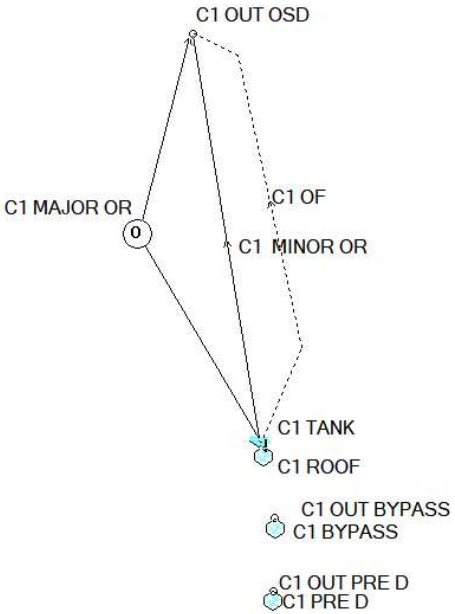
DRAWING TITLE: STORMWATER CATCHMENT PLAN

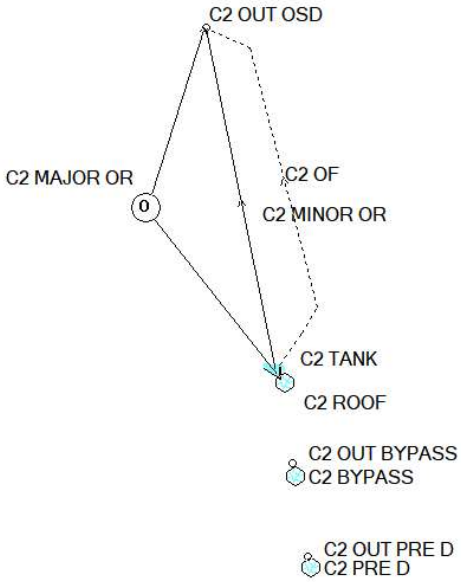
PROJECT No.	DRAWING No.	MILESTONE	REVISION
21-000050	C4-60		C

FILE: \\STTUMASU_BROWNCAN\LOCAL\PROJECTS\21\21-000050 CGO ACCOMODATION VILLAGE\06_MODEL\AUTOCAD\CIVIL\C4-60.DWG LAST SAVED BY AYONA.ZAHAB PLOTTED: 15-Apr-21

21-000050-RPT-SWMP-20210415.docx

Appendix B Calculations


C1 OUT OSD
C1 MAJOR OR
0
C1 OF
C1 MINOR OR
C1 TANK
C1 ROOF
C1 OUT BYPASS
C1 BYPASS
C1 OUT PRE D
C1 PRE D


C2 OUT OSD
C2 MAJOR OR
0
C2 OF
C2 MINOR OR
C2 TANK
C2 ROOF
C2 OUT BYPASS
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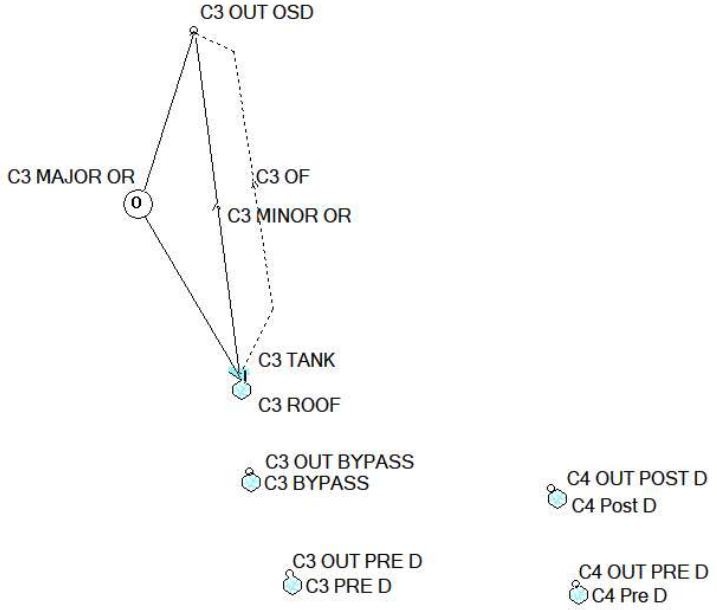
C3 OUT OSD
C3 MAJOR OR
0
C3 OF
C3 MINOR OR
C3 TANK
C3 ROOF
C3 OUT BYPASS
C3 BYPASS
C3 OUT PRE D
C3 PRE D
C4 OUT POST D
C4 Post D
C4 OUT PRE D
C4 Pre D

