Construction & EnvironmentalManagement Plan

55 Coonara Avenue, West Pennant Hills –

Concept Development Application that includes the detailed first stage comprising the Civil Works

8 March 2023

Revision		Date
A	Concept Development Application that includes stageComprising the Civil Works	13 September 2021
B	Updated CEMP to include amended designs and reports	7 June 2022
C	Updated CEMP to address approved DA860/2022/JP Consent Conditions	8 March 2023

Table of Contents

INTRODUCTION

This Construction & Environmental Management Plan (CEMP) has been prepared to accompany the Concept Development Application that includes the detailed first stage comprising the Civil Works. This CEMP addresses the civil works related items for the proposed redevelopment of the site located at 55 Coonara Avenue, West Pennant Hills (Lot 61 DP737386).

The CEMP is intended to provide an overview as part of the DA as to how future construction related items are proposed to be managed. The CEMP outlines the actions and staging of works necessary to address neighbouring properties and authorities, whilst maintaining a safe and productive construction site.

The awarded Civil Contractor will provide a more detailed CEMP in strict accordance with SafeWork NSW, Hills Shire Council and Mirvac's requirements to address any DA conditions to be satisfied prior to the issue of a Construction Certificate. Implementation of a CEMP is central to the successful completion of a project. The CEMP is a positive commitment by Mirvac to ensure that the statutory obligations are fulfilled and that the project is delivered to the highest Mirvac quality, safety, and environmental standards.

PURPOSE OF THIS REPORT

The objectives of this report are to:

- Outline the proposed phases of construction works on site and assess interaction with the surrounding community to minimise the effects of construction activity to the community.
- Examine and address the proposed site's sediment and erosion control measures to ensure minimal effect.
- Adopt a waste management plan with the hierarchy of avoid > reuse > recycle > dispose.
- Outline sustainability initiatives, commitments, and targets on the project.
- Examine and address the site's likely effect on vehicle movements and traffic control measures.
- Guidelines to reduce potential noise and vibration concerns to nearby tenants, residents and asset owners during excavation and construction works.
- Outline measures and procedures for the effective management of the environment in relation to air quality and hazardous materials.
- A commitment to providing a safe working environment.
- Planned construction access and delivery routes along with property condition report/s to ensure public assets are maintained throughout construction
- Flora and fauna protection in accordance with Council approved Vegetation Management Plan and Fauna Management Plan

The responsibility for the management of this document and the actions contained therein lies with the Mirvac Senior Management Team (SMT) for the project. The CEMP review procedure will be tracked and monitored throughout the project construction phase, with required amendments and updates considered if major site condition change occurs and/or as required to suit project requirements.

All construction activities will be undertaken in accordance with the relevant sections from the Building Code of Australia, Australian Standards, Hills Shire Council Approvals, Workplace Health and Safety Act and Work Health and Safety Regulations.

All employees and contractors involved in the project will be inducted prior to commencement of works on site. Included in the induction will be health, safety and environmental requirements and all applicable conditions of consent. Any relevant training requirements will be carried out and monitored throughout the project.

PROJECT OVERVIEW

The 55 Coonara Avenue Site comprises approximately 25.87 hectares of R3 and R4 Residential and E2 Environmental Conservation zoned land in Sydney's North West growth corridor. The site was originally developed in the early 1980's comprising 34,000 square metre specialised business park facility with 1,670 car spaces atgrade and within a 4 storey multi-level car park.

Site Location:

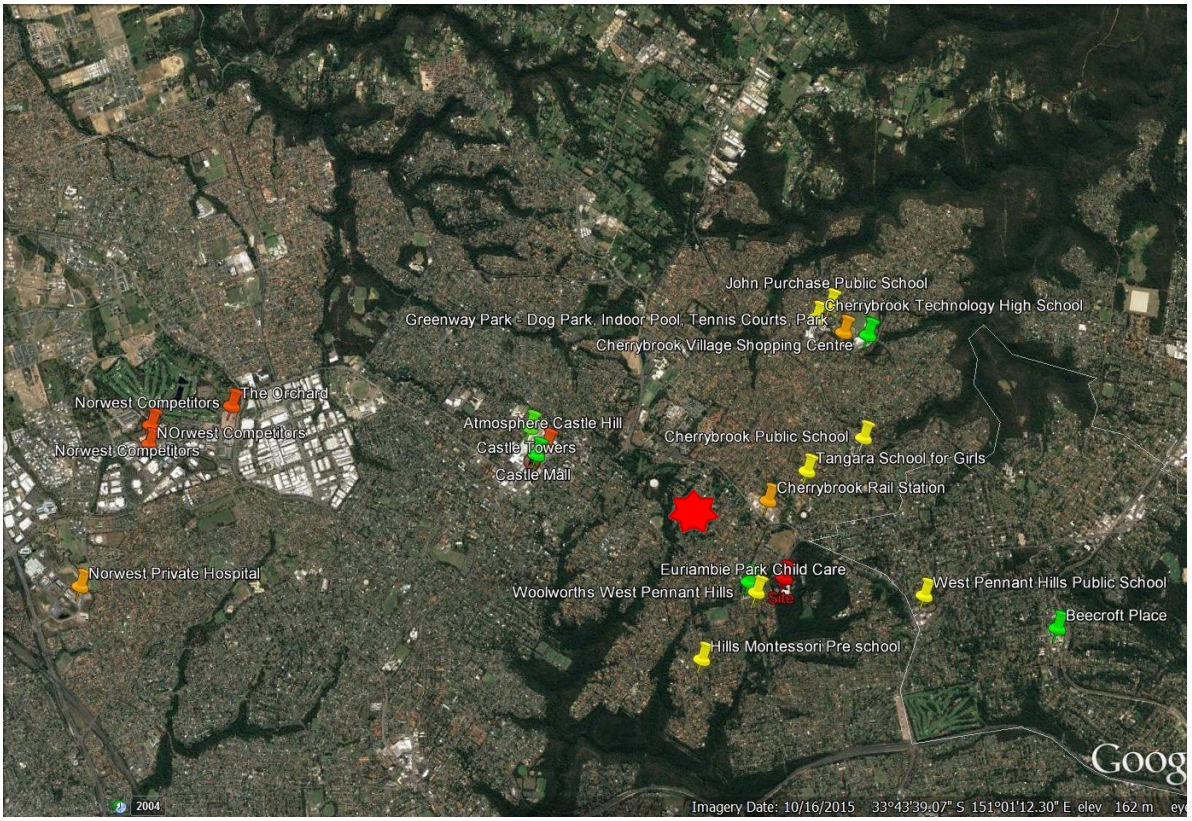

Figure 1: Site Location

Figure 2: Aerial View of the Site (Approximate Site Boundary Outlined)

HOURS OF WORK

In accordance with standard hours of construction works, the proposed hours for works are as follows:

Between 7:00 am and 5:00 pm, Mondays to Fridays inclusive.

Between 7:00 am and 5.00 pm, Saturdays.

No work will be carried out on Sundays and Public Holidays (unless otherwise approved).

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RESTRICTIONS ON HOURS

With the known proximity of two known nesting locations that have previously been used for the endangered Powerful Owl. Hours of work will be restricted when within 100m during the breeding season (March – September) to commence 1 hour after sunrise (8.00am) and finish before 4.00pm, noise monitoring is to be established induring the breeding period in these areas to ensure minimal impact to owl roosting areas.

Noise and Vibration monitoring will be carried out in accordance with Appendix D - Noise & Vibration Management Plan prepared by Acoustic Logic.

CONTACT DETAILS

Contact details for key project personnel are provided below:

The Site Manager for the project is yet to be determined and their details shall be provided here once known.
Mobile: TBA
Email: TBA

The Project Manager for the project is yet to be determined and their details shall be provided here once known.
Mobile TBA
Email TBA

CEMP 'ACTION LIST'

The 'CEMP Action List' will form the basis of the Construction & Environmental Management Plan. The Action List will be created in response to DA consent conditions that are to be addressed prior to and during the construction phase of the project. The Action List will further address any other authority related requirements and will take into consideration the concerns of neighbouring building occupants.

The Action List provides a means by which responsibilities of the project team can be readily identified and monitored.

In addition to the Action List, a series of attachments will be provided, which will contain supplementary, detailed information in the form of checklists, registers, templates, and reports. The attachments will contain the information and tools that must be implemented during the construction phase to address relevant DA consent conditions associated with the project.

SITE MANAGEMENT PLAN

INTRODUCTION

The following Site Management Plan has been developed to outline the proposed phases of the civil works on site, the sequence of work, and to assess Mirvac's interaction with the surrounding community.

INDICATIVE PROGRAM

It is envisaged the civil works will take approximately 19 months to complete, consisting of:

Site Establishment and Enabling Works – 1 month. (Establishment of additional Tree Protection and Environmental Protection Zones outside the Demolition DA footprint, Installation of Sediment & Erosion controls, Installation of Site Hoardings and Security Fencing, Site Amenities).
Civil Works – 18 months. (Bulk earthworks, piling, stormwater drainage works, detailed excavation, installation of anchors, services infrastructure, retaining walls, roads).

CONSTRUCTION STAGING

The below typically details the various activities to be undertaken during each of the phases of works:

Site Establishment & Enabling Works

The works to be completed include the establishment of:

- Installation of Site perimeter hoardings to Coonara Avenue Frontage not previously completed in the Demolition phase of works
- Establishment of additional Environmental and Tree Protection zones in accordance with approved Arborist Impact Assessment to areas not previously completedin the Demolition phase of works
- Establishment of Site accommodation, amenities, and offices for the duration of the works
- Upgrade works to the entry points to the Development Site for construction access and the future subdivision
- Implementation of environmental and stormwater controls within the site, to the perimeter of the works zone and at the entry points.
- Temporary Services Works required for the proposed civil works

Civil Works

Prior to and in conjunction with civil works, Mirvac must undertake bulk earthworks to achieve the required/designed levels for the development. The indicative scope of works regarding Bulk Earthworks is summarised below:

- Staged clearing site of unsuitable material and topsoil
- Stockpile and stabilisation of materials that are to be reused on site
- Retention piles & perimeter shoring wall/s required to facilitate the Bulk Earthworks to design levels within the site.
- Foundation piling works
- Excavation of in situ materials from areas exceeding required/designed levels
- Stockpile and relocation of such materials
- Grading and compaction of such areas to achieve required/designed levels
- Installation of retaining walls to achieve required/designed levels

Infrastructure Works

As part of the civil works, Infrastructure Works are required to provide essential services to the development. The indicative scope of works regarding Infrastructure Works is summarised generally below:

Communications

- Excavation of trenches required for in ground communications infrastructure
- Installation of inground communications infrastructure
- Backfill and compaction of service trench
- Connection of internal service reticulation to external supply in Coonara Avenue

Electrical Works

- Excavation of trenches required for in ground Electrical infrastructure
- Installation of inground High Voltage Power infrastructure and Substations
- Installation of services reticulation to supply future housing lots
- Backfill and compaction of service trench
- Installation of lighting reticulation to road reserve and park areas
- Connection of internal service reticulation to external supply

Stormwater

- Excavation of trenches required for in ground Stormwater infrastructure
- Installation of inground Stormwater infrastructure
- Installation of Onsite Detention Systems to control stormwater flows downstream of the site.
- Backfill and compaction of service trenches
- Connection of internal service reticulation to external egress

Sewer

- Excavation of trenches required for in ground Sewer infrastructure
- Installation of inground Sewer infrastructure
- Backfill and compaction of service trench
- Connection of internal service reticulation to existing headworks

Water

- Excavation of trenches required for in ground Water infrastructure
- Installation of inground Water infrastructure
- Backfill and compaction of service trench
- Connection of internal service reticulation to external supply in Coonara Avenue

Road Construction

- Excavation for stormwater (road) infrastructure and tree pits
- Placement/installation and connection of stormwater and subsoil services
- Backfill and compaction of excavation with suitable material
- Installation/Placement of suitable subgrade and compaction
- Installation of Kerb and Gutter and Footpath pavement

- Placement of final pavement layers including wearing course

STAGING AREAS

Staging areas will be utilised within Mirvac's site boundary. The staging areas as indicated in **Appendix A** – Site Plan will be in place and operational. Material handling areas will be located as close as possible to the work fronts to minimise the extent of double handling works and reduce vehicle movements and additional noise across the site.

FLORA AND FAUNA MANAGEMENT

During the delivery of the civil works phase, an appropriately qualified Arborist and Ecologist will be engaged to monitor, supervise, and provide advice as required and to ensure that all environmental requirements are being adhered to. The civil works footprint has been constrained to the minimum area to undertake the works safelywhilst observing buffer zones from existing habitat values.

A detailed Biodiversity Assessment Report (BDAR) has been prepared by Keystone Ecological in relation to the civil works extent and existing ecological environment. The BDAR has assessed the present flora and fauna species and locations. The flora and fauna protection measures within this report will be complied with throughout the development of the project.

A detailed Arboricultural Impact Assessment has been prepared by Footprint Green in relation to the civil works. The tree protection and maintenance measures within this report will be complied with throughout the development of the project. The vegetation within the civil works footprint has been identified as majority landscape gardenswhich were planted in the original 1980's site development. Species within the civil works footprint are generally not endemic to the site.

Prior to works commencing for clearing and regrading of the carpark areas and to the civil footprint, wildlife clearance inspections will be undertaken in accordance with the approved Fauna Management Plan by Cumberland Ecology and Vegetation Management Plan by Cumberland Ecology of existing trees, structures and vegetation by a qualified ecologist and any wildlife identified relocated to suitable habitat area within the site. A qualified arborist will be onsite to ensure retained trees are protected and tree protection fencing is established prior to works commencing.

Furthermore, for any works and access requirements in or through areas identified of high ecological value, the Site Arborist and Ecologist will supervise the works and advise of any specific protection measures to be undertaken to avoid any impacts.

INTERACTION WITH SURROUNDING COMMUNITY

The following actions, which focus on minimising the effects of construction activity to the community surrounding the project, will be implemented:

Pre-commencement consultation with the surrounding neighbours.

Installation of perimeter fencing to site boundaries to delineate the construction site from public areas.Protective devices will be in accordance with WHS laws, regulations, and authority requirements.

Monitor compliance of the Construction Traffic Management Plan (**Appendix B)** of this document.

Clear display of contact details on the fence/hoarding for community information and contact in case of emergency or complaint.

Make arrangements for the notification to surrounding properties of activities which may affect theiramenity, including the provision of a 24-hour contact point.

Close community liaison with adjacent neighbours.

Periodic Newsletters updating tenants and surrounding residents on construction works and upcoming activities or interactions; and

Periodic meetings to discuss the progress of works and to address any concerns raised by the surrounding community.

Community Website

FIRE PROTECTION MEASURES DURING CONSTRUCTION

All works will comply with the requirements of the National Construction Code, BCA and Australian standards related to fire protection measures during construction. Additionally, during construction, the fire brigade will be consulted with in accordance with the varying stages throughout the project. Initial site setup will include temporary Hydrant Booster/s which will then be extended throughout the site as the construction progresses. Internal fire safety measures will be progressively installed and reviewed at regular intervals. Signage will be displayed in prominent locations displaying site access locations, emergency evacuation points, main switchboard, and any fuel storage locations.

INFRASTRUCTURE ASSETS

Relevant utility providers will be consulted with throughout the design process prior and during construction for approval of the design and proposed construction methodology to ensure compliance with Health, Safety and Environmental requirements, Network Standards and Codes of Practice. A detailed Risk and Opportunity Register and work method statements shall be completed following acceptance of the design principles.

UNEXPECTED FINDS PROCEDURE

The site has been subject to separate detailed review by an environmental consultant and site auditor. Their recommendations will be followed.

In the event of an unexpected find being discovered on site, all site personnel shall follow the site-specific Unexpected Finds Protocol outlined in Figure 2 - below. This Protocol will be displayed in the Site Office and included in the Site-Specific Induction as a precautionary measure to protect workers and the community should an unexpected find be discovered.

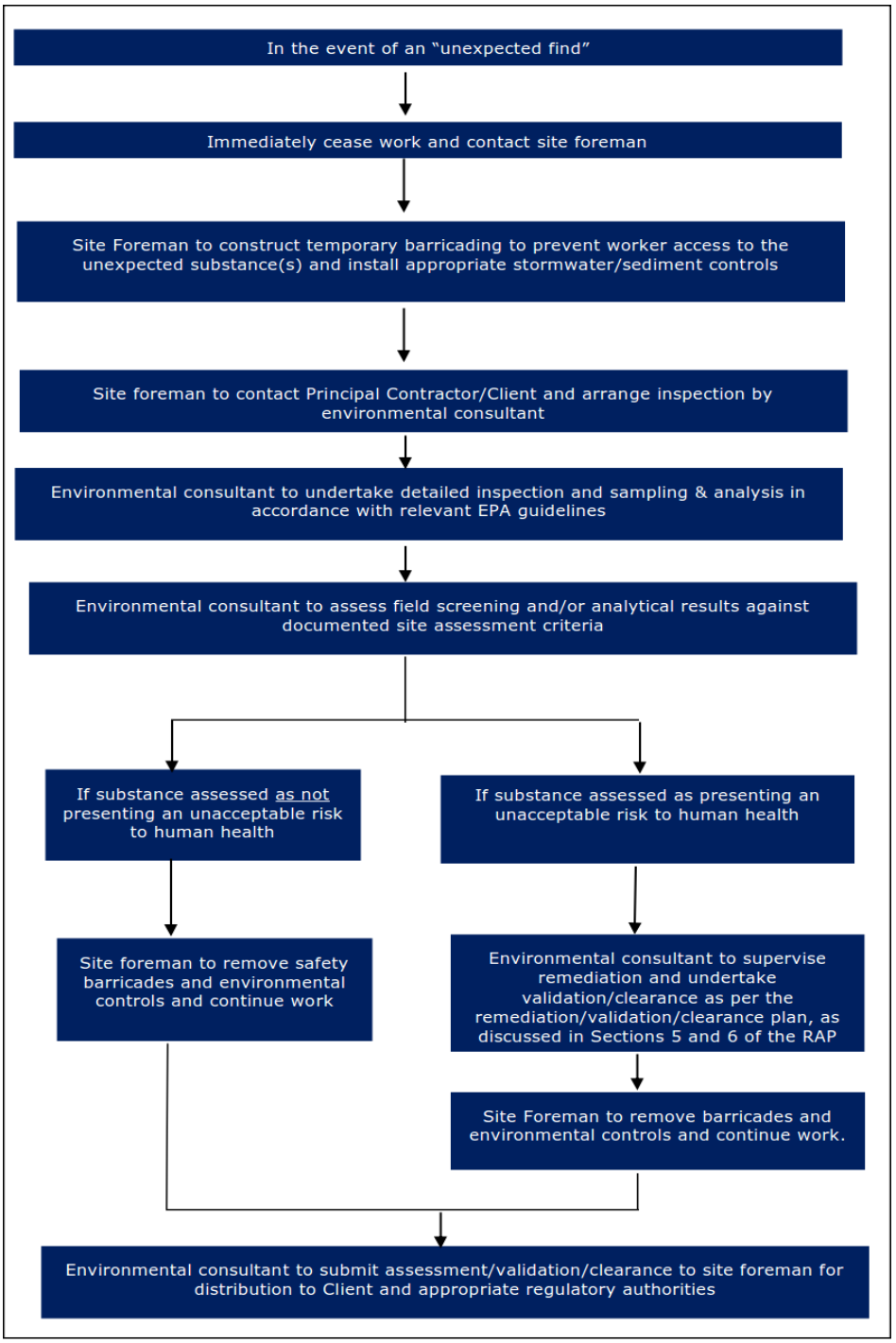


Figure 3: JBS&G Unexpected Finds Protocol

CONSTRUCTION WASTE MANAGEMENT PLAN

CONSTRUCTION WASTE MANAGEMENT PLAN

An aim of the project is to reduce the amount of waste to landfill by adopting the waste management hierarchy of *avoid* > *reuse* > *recycle* > *dispose* throughout the civil works phase.

Waste Materials generated on site are to be managed such that recycling is maximised and the volume of waste transported to landfill is minimised in accordance with Mirvac targets.

A site-specific Waste Management Plan (WMP) (**Appendix E)** has been completed which details the waste recycling, recovery, and disposal of all waste during the civil works phase of the project.

The Figure 4 below details the general principles for prevention of waste.

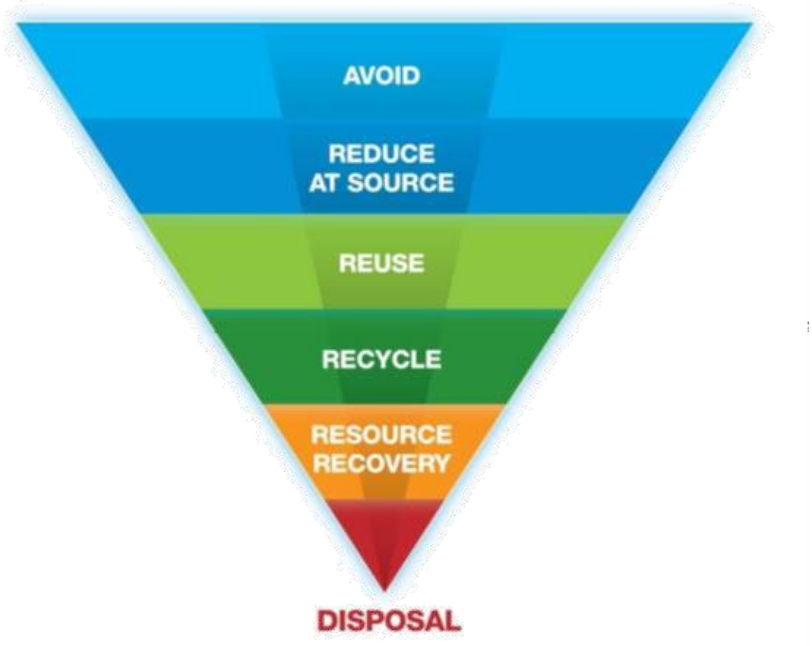


Figure 4: Waste Prevention Methodology

SUSTAINABILITY

Another aim for the site is to achieve environmental and social outcomes throughout the project by committing to implementing sustainability initiatives where possible. Exploring and implementing sustainability initiatives over and above the legislative requirements will make a significant contribution to the physical environment and the local community.

By exercising the sustainability values depicted in Figure 5 and recognising the benefits of social, environmental and economic sustainability, the project will promote a balanced lifestyle for its future occupants and the wider community which will be reflected in the development and throughout the construction phases.

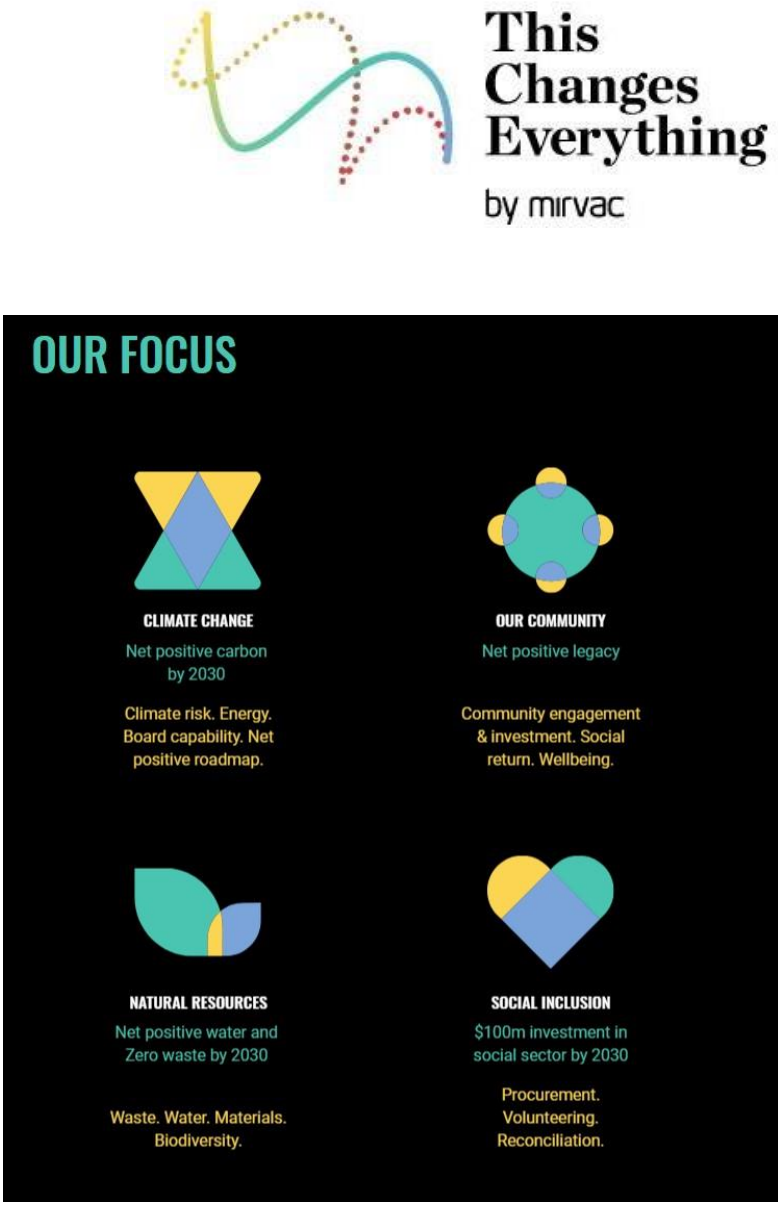


Figure 5: Mirvac's Sustainability Values

STRATEGY

Adherent with Mirvac's commitment to sustainability, an integrated approach "This Changes Everything" is focused on the responsibility Mirvac has to the environment and community. With engagement from relevant stakeholders, Mirvac seeks to deliver a culture that fosters sustainability and creates a lasting positive impact. The six aspects of this strategy include:

Climate Change:

Mirvac aims to generate more energy than we consume. In management practices, the Principal Contractor will invest in opportunities such as renewable energy onsite and assess suppliers in their involvement to sustainability.

Natural Resources:

Mirvac have made a commitment to achieve net positive water and zero waste to landfill by 2030. Through efficient use of resources, the Principal Contractor will reduce consumption of natural resources and operate in a manner which will maximise recycling of waste.

Our Community:

Mirvac has a target to triple our community investment by 2022 and create a net positive legacy. Each Mirvac project has a role to play in achieving this target.

Social Inclusion:

Mirvac has a target to spend $100 million in the social sector by 2030 to help other organisations that are purpose driven. This includes partnering with Indigenous businesses and social enterprises.

Our People:

Mirvac has a target to have a highly engaged, capable, and diverse workforce

Trusted Partner:

Mirvac has a target to be the most trusted owner and developer in Australia.

The above strategy is a group wide one to which individual projects contribute in ways that are relevant and practical to the specifics of that project.

PERFORMANCE CRITERIA

The following criteria will be monitored during construction to measure overall performance in addressing sustainability targets:

Environmental Management System

Implement a Workplace Risk Management Plan that is certified to AS/NZS ISO 14001, which establishes clear environmental objectives & targets for the site works.

Community / Sensitive Receivers

Provide opportunities for the local community to learn about the project.

Energy

Examine opportunities to reduce electricity and water consumption and the use of alternative systems implemented for site amenities.

Sustainability Induction

Construction staff will be educated on the sustainability initiatives planned for the project and be encouraged to innovate and find sustainable solutions through site induction, toolbox talks and feedback from weekly site Health, Safety and Environmental Committee meeting/inspections.

Innovation

Ongoing review of project planning and development to explore innovative options to promote sustainability on the project.

HAZARDOUS MATERIALS

EXISTING SITE SURVEY

A Hazardous Materials Survey has been completed for the site and submitted as part of the Demolition Management Plan and Stage 1 Concept Plan and Civil DA.

HAZARDOUS MATERIALS CONTROLS AND MONITORING

In the event of unexpected Hazardous materials identified within the site, the unexpected finds protocol shall be implemented. As part of the process and prior to commencement of works to remove hazardous material, air monitoring devices will be established to adjacent properties where required.

Removal of any ACM or hazardous materials will be in strict accordance with Codes of Practice for the safe removalof the relevant hazardous materials. All hazardous materials removal works will be completed by licensed contractors.

Hazardous materials disposal will be recorded. All records will include vehicle details, material type, when it was removed, and where it was disposed.

GROUND CONTAMINATION

Based on specialist advice, previous on-site testing, the JBS&G Detailed Site Investigation report and JBS&G's Hazardous Materials Survey, there is no significant potential for ground contamination to be present on site. Existing underground storage tanks are insitu concrete chambers which will be removed in accordance with EPA UPSS Regulations.

GOODS STORED ON SITE DURING CONSTRUCTION

During civil works, a hazardous materials register will be maintained as part of the Risk Management Plans and audit procedures. The hazardous materials register will include the following materials / procedures:

Fuels required for running of plant and equipment, these fuels will include unleaded petrol, diesel,and gas. All fuel will be contained and bounded as required under EPA guidelines, Department of Environment Climate Change and Work Cover requirements.

Re-fuelling procedures and designated re-fuelling areas will be implemented and allocated to eliminate risks associated with spills and will also identify procedures to contain spills.

Spill kits and adequate training will be provided to relevant construction staff and at locations identified as storage and refuelling zones.

Dangerous goods to be stored on site will also include oxyacetylene, bonding agents etc. and will also be stored as required under relevant Australian Standards, EPA guidelines, the Department of Environment Climate Change and Water, Work Cover requirements and Industry codes of practice.

Hazardous substances and dangerous goods will be stored in secure well-ventilated areas. All relevant firefighting equipment, first aid facilities and relevant authorities contact details i.e. Fire, EPA will be displayed at prominent locations and included at site inductions.

Mixed class gas cylinders, e.g. oxy and acetylene, will be separated from other hazardous substances or flammable goods by a minimum distance of 3 metres as detailed in AS4332 Storage and Handling of Gases in Cylinders. The exception to this requirement is minor storage situations (a total capacity of all cylinders in the store of less than 2,000 litres) where both oxygen and acetylene can be stored together.

Storage of dangerous goods that 'exceed' the amounts outlined in the Mirvac Group Dangerous Goods Storage Guidelines require the premises (workplace) to be licensed under dangerous goods legislation and associated regulations. To minimise workplace risk and eliminate the need for licensing, except in exceptional circumstances, it is a Mirvac Group requirement that maximum volumes of Dangerous Goods do not exceed those quantities outlined in the abovementioned guidelines.

The storage area for hazardous substances and dangerous goods shall be constructed with an impervious floor and bunded with a minimum capacity of 110% of the largest container in the store, e.g. a store consisting three 20 litre substance containers requires a bunding capacity of 22 litres.

Mirvac will maintain a dangerous goods register and material safety data sheets for each product listed as well as having a procedure to deal with potential spills.

All relevant firefighting equipment, first aid facilities and relevant authorities contact details i.e. Fire, EPA will be displayed at prominent locations and included at site inductions.

SOIL, WATER & GROUNDWATER MANAGEMENT

EROSION & SEDIMENT CONTROL PLAN

An Erosion and Sediment Control Plan **(Appendix C)** will be implemented on the project to provide site controls and mitigation measures during the project. The Erosion and Sediment Control Plan has been designed with a holistic approach in establishing, implementing and maintaining controls to minimise and trap sediment on the site.

The Erosion and Sediment Control Plan will be further developed and implemented on the project to provide site controls during the construction phases. Civil works will be undertaken in a manner to avoid erosion and sedimentation leaving the site onto the surrounding land or waterways. The plans will ensure the controls are established early during the project and maintained throughout the life of the project.

GENERAL PRINCIPLES FOR SEDIMENT & EROSION CONTROL

It is important to design and install measures that mitigate the erosion of any civil works and construction activity. Once this is achieved, run off water which carries the sediment must be controlled in such a way as to reduce the amount of sediment leaving the site. Site water and sediment management will be in accordance with EPA, Hills Shire Council and NSW Department of Housing Manual, 'Managed Urban Stormwater Soils & Construction" 2004 ('Blue Book') requirements. The following general items may be incorporated into the management of the site:

Temporary holding area for excavated material within temporary sediment basins to ensure erosion and sediment particles do not enter surrounding waterways.
Ingress of water due to periods of heavy rain will be managed through on-site detention. Excess surface water will be channelled into dedicated sediment holding bund/ tank. This water will be cleaned, the water will be pumped to stormwater following cleaning and treatment in accordance with the Principal Contractor's water quality discharge procedures, Environmental Protection Authority (EPA) and Sydney Water requirements.
Stockpiled materials will be kept to required batters stabilised to ensure soil is not eroded and silt fencing installed around the stockpile to prevent sediment run off. Stockpiles are to be stabilised with hydro mulch when they will be in place for greater than 14 days.
Appropriate stabilised site access and/or shaker grids will be installed at site access points.
During the construction period, a wheel wash system will be implemented to ensure loose material does not migrate off site.
Vehicles leaving the site will secure and cover their loads. All trucks will be inspected prior to leaving the site (where applicable).
All roads and pedestrian footways surrounding the site will be swept to remove any debris associated with the works on the site. Street sweeper will operate during site hours for cleaning the site frontage.
Silt fences are designed to filter run-off (if any) leaving the site, trapping sediment, and allowing filtered water to pass; and
Discharge of site generated catchment water shall be managed in accordance with the Principal Contractor's Water Quality Discharge Procedure and EPA Guidelines.

STORMWATER MANAGEMENT

The objectives of the Stormwater Management Plan during civil works is to ensure:

Compliance with Hills Shire Council requirements
Mitigate and/or address discharge of stormwater off the site and to ensure that the environmental values of receiving waters are maintained or enhanced
Adequate erosion and sediment control measures are implemented prior to the commencement of civil engineering and are maintained during the entire works phase; and

Construction site runoff is appropriately treated in accordance with the requirements of NSW Department of Housing Manual, 'Managed Urban Stormwater Soils & Construction" 2004 ('Blue Book')

As part of these works, erosion and sedimentation controls shall be constructed in accordance with the civil engineering drawings, and the 'Blue Book' prior to any earthworks commencing on site and in accordance with staging requirements. These details are represented on Northrop's Erosion and Sediment Control drawings **(Appendix C).**

Sediment Basins

Ten (10) concept sediment basins have been designed by Northrop Engineers to capture site runoff during construction and have been located at the low points of each sub-catchment. The basins will be constructed in stages to enable maximum runoff capture and dissipate flows for downstream protection. These are assisted by the construction of diversion swales to capture direct runoff to the basins.

Calculations to determine concept design basin size have been based on proposed developed catchments and available geotechnical information regarding soil types.

The sediment basins are to be maintained throughout the civil and construction works, ensuring they operate effectively. Stormwater in the sediment basins will be removed by either pit (above base) and pipe system or pumping to maintain the minimum storage volume at the lower level of the settling zone. Overflow weirs shall be provided at each sediment basin to control overland flows for rainfall events more than the design criteria which is to cater for storm events up to an including the 10 years ARI storm event. The concept sediment basin volumes are summarised in Table 1 below.

SEDIMENT BASIN VOLUMES

Basin No.	Catchment Area (ha)	Volume Required (m^3)	Volume Provided (m^3)
1	0.5	142	142
2	0.5	129	129
3	0.4	115	115
4	1.5	392	392
5	0.6	166	166
6	2.022	532	532
7	1.1	290	290
8	1.03	272	272
9	0.63	166	166
10	0.64	167	167

Table 1: Sediment Basin Volumes (Northrop Consulting Engineers)

Flood Control Mitigation

Additional flood control modelling was provided during the DA phase to further demonstrate the reduced impact on flowrates for pre-developed flowrates in comparison to the post-developed flowrates for all storm events up to and including the 100-year ARI. The results of this additional analysis and modelling were summarised in Northrop Engineers Civil Engineering Assessment Report Rev 13 (01.06.22), 2022-08-10 DA860-2022 - Supplementary Flood Response (1), 2022-09-02 Addendum for Civil Engineering Assessment Report, Request for Information dated 05/09/2022 and SY172528-00-BE Stage1 CC1 Letter V2 dated 15/03/2023.

During the bulk earthworks operations, the hydraulic performance of the site, particularly with impacts downstream will need to be strictly managed to ensure the following:

- Necessary flood control structures and/or temporary detention systems are in place onsite
- Flood control structures are maintained throughout the entire development to ensure downstream impacts are reduced

Detailed DRAINS model supporting the drainage network reflecting each stage/phase of the development works has been submitted to the principal certifying authority (PCA) for review and approval to ensure the conditions outlined in the development consent are addressed and adhered to on site.

Civil Measures

Prior to any earthworks commencing on site, all sediment and erosion control measures will be implemented. The measures are in accordance with the NSW Department of Housing Manual, "Managing Urban Stormwater Soils & Construction" 2004 'Blue Book' and will be required to be managed to suit the construction sequence, programme, and methodology. These measures will include:

- A security fence to the temporarily constructed around the extent of works, with a security fence around the site office area and the proposed sediment basins as required.
- Installation of sediment fencing downstream of disturbed areas, including any topsoil stockpiles'
- Installation of silt arrestors to collect site runoff and retain suspended particles'
- Use of dust control measures including stabilising stockpiles, dust suppression through water carts and misting / watering of exposed areas and excavation work zones.
- Placement of hay bales or mesh and gravel filters around and along proposed catch drains and around stormwater inlet pits; and
- Construction of temporary sediment basins progressively to suit earthworks staging for flood control mitigation.

TRAFFIC MANAGEMENT PLAN

INTRODUCTION

A Construction Traffic Management Plan (CTMP) has been prepared for the civil works stage of this project. The CTMP addresses the site in context with its surrounding environment, location, and road network as well as traffic flows in line with the overall principles of traffic management and the proposed working hours.

Refer to **Appendix B** for the CTMP prepared by the Traffic Consultant PTC Consultants.

ADJOINING ROAD NETWORK

Coonara Avenue: a local road that runs in a north-south direction along the western boundary of the Site. The road is subject to a 50 km/h speed zoning and generally carries two lanes of traffic in either direction with an

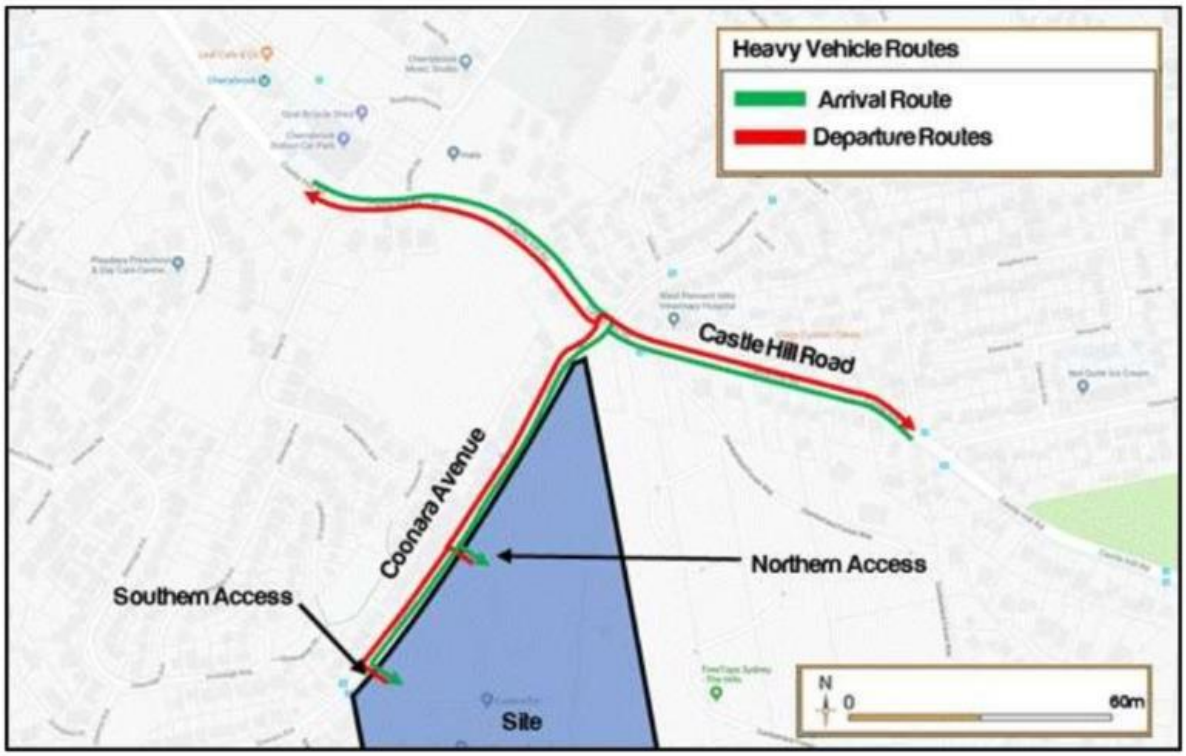
undivided carriageway. There are currently "No Parking" restrictions along the length of Coonara Avenue fronting the site, and timed parking restrictions on the opposite kerbside.

Castle Hill Road: A Roads & Maritime Services (Roads & Maritime) classified as a main road that runs in an east- west direction along the northern boundary of the Site. The road is subject to a 60 km/h speed zoning and generally carries two lanes of traffic in either direction with an undivided carriageway. There is morning and afternoon peak clearways operating between 6:00 – 10:00 am and 3:00 – 7:00 pm Monday to Fridays, otherwise there are 'No Stopping' on both sides of the road.

VEHICLE ROUTES

The routes for all construction vehicles proceeding to and exiting from the project have been identified in the CTMP. The routes have been determined by assessing travel and turning paths at the intersections and to minimise the impact of construction traffic on local streets and highly activated pedestrian frontages. Dedicated vehicle routes have been devised to use the arterial road network as much as possible. The nominated routes to and from the site are shown below and in the CTMP **(Appendix B)**. Site entry signage will be installed to direct all deliveries to the correct areas.

Figure 6: Heavy Vehicle Route – Incoming and Outgoing



ACCESS AND EGRESS TO SITE

8.4.1 Construction Vehicles

For the duration of the civil works, vehicles are proposed to utilise Coonara Avenue as the site entry / exit point via dedicated gates at the existing southern and northern driveways on Coonara Avenue, and as such will mitigate the impact to the surrounding residents. The proposed site access and egress layout is shown in Figure 6.

The following will be implemented for site access and egress points:

The entry / exit gates at the existing Coonara driveway be manned by a qualified traffic controller during working hours

when trucks are entering and exiting the site. Traffic Controllers will be responsible formanaging vehicular, pedestrian and cyclist traffic movements. Mirvac shall ensure that clear access ismaintained to facilitate any emergency access/evacuation.
No vehicles will be allowed to be parked or stabled on Coonara Avenue. All vehicles are to enter the site and be parked within the site boundary.
Relevant statutory signage shall be erected defining the vehicle entry and exit points at all stages of civil works.
Internal traffic control measures including statutory signage and authorised traffic controllers to mitigate any potential lant/plant or plant/personnel risks.

TRAFFIC FLOW

While the site was fully operational as a commercial business park there was up to 960 vehicles per hour during peak periods generated from the site. Comparatively, the combined trip generation of light and heavy vehicles during the civil works is expected to be materially lower between 40 – 50 vehicle movements only.

Stage	Vehicle Types	Average Vehicle Trips Per Day	Estimated Peak Vehicle Trips Per Day
Civil works	HRV (12.5m), Articulate Vehicle (19m)	60	85

Figure 7: Estimated vehicle trips per day

From the CTMP prepared, it has been determined that the peak traffic volumes represent less than the previous operational volumes of the commercial site and as such will have minimal effect on the surrounding road network.

PLANT & EQUIPMENT

The following is a summary of the types of plant and equipment that will be utilised for the civil works phase of the project:

- Articulated flatbed truck for delivery of site sheds and hoarding materials.
- Articulated float / low loader for delivery of earth moving equipment such as excavators, dozers, dump trucks and piling rigs.
- Truck and trailers for delivery of clean excavated material to the site.
- Concrete trucks for delivery of ready-mix concrete.
- Prime mover and enclosed flatbed trailer for delivery of materials.
- Medium rigid vehicles, small rigid vehicles, vans, and couriers to deliver smaller materials.
- Construction service vehicles as required to facilitate the delivery of the civil works.

LOADING AND UNLOADING OF MATERIALS

All loading and unloading of materials will be undertaken within the site boundary. Based on the proposed staging and construction methodology there is currently no requirement for a work zone. For authority infrastructure augmentation works and road crossings for connections, the footpath and roadway will be appropriately managed utilising footpath closures as required and driveway access maintained for all residents on Coonara Avenue. Any footpath and road opening permits will be applied for with The Hills Shire Council (HSC).

Other measures to be incorporated include:

- Statutory and directional signage to be installed and maintained throughout construction.

- All loading and unloading operations are to comply with Work Safe and relevant authorities'
- requirements.
- No materials will be stored on public footpaths, roads, or shared access ways.
- Should any lane closures be required, a relevant traffic management plan will be issued along with any required permits and if deemed required, a local resident warning

TRAFFIC & PEDESTRIAN MANAGEMENT

For the duration of the project, pedestrians will be able to continue to safely use the public footpaths adjacent to site. Prior to the works commencing the site perimeter will be fully secured with security fencing. The existing footpath on the eastern side of Coonara Avenue enters the northern access into site, which will be removed during construction. During this time, all pedestrians are to be directed to the opposite footpath.

All site workers and visitors shall enter and exit the site via designated pedestrian access points around the site. Statutory and directional signage will be established at all site entry and exit points to alert pedestrians and other drivers to the movement of demolition traffic. All visitors to the site will always be required to be escorted by the Principal Contractor and will be provided with a defined entry path from the point of entry.

WORKER AND STAFF PARKING

There will be parking available on the construction site. All site workers and all personnel related to the civil works onsite will be actively encouraged to utilise public transport to access the site. There are high frequency bus services within immediate walking distance and the Cherrybrook Metro Station within 800m from site. Workers will be instructed there is strictly no parking in neighbouring streets.

NOISE AND VIBRATION MANAGEMENT PLAN

INTRODUCTION

A detailed Construction Noise and Vibration Management Plan (CNVMP) for the civil works has been prepared by Acoustic Logic **(Appendix D).** This management plan provides guidelines to reduce potential noise and vibration to nearby residents, asset owners and ecologically sensitive receivers while works are carried out. The CNVMP primarily deals with potential vibration and noise generating activities associated with the civil works.

The CNVMP will be in accordance with the targets and guidelines of the NSW EPA Interim Construction Noise Guideline (ICNG), 2009. The CNVMP will also be updated to address the requirements of any conditions of consent.

In addition, the CNVMP details specific criteria for noise and vibration targets and monitoring methodology relative to the neighbouring properties, ecological considerations, assets, and infrastructure. Mirvac and the Principal Contractor will comply with the obligations provided in the CNVMP and commit to the Noise and Vibration Control Measures detailed within this section of the CEMP.

PLAN OBJECTIVE

The principal objectives of the CNVMP are:

Identification of the noise and vibration standards which will be applicable to this project.
Formulation of a strategy for construction to comply with the standards identified in the above point.
Development of a monitoring programme to measure and regulate noise and vibration associated with the project.
Liaise with Local Authorities and neighbouring property owners when required.

NOISE CRITERIA

The criteria for noise from civil works on the project will ensure acceptable levels are maintained within the site and to surrounding properties. The noise criteria is outlined in the Construction NVMP.

Further to this, specific criteria relating to noise control limits, extent of works and monitoring shall be developed in consultation between Mirvac and the civil works contractor. These specific criteria will be included within the CNVMP.

VIBRATION CRITERIA

The criteria for vibration from civil works on this project will ensure acceptable levels are maintained within the site and to surrounding properties. The vibration criteria will be outlined in the CNVMP.

Further to this, specific criteria relating to vibration control limits, extent of works and monitoring shall be developed in consultation between Mirvac and the civil works contractor and these will be included within the CNVMP.

CONTROL OF CIVIL WORKS NOISE AND VIBRATION

As part of the CNVMP, a detailed review will be undertaken of each of the proposed activities which will occur as a part of the civil works prior to commencement. The execution of this work will confirm the effectiveness of ongoingnoise control strategies for this project. In addition, the site working hours will be strictly enforced and all workscarried out in accordance with approved consent conditions, Council and Regulatory codes (or as otherwise approved). Any works outside of standard work hours for float deliveries and the like will require statutory approvals from Transport for NSW and Council. Resident notification will also be provided in writing to affected neighbouring residents.

NOISE AND VIBRATION CONTROL METHODS

The determination of appropriate noise control measures are dependent on the particular activities and construction plant. This section provides an outline of the proposed methods:

Substitution by Alternative Process

Where a particular activity and/or construction appliance exceeds noise criteria, it may be possible to select an alternative process.

Engine Silencing

Where construction plant / appliances exceed noise criteria, the use of silencing devices may be possible. These may take the form of engine shrouding, or residential class mufflers fitted to exhausts.

Emission Restrictions

During the construction process, noise emission will be checked for specified plant and equipment. The implementation of random noise monitoring will ensure equipment remains within the specified limits.

Equipment Locations

The location of equipment will be considered during construction to ensure plant and equipment is located in suitable positions from noise sensitive areas, optimising attenuation effects from topography, natural and purpose-built barriers and material stockpiles.

Equipment Maintenance

To determine the requirement for silencing devices on machinery it is proposed to undertake regular noise checks. Noise levels of all machines on site will be monitored for each equipment type. Items such as mufflers and engine shrouds will be maintained to ensure they are in good working order.

ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

Continual communication is required between all parties that may be affected, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

Inform and educate groups about the proposed works and the noise controls being implemented.

Increase understanding of all acoustic items related to the proposed works and options available.

Identify group concerns generated by the project, so that they can sought to be addressed.

Provide advice about the time and duration of potential noisy activities.

Ensure that concerned individuals or groups are aware if and have access to the site complaints register which will be used to address any noise related problems, should they arise.

In addition to the above, Mirvac have also proactively taken steps to establish a Community Reference Group prior to any works commencing on site.

NOISE COMPLAINT PROCEDURE

The project team will ensure that there is a specific procedure in relation to the handling of noise related complaints. When a noise related complaint is brought forward, the specific details will be recorded on the Mirvac community contact register form. The details will then be reviewed by the site manager. The site manager will then assess the complaint against Mirvac's construction guidelines in relation to approved working hours, development consent conditions, noise levels and any other relevant items relating to the matter. Mirvac will close out the matter accordingly within 48 hours.

If a breach of the guidelines and restrictions is found, further action will be taken to resolve the matter. If a suitable outcome cannot be achieved, a suitable acoustic and vibration engineer will be consulted to review and respond to the noise complaint. Further notification will then be provided to the complainant of the course of action to be taken to resolve the matter.

AIR QUALITY CONTROL

A Dust and Odour Management Plan has been prepared by JBS&G **(Appendix G)** to detail dust and odour mitigation measures for the site during civil works. Any complaints that may eventuate from neighbouring properties will be actioned in accordance with the Community Contact register requirements.

DUST

Dust created by civil works related activities typically become more prominent during windy conditions and will be managed by way of water suppression and select work procedures. Visual monitoring is to be undertaken throughout the civil works phases of the project.

The implementation of the below dust mitigation measures shall be incorporated to reduce the likelihood of potential issues occurring.

The construction site will be maintained and kept clean. Where suitable, the use of mechanical sweepers and covered waste bins will be utilised.
Controlled site access will be maintained, with vehicle wash down / clean down facilities to be established to maintain access roads.
All vehicles on site shall be confined to a designated route with speed limits enforced
All materials transported from site in trucks will be appropriately covered.
Material should be, where possible, loaded directly into a truck for offsite disposal. Where materials may be identified for beneficial re-use, materials should be taken to suitable location rather than demolition, stockpile, transport, and placement. This approach reduces double handle of materials and potential for excessive dust generation.
Stockpiles will be stabilised and hydro mulch utilised on stockpiles that
Silt and other materials will be removed from and around erosion control structures following any significant rain events to ensure sediment deposits do not become dust sources.
The site perimeter will be encapsulated with hoardings / shade cloth to minimise the egress of dust at the boundary of the site
Weather forecasts will be monitored from the Bureau of Meteorology and works managed to mitigate adverse weather
Water points will be located around the perimeter of the work zones and will be used during specific activities as required. Dust Suppression systems including Fog Cannons will be utilised during bulk excavation works to minimise dust.

ODOUR

Odours may be controlled such that they are minimised as far as practical at the boundary of the site during civil works. Odours shall be detected on the sense of smell. The following odour control procedures can be undertaken if required.

Use of appropriate covering techniques to cover stockpiles
Use of fine mist sprays
Adequate maintenance of equipment and machinery to minimise exhaust emissions.

As most of the site excavation is within sandstone rock, odours from organic soil is expected to be of low probability.

WORKPLACE RISK MANAGEMENT

INTRODUCTION

Mirvac is fully committed to providing a safe working environment.

A licensed Civil Works Contractor will be appointed as the Principal Contractor and will implement a Risk Management Plan that requires equipment, workplaces and practices comply with relevant regulations and standards. Regular and ongoing reviews of these standards will be conducted and where higher standards are practical and desirable, they will be adopted. In addition, Mirvac will:

Provide adequate resources to satisfy this policy.

Identify, control, and reduce work-related hazards and risks that may produce injury, illness, or asset damage.

Identify, quantify, and control to safe levels, those chemicals, and physical agents in the workplace capable of causing ill health.

Promote the Environmental, Health, Safety and Welfare of employees and subcontractors while respecting the privacy of individuals.

Provide information, instruction, and training for employees to increase their personal understanding of workplace hazards and promote safe working practices

Consult employees and contractors in environmental, health and safety to reduce workplace hazards and risks.

Consult with clients, industry bodies and others in the development of appropriate standards, control strategies and monitoring techniques which comply with the requirements of statutory authorities.

Set short- and long-term goals in work health and safety management, and review performance against these goals.

SAFETY PLANS AND SAFE WORK METHOD STATEMENTS

The preparation, implementation and continued improvement of the Risk Management Plan and Job Safety Environmental Analysis is the key to success in the management of the Project's Safety.

This plan includes:

A description of the work to be undertaken.

An identification of the hazards associated with the works.

A description of the hazard control measures to be used; and

Nominated persons responsible to ensure all persons are consulted into the safe work method statement and ensure controls are implemented.

A detailed Site-specific Workplace Risk Management Plan will be implemented prior to commencement of works and updated as required.

ACCOUNTABILITY OF KEY PERSONNEL

All personnel have a role and are responsible for the environmental management of the project. The key personnel accountable for the environmental management are as follows:

Workplace / Site Managers

Manage all reported hazards and environmental impacts in an appropriate and timely manner.
Provide suitable supervision, instruction and facilitate training, to provide employees or service providers with the knowledge and skills required to undertake their work duties safely and in a manner which minimises risk to the environment.
Establish the development of a Workplace Risk Management Plan in accordance with the Mirvac Group Health Safety Environment Management System and the objectives of the Health Safety Environment Policy.
Facilitate the development of a workplace specific Induction and workplace rules in accordance with the Mirvac Group Health Safety Environment Management System.
Verify that health safety and environment conditions stipulated in the contract are formally evaluated in the award of tendered or high-risk contracts.
Facilitate the review of Service Provider health safety and environment plans or procedures for specific work contracts including HSE Management Plan and Job Safety Environment Analysis or equivalent documentation using Mirvac Group form Service Provider Permit for Works to Proceed prior to the contractor commencing work at the workplace.
Establish control methods and procedures for the reduction of noisy plant and equipment as outlined in the Mirvac Group Noise Management Procedure.
Facilitate regular workplace inspections by the foreman or other area supervisors using the Mirvac Group Workplace Health Safety Environment Inspection and implement corrective action where deficiencies are identified.
Secure areas such as flora or fauna habitats identified for environment protection.
Record community contact by stakeholders affected by the project on Mirvac Group Community Contact Register and instigate action within 48 hours including a response to the initiator of the contact.
Facilitate the resolution of any disputes which may arise over workplace health safety environment issues.

HSE Officers:

Undertake HSE duties as directed by the Workplace Manager consistent with the requirements of the Health Safety Environment Management System
Identify work activities which have the potential for significant (material harm) impact on the environment and ensure they are planned and executed to minimise risk to the environment.
Ensure a Community Contact Register is maintained and that any contact is recorded, and corrective action implemented with a response to the community member within 48 hrs.
Facilitate the dissemination of health safety environment information to all relevant personnel.
Assist the Workplace Manager in developing a written corrective action plan to eliminate any deficiencies identified from any workplace audit by an internal or external third party. The time frame for rectification of issues raised in any inspection, audit or other appraisal shall be determined by the Division/Regional HSE Manager but shall not exceed 30 days.

HSE Representative:

Report on health safety environment performance.

Assist in the development of a workplace specific Induction and workplace rules in accordance with the Mirvac Group
Health Safety Environment Management System.

Site Supervisor:

Develop appropriate and timely remedial action for reported hazards & environmental impacts
Provide suitable supervision, instruction and facilitate training to provide employees or service providers with the knowledge and skills required to undertake their work duties safely and in a manner, which minimises risk to the environment

EMERGENCY RESPONSE AND EVACUATION

The Workplace Manager, or a nominated representative, in conjunction with other appointed Mirvac personnel will develop emergency procedures for the workplace including an emergency contact list to be displayed on the workplace notice board and at other prominent locations. The Emergency Response Contact Information Table is completed by the Workplace Manager or a nominated representative.

Each workplace has a stand-alone documented Emergency Response Plan (ERP) prepared in accordance with the WRMP.

Group Emergency Response Procedures are tested regularly. Where an Ambulance is called to attend a workplace injury, a Standby Person has been nominated and positioned at the main entry to the workplace to assist Ambulance Officers to locate and attend the injured person as required by the Mirvac Group Emergency Response Procedure. A completed Mirvac Group Emergency Call procedure is displayed in the workplace which provides a summary of information required when making an emergency call.

HIERARCHY OF CONTROLS

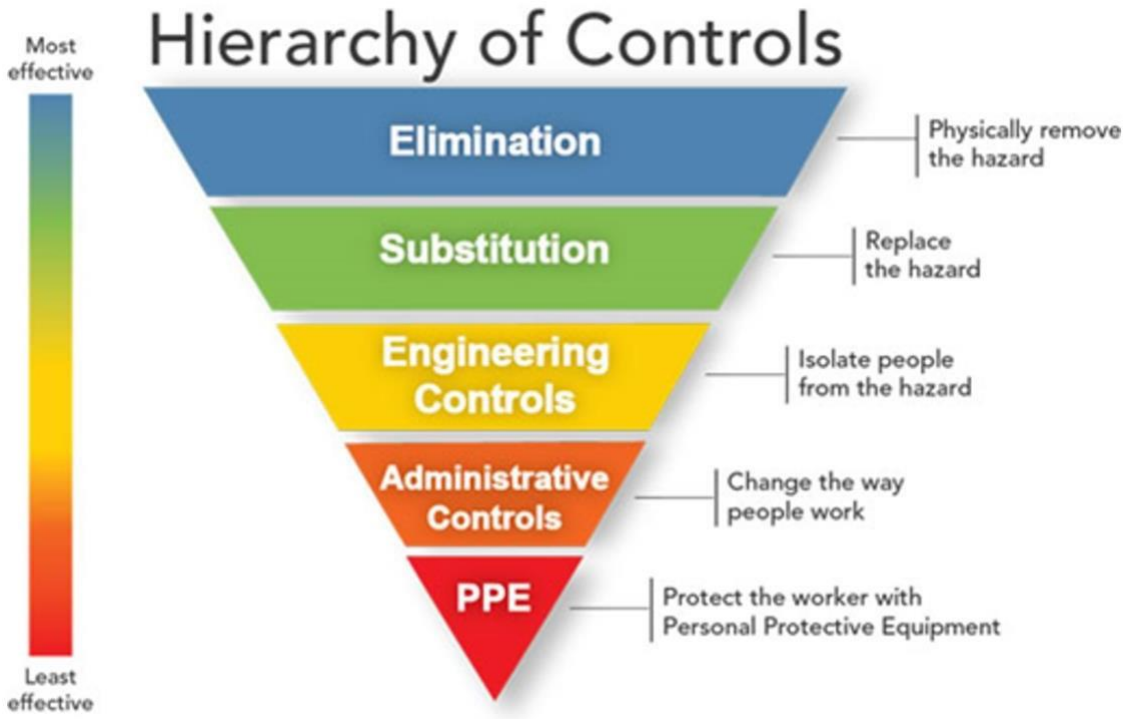


Figure 8: Hierarchy of Controls

COMMUNITY CONSULTATION

INTRODUCTION

Consultation will be made with the local community and relevant agencies at an appropriate time and setting by a Mirvac representative via the Community Reference Group (CRG). The objectives of the consultation are to outline all major activities, operations and environmental performance of the project which may affect their amenity.

Using sound management practices, positive engagement with stakeholders, authorities or customers can be achieved. Members of the community who are involved with Mirvac can expect opportunities for discussion and feedback. Mirvac upholds high regard and is sensitive to social amenity and the lifestyle impacts of its business undertakings and mirrors it in response.

Commitment to community consultation will be achieved by:

Establishment of a Community Reference Group.

Community Information Sessions

A dedicated Community Liaison Officer

Weekly works meetings to highlight activities with potential impacts on neighbours

A project newsletter

Advance notification of higher impact works i.e. noisy or disruptive operations and the estimated durations

A project emails

Regular contact of neighbouring properties

Individual stakeholder meetings on request

Site signage with 24-hour contacts

Community website

DISPUTE RESOLUTION

Mirvac acknowledges the potential for disruption because of the development and proposes that a complaint procedure and register be developed. Should a complaint or infringement occur, the following procedures are to be adopted in accordance with the Mirvac group wide standard systems:

All complaints and infringements are to be brought to the attention of the Mirvac Site Manager immediately upon receipt.
The Mirvac Site Manager shall investigate the complaint and ensure appropriate action is taken to address the complaint or infringement within the time frame HSE Objectives and Targets for Community Contact Issues detailed within the Mirvac Construction HSE Management Systems Manual.
A Community Contact Notification form shall also be completed for all complaints and enquiries
A copy of this documentation is to be filed within the site office.

The contact details of the Site Manager will be permanently shown on the site noticeboard to be displayed in a prominent location at the site entry as an emergency 24-hour contact.

APPENDICES

APPENDIX A – SITE PLAN

APPENDIX B – CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT PLAN (PTC CONSULTANTS)

APPENDIX C - SEDIMENT & EROSION CONTROL PLAN (NORTHROP)

APPENDIX D – CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN (ACOUSTICLOGIC)

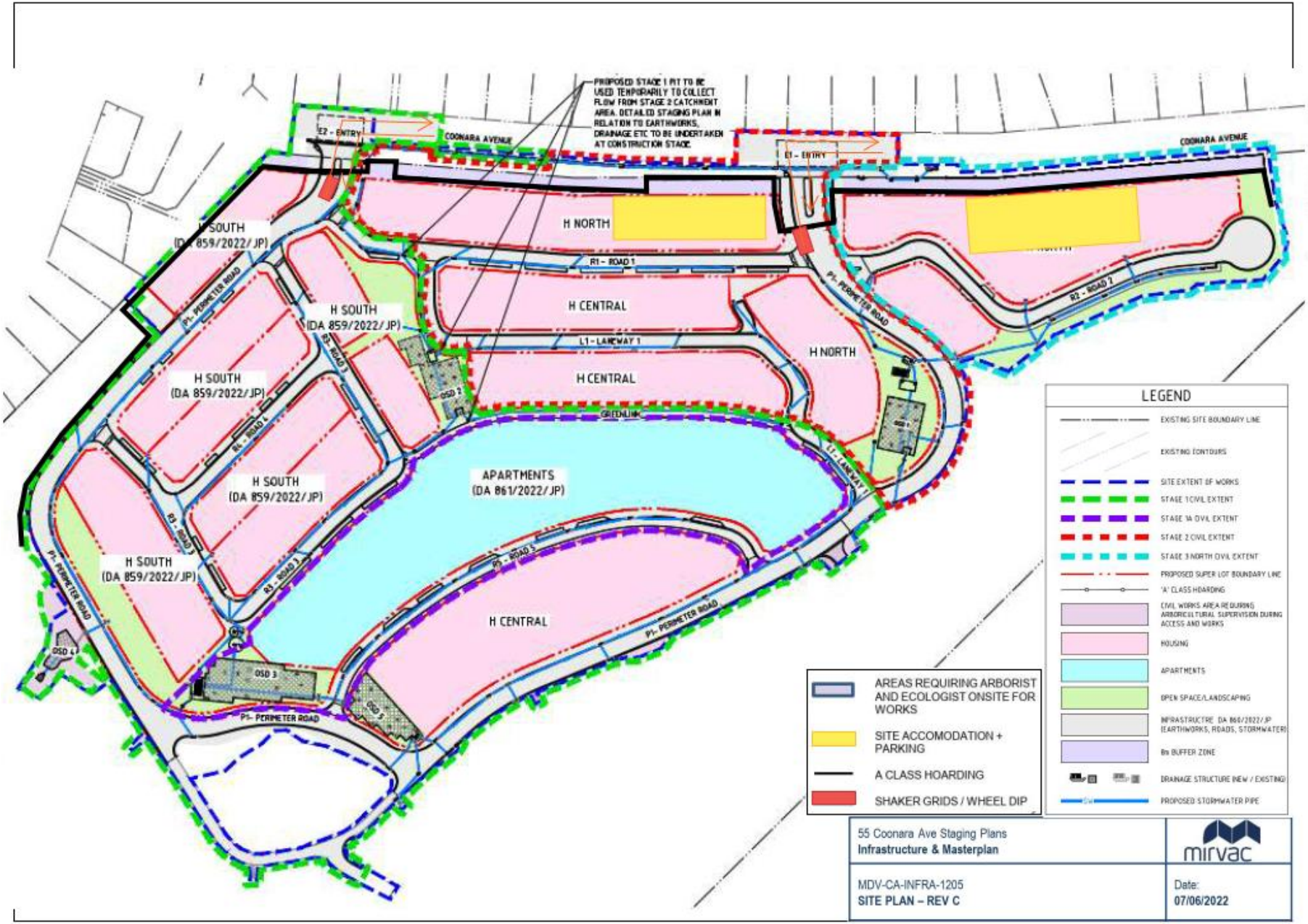
APPENDIX E – WASTE MANAGEMENT PLAN

APPENDIX F – MIRVAC GROUP POLICIES

APPENDIX G – DUST AND ODOUR MANAGEMENT PLAN (JBS&G)

APPENDIX H – FAUNA MANAGEMETN PLAN (CUMBERLAND ECOLOGY)

APPENDIX A – SITE PLAN



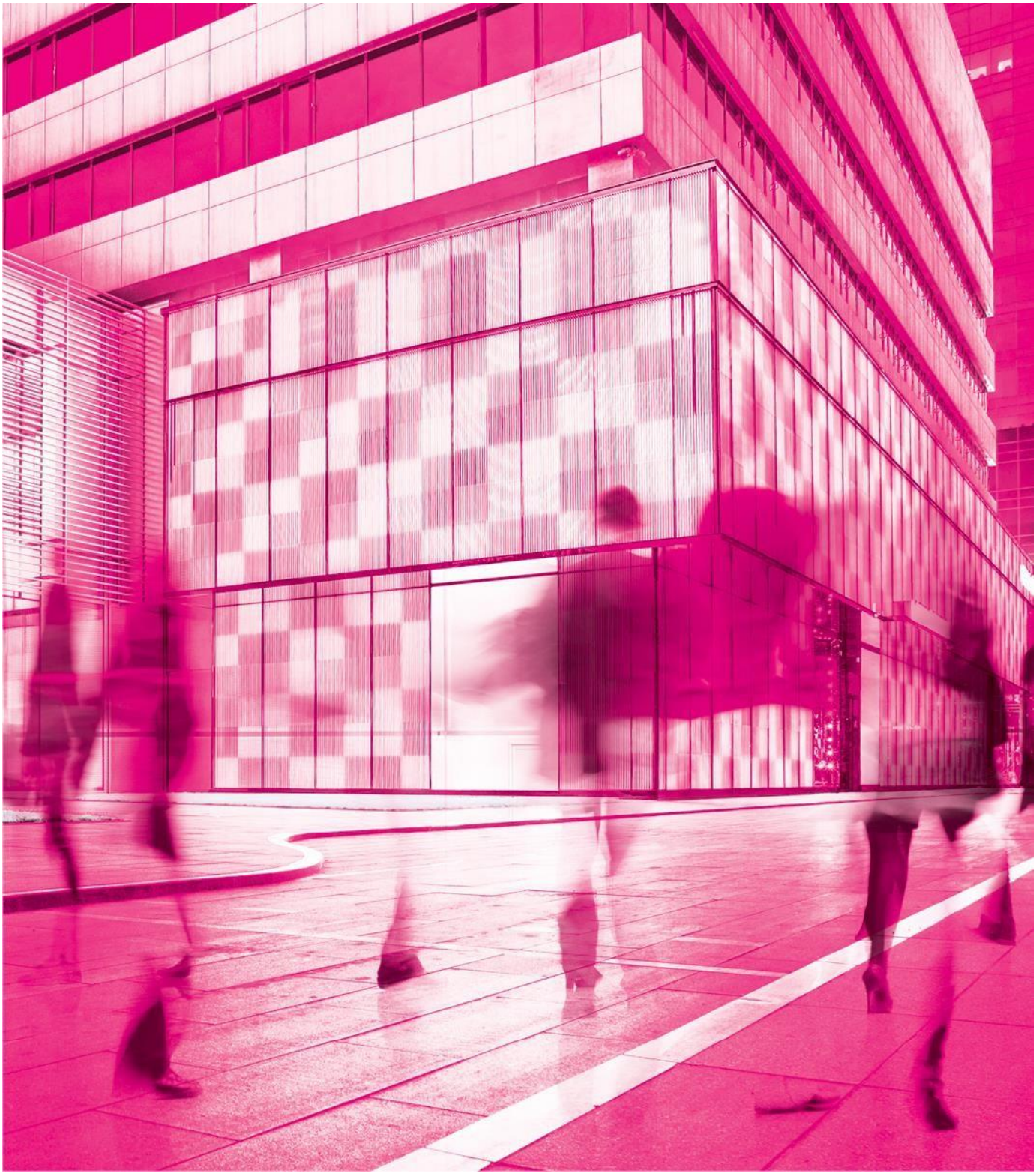
55 Coonara Ave Staging Plans
Infrastructure & Masterplan

mirvac

MDV-CA-INFRA-1205
SITE PLAN – REV C

Date:
07/06/2022

APPENDIX B – CONSTRUCTION TRAFFIC & PEDESTRIAN MANAGEMENT PLAN (PTC CONSULTANTS)



CTMP;

Concept Development Application
Including Detailed First Stage Civil Works
55 Coonara Avenue West Pennant Hills

For Mirvac

14 February 2023

parking;
traffic;
civil design;
wayfinding;

ptc.

Document Control

Concept Development Application Including Detailed First Stage Civil Works 55 Coonara Avenue WestPennant Hills, CTMP

Issue	Date	Issue Details	Author	Reviewed	For the attention of
1	21/05/2021	Draft Issue (V01)	JJ	DB	Marney Watt
2	20/07/2021	Final Issue (V02)	JJ	DB	Robert Malcolm
3	23/07/2021	Final Issue (V03)	JJ	DB	Robert Malcolm
4	29/07/2021	Final Issue (V04)	JJ	DB	Robert Malcolm
5	03/09/2021	Final Issue (V05)	JJ	DB	Robert Malcolm
6	14/02/2023	Final Issue (V06)	AM	DB	Rohan Virwani

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Contents

List of Figures

List of Tables

Introduction

Project Summary

ptc. has been engaged by Mirvac to prepare a Construction Traffic Management Plan (CTMP) to accompany a Concept Development Application that includes the detailed First Stage comprising the Civil Works to The Hills Shire Council for the proposed redevelopment of the site located at 55 Coonara Avenue,West Pennant Hills.

The location of the site is shown in the local context in Figure 1.

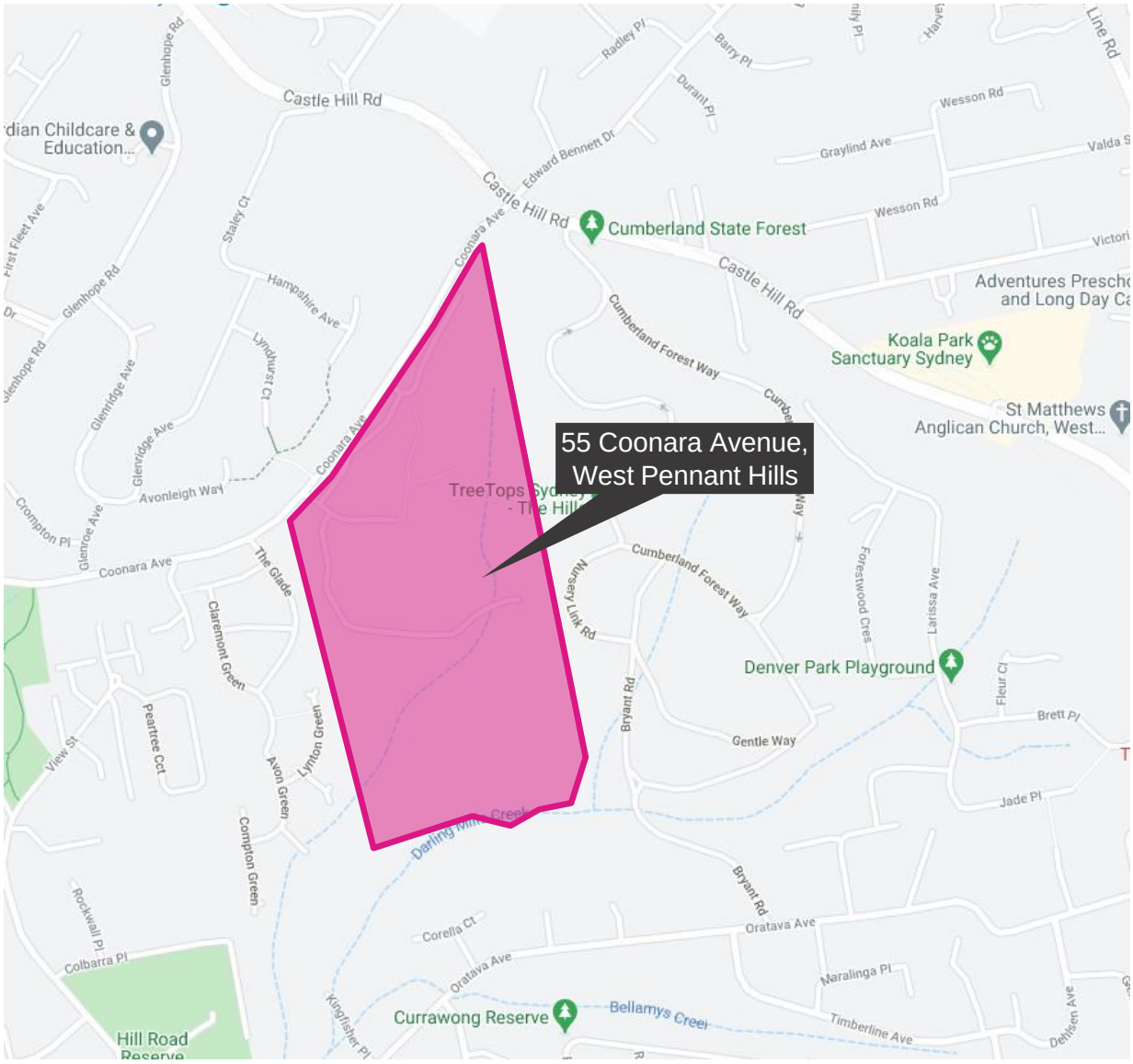


Figure 1: Site Location (Source: Nearmap)

Background Information

Site Context

This CTMP has been prepared in relation to the proposed redevelopment of a 25.87 hectare site at 55 Coonara Avenue, West Pennant Hills.

The proposed development is generally limited to the previously disturbed portion of the site, that was developed as an orchard prior to 1940 and subsequently developed in the 1980s by IBM as a 36,000 square metre office facility.

Recent rezoning of the land has ensured the ongoing protection of remnant forest areas, by implementing an E2 Environmental Conservation zone.

The proposed development is limited to the land zoned R3 Medium Density Residential and R4 High Density Residential and provides for a combination of two and three storey dwelling housing and attached dwellings, as well as apartment buildings.

The concept proposal provides for a total of approximately 166 attached dwellings and dwelling houses and 252 apartments, as well as communal facilities. The development will include public and private open spaces. Also included in this DA is the civil engineering works component including; site clearing, sediment and erosion control, bulk earthworks, piling, roads, retaining walls, stormwater and services infrastructure.

Surrounding Land Use

The site is zoned Medium Density Residential (R3), High Density Residential (R4) and Environmental Conservation (E2) zone and the LEP permits a maximum of 600 dwellings on the site. The site is surrounded by the following key land zones:

Environmental Living zone (E4);

Low Density Residential zone (R2);

Medium Density Residential zone (R3);

Public Recreation zone (RE1);

Private Recreation zone (RE2); and

Forestry zone (RU3).

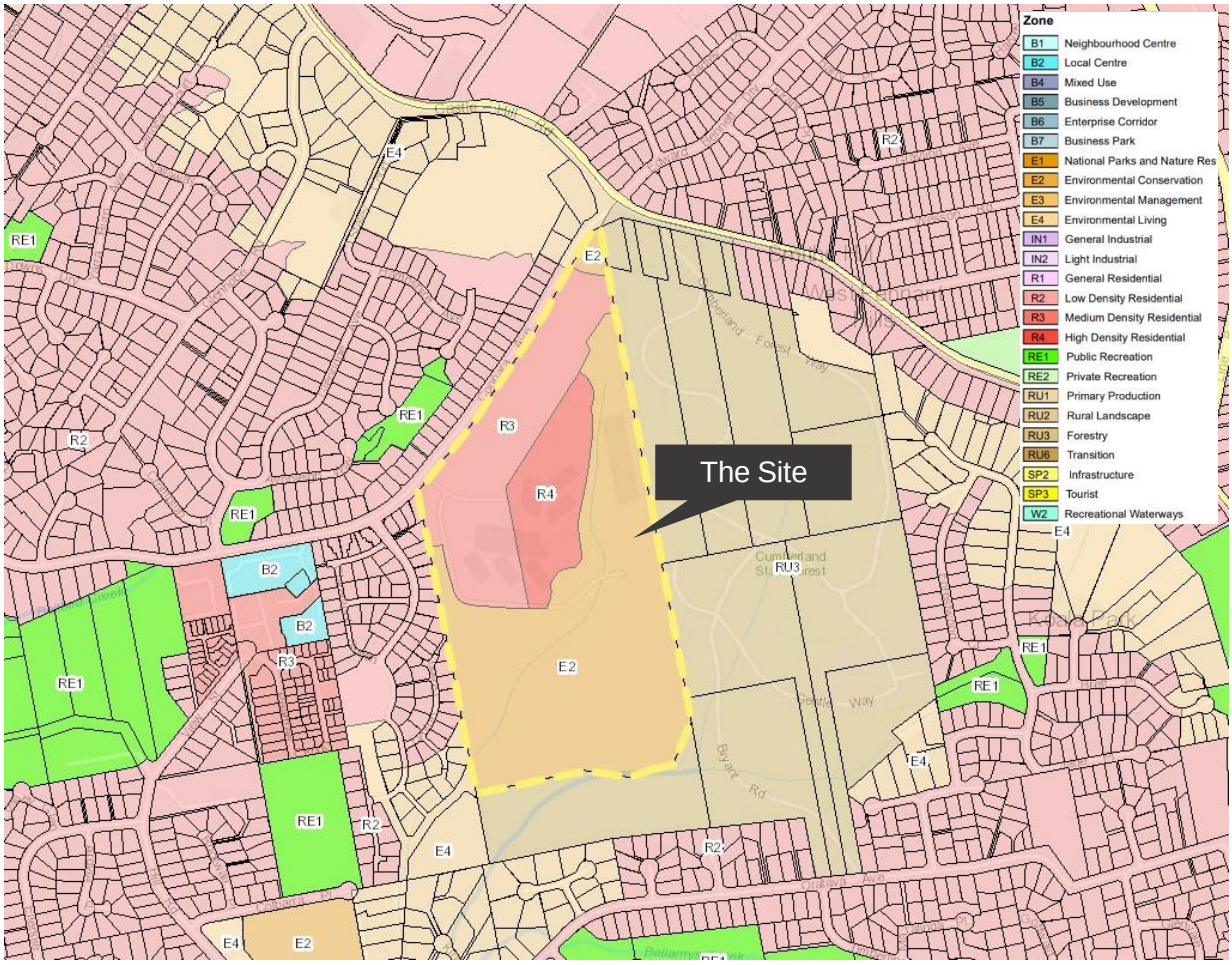


Figure 2: Surrounding Land Zones

Existing Transport Facilities

Road Hierarchy

Figure 3: Road Hierarchy (Source: RMS Road Hierarchy Review)

The NSW administrative road hierarchy comprises the following road classifications:

State Roads – Under the care and maintenance of Roads and Maritime Services

Regional Roads – Under the care and maintenance of Council partially funded by the State

Local Roads – Under the care and maintenance of Council

Existing Road Network

Table 1: Existing Road Network - Castle Hill Road

Castle Hill Road	
Road Classification	State Road
Alignment	North West – South East
Number of Lanes	2 lanes in each direction
Carriageway Type	Undivided
Carriageway Width	12.5 metres
Speed Limit	60 kph
School Zone	No
Parking Controls	Clearway 6am-7pm Mon-Fri & 9am-6pm Sat-Sun & Public Holidays
Forms Site Frontage	No

Figure 4: Castle Hill Road Westbound

Table 2: Existing Road Network - Coonara Avenue

Coonara Avenue	
Road Classification	Local Road
Alignment	North East – South West
Number of Lanes	1 lane in each direction
Carriageway Type	Undivided
Carriageway Width	12.5 metres
Speed Limit	50 kph
School Zone	No
Parking Controls	Generally, No Parking on eastern side and unrestricted parking on western side of site frontage.
Forms Site Frontage	Yes

Figure 5: Coonara Avenue Westbound

Table 3: Existing Road Network - Pennant Hills Road

Pennant Hills Road	
Road Classification	State Road
Alignment	North - South
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	22.5 metres
Speed Limit	70 kph
School Zone	No
Parking Controls	Clearway & No Parking restrictions
Forms Site Frontage	No

Figure 6: Pennant Hills Road Southbound

Key Intersections

The key intersections in the vicinity of the development site and their characteristics are listed below:

Castle Hill Rd / Coonara Ave / Edward Bennett Dr	traffic signal controlled, 4-leg intersection
Castle Hill Rd / Pennant Hills Rd	traffic signal controlled, 3-leg intersection
Cumberland Hwy / M2 Motorway	traffic signal controlled, 4-leg intersection

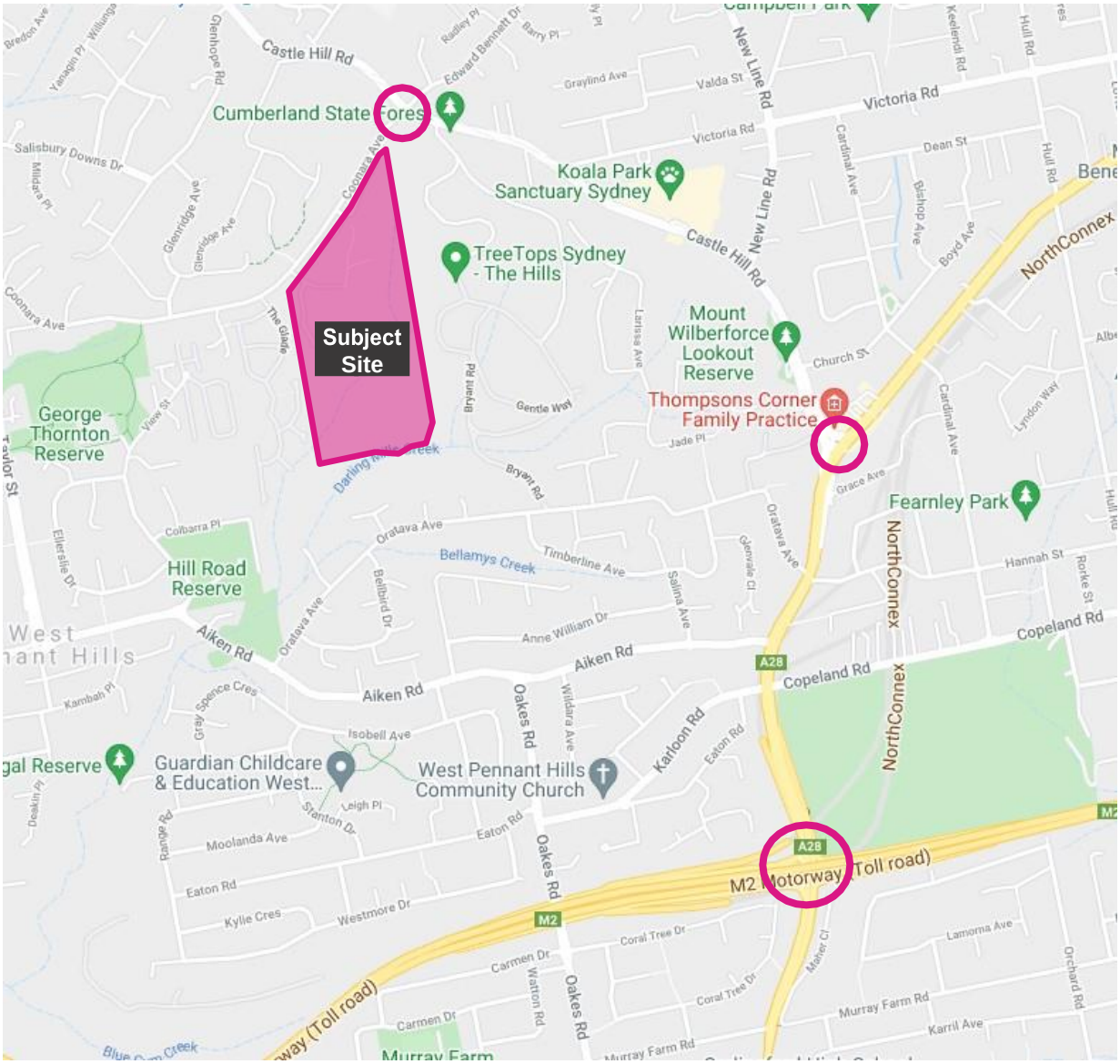


Figure 7: Key Intersections (Source: Nearmap)

Public Transport

Bus Services

The locality has been assessed in the context of available forms of public transport that may be utilised by local residents. When defining accessibility, reference is made to the NSW Planning Guidelines for Walkingand Cycling (2004) where a distance of up to 800m is recommended as a comfortable walkable catchment to access public transport and local amenities. The document also

suggests a distance of 1500m as a suitable catchment for cycling.

Figure 8: 400m Walkable Catchment and Bus Routes

The frequency of each bus route surrounding the site, shown in Table 4, demonstrates good accessibility tothe surrounding land uses and CBDs.

Table 4: Bus Frequency (Effective from 29 January 2021)

Bus Route	Coverage (to and from)	Service Frequency
632	**Pennant Hills – Rouse Hill Station via Norwest & Castle Hill**	**Mon-Fri: Every 30 min Sat: Every 1 hr Sun & Public Holidays: Every 1 hr**
633	**Pennant Hills – Rouse Hill Station via Kellyville & Castle Hill**	**Mon-Fri: Every 30 min Sat: Every 30 min Sun & Public Holidays: Every 30 min**
635	**Castle Hill – Beecroft via West Pennant Hills**	**Mon-Fri: Every 15-30 min Sat: Every 1 hr Sun & Public Holidays: Every 1 hr**
642X	**City Wynyard – Round Corner Dural via Lane Cove Tunnel**	**Mon-Fri: Every 5-15 min (afternoon service only) Sat: No services available Sun & Public Holidays: No services available**
N92	**Tallawong – City Town Hall (Night Service)**	**Mon-Fri: Every 1 hr (3 services available) Sat: Every 1 hr (4 services available) Sun & Public Holidays: Every 1 hr (4 services available)**

Metro Services

Cherrybrook railway station is a rapid transit Metro station that opened 26 May 2019 and is located within800 metres or 10 minutes' walk of the site as shown in Figure 9.

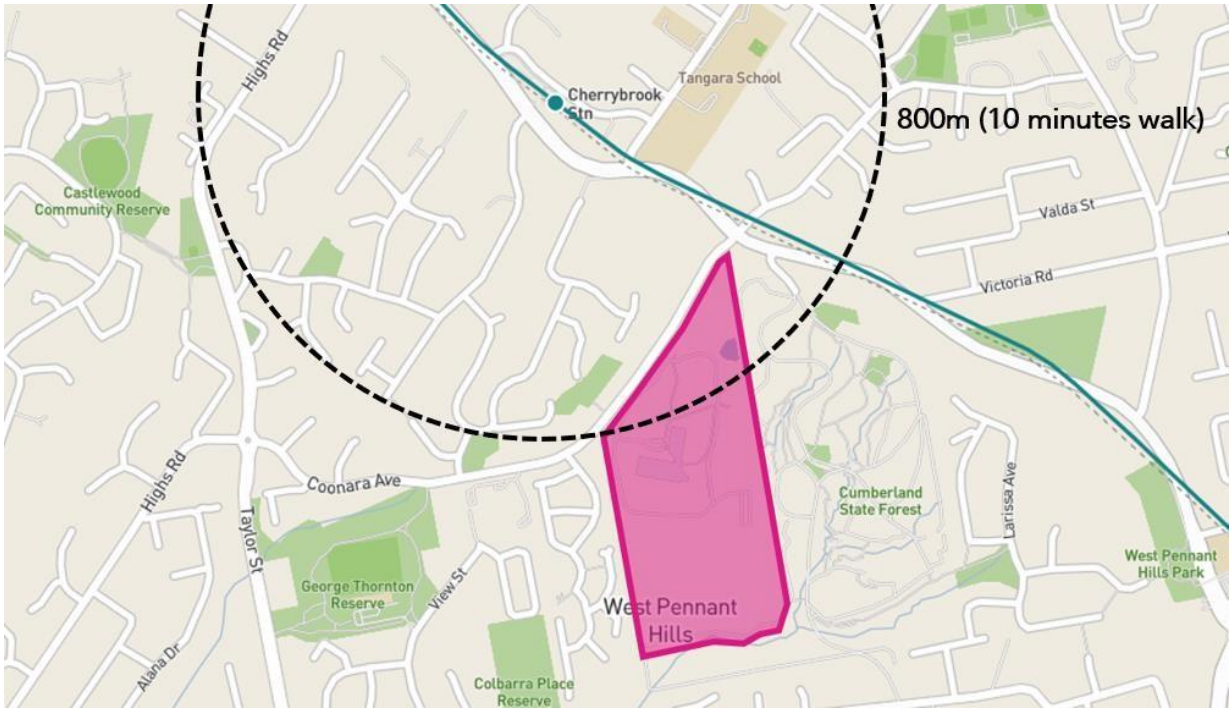


Figure 9: Cherrybrook Metro Station 800m from subject site

Services stop at Cherrybrook Station along the Metro line from Chatswood to Tallawong at a frequency of 4minutes during the morning and evening peaks. The facilities at the station include bike racks, 35 bike sheds, 390 space car park, 12 motorcycle spaces.

Active Transport

The current cyclist friendly infrastructure available in the vicinity of the site is illustrated in Figure 10. Therefore, cycling will only be a viable alternative mode of transport for experienced cyclists until cyclinginfrastructures are constructed in the vicinity of the site to encourage active travel. The site is well servedwith sufficient pedestrian