PIT / NODE DETAILS

Version 15

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Deptl (m)	Major Safe Pond Depth (m)
C1 OUT OSD	Node					0		0		963.652	-568.166		11		No					
C1 OUT PRE D	Node					0		0		965.139	-578.391		67		No					
C2 OUT PRE D	Node					0		0		978.165	-577.847		16688781		No					
C2 OUT OSD	Node					254.8		0		976.277	-568.14		16688809		No					
C3 OUT PRE D	Node					0		0		990.245	-578.046		16918066		No					
C3 OUT OSD	Node					0		0		988.484	-568.062		16918210		No					
C1 OUT BYPASS	Node					0		0		965.148	-577.039		30125587		No					
C2 OUT BYPASS	Node					0		0		977.864	-576.126		30125778		No					
C3 OUT BYPASS	Node					0		0		989.496	-576.178		30126133		No					
C4 OUT PRE D	Node					0		0		995.508	-578.235		30339573		No					
C4 OUT POST D	Node					0		0		995.042	-576.481		30339734		No					

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Lengt	id
C1 TANK	0.1	11		Orifice		80		0.14		964.887	-575.709	No			6
	1.86	11													
C2 TANK	0.1	13.5		Orifice		75		0.1375		977.549	-574.459	No			16688817
	1.86	13.5													
C3 TANK	0.1	6		Orifice		85		0.1425		989.323	-574.423	No			16918076
	1.86	6													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C1 ROOF	C1 TANK	0.16	100	0	0	7		7	7									0				1
C1 PRE D	C1 OUT PRE D	0.5333	0	100	0	6		6	6									0				1
C2 PRE D	C2 OUT PRE D	0.5194	20	80	0	6		6	6									0				1
C2 ROOF	C2 TANK	0.1728	100	0	0	7		7	7									0				1
C3 PRE D	C3 OUT PRE D	0.3987	0	100	0	6		6	6									0				1
C3 ROOF	C3 TANK	0.0898	100	0	0	7		7	7									0				1
C1 BYPASS	C1 OUT BYPASS	0.3732	25	75	0	8		8	8									0				1
C2 BYPASS	C2 OUT BYPASS	0.3466	45	55	0	8		8	8									0				1
C3 BYPASS	C3 OUT BYPASS	0.3089	14	86	0	8		8	8									0				1
C4 Pre D	C4 OUT PRE D	0.9252	12	88	0	6		6	6									0				1
C4 Post D	C4 OUT POST D	0.9252	49	51	0	8		8	8									0				1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)
C1 MINOR OR	C1 TANK	C1 OUT OSD	1	0.1	0.09	1	uPVC, not under roads, 1% minimum slope	300	303	0.012	NewFixed	1	C1 TANK	0					
C2 MINOR OR	C2 TANK	C2 OUT OSD	1	0.1	0.09	1	Concrete, not under roads, 1% minimum slope	300	300	0.013	NewFixed	1	C2 TANK	0					
C3 MINOR OR	C3 TANK	C3 OUT OSD	1	0.1	0.09	1	Concrete, not under roads, 1% minimum slope	300	300	0.013	NewFixed	1	C3 TANK	0					

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
C1 OF	C1 TANK	C1 OUT OSD	0.1	1.86	2.5	1.7	2.47m wide concrete pathway	0.13	0.08	0.6	1	0	5454397	1.86	0	2
C2 OF	C2 TANK	C2 OUT OSD	0.1	1.86	2.5	1.7	1.83m wide concrete pathway	0.13	0.08	0.6	1	0	16689180	1.86	0	2
C3 OF	C3 TANK	C3 OUT OSD	0.1	257	1.6	1.7	1.83m wide concrete pathway	0.13	0.08	0.6	1	100	16919428	1.86	0	2

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
C1 MINOR OR	uPVC, not under roads, 1% minimum slope	303	0.3	-0.4	Unsafe
C2 MINOR OR	Concrete, not under roads, 1% minimum slope	300	0.45	-0.33	Unsafe
C3 MINOR OR	Concrete, not under roads, 1% minimum slope	300	0.45	-0.42	Unsafe

This model has no pipes with non-return valves

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Version 8 Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
C1 OUT OSD	0		0				
C2 OUT OSD	0		0				
C3 OUT OSD	0		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C1 ROOF	0.069	0.069	0	7	7	7	1% AEP, 10 min burst, Storm 5
C1 PRE D	0.172	0	0.172	6	6	6	1% AEP, 10 min burst, Storm 2
C2 PRE D	0.176	0.042	0.134	6	6	6	1% AEP, 10 min burst, Storm 2
C2 ROOF	0.074	0.074	0	7	7	7	1% AEP, 10 min burst, Storm 5
C3 PRE D	0.129	0	0.129	6	6	6	1% AEP, 10 min burst, Storm 2
C3 ROOF	0.039	0.039	0	7	7	7	1% AEP, 10 min burst, Storm 5
C1 BYPASS	0.121	0.038	0.083	8	8	8	1% AEP, 10 min burst, Storm 2
C2 BYPASS	0.119	0.063	0.057	8	8	8	1% AEP, 10 min burst, Storm 2
C3 BYPASS	0.096	0.017	0.079	8	8	8	1% AEP, 10 min burst, Storm 2
C4 Pre D	0.307	0.045	0.263	6	6	6	1% AEP, 10 min burst, Storm 2
C4 Post D	0.323	0.183	0.14	8	8	8	1% AEP, 10 min burst, Storm 2

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
C1 MINOR OR	0.017	1.15	0.262	0.168	1% AEP, 15 min burst, Storm 4
C2 MINOR OR	0.015	1.05	0.292	0.165	1% AEP, 15 min burst, Storm 4
C3 MINOR OR	0.015	1.06	0.198	0.167	1% AEP, 10 min burst, Storm 10

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
C1 MAJOR OR	0.034	0.034						1% AEP, 15 min burst, Storm 4
C1 OF	0	0	0.642	0	0	0	0	
C2 MAJOR OR	0.042	0.042						1% AEP, 15 min burst, Storm 4
C2 OF	0	0	0.465	0	0	0	0	
C3 MAJOR OR	0.017	0.017						1% AEP, 10 min burst, Storm 10
C3 OF	0	0	0.465	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level	
C1 TANK	1.75	18.1	0.051	0.017		0.034
C2 TANK	1.69	21.4	0.056	0.015		0.042
C3 TANK	1.14	6.2	0.032	0.015		0.017

Run Log for Catchments 20210327.drn run at 23:00:36 on 31/3/2021 using version 2020.061

Flows were safe in all overflow routes.

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Appendix C Risk Assessment Framework

(Prepared by EMM Consulting)

Assessment of potential impacts to surface water was undertaken for construction and operational phases of the project.

A description of each activity has been provided, and potential impacts (or 'hazards') to surface water quality, stormwater quantity and flooding have been identified and described using a risk framework.

To generate a risk rating for each of the project hazards (Table C.1), both the Significance (Table C.2) and Likelihood (Table C.3) of the potential impact were considered. An 'initial' risk rating was applied to each hazard based on the concept design, operational protocols, and standard mitigation measures. Project specific mitigation measures were then considered and a revised or 'mitigated' risk rating developed.

A summary of identified risks, mitigation measures and project effects is provided in Section 5.

Table C.1 Risk matrix

Likelihood	Significance				
	Negligible	**Minor**	**Moderate**	**High**	**Severe**
Rare	Low	Low	Low	Medium	Significant
Unlikely	Low	Low	Medium	Significant	High
Possible	Low	Medium	Significant	High	High
Likely	Low	Medium	Significant	High	Extreme
Almost Certain	Medium	Significant	High	Extreme	Extreme

Table C.2 Classification of significance

Significance category	Description
Severe	The impact is considered critical to the decision-making process. Impacts tend to be permanent or irreversible or otherwise long-term and can occur over large areas. Very high sensitivity of environmental receptors to impact.
High	The impact is considered likely to be important to decision-making. Impacts tend to be permanent or irreversible or otherwise long-term (>5 year recovery period). Impacts can occur over large or medium size areas. High to moderate sensitivity of environmental receptors to impact.
Moderate	The effects of the impact are relevant to decision-making including the development of environmental mitigation measures. Impacts can range from long-term to short-term in duration (1 to 4 year recovery period). Impacts occur mostly near the source, which is apparent and requires mitigation to be within limits of acceptability. Moderate sensitivity of environmental receptors to impact.
Minor	Impacts are recognisable/detectable but acceptable and may be contained on-site. These impacts are unlikely to be of importance in the decision-making process but are relevant in the consideration of standard mitigation measures. Impacts tend to be short-term (<12 month recovery period) or temporary and/or occur at a local scale.
Negligible	Minimal change to the existing situation. This could include for example impacts which are beneath the levels of detection, impacts that are within the normal bounds of variation or impacts that are within the margin of forecasting error.

Table C.3 Classification of likelihood

Likelihood category	Description	Annual probability of occurrence
Almost Certain	A recurring event during the lifetime of an operation or project.	More than two occurrences per year
Likely	An event that will probably occur during the lifetime of an operation or project.	Around one occurrence per year
Possible	An event that may occur during the lifetime of an operation or project.	More than 10% annual probability of occurrence
Unlikely	An event that is unlikely to occur during the lifetime of an operation or project.	More than 1% annual probability of occurrence
Rare	An event with a low probability to occur during the lifetime of an operation or project.	Less than 1% annual probability of occurrence

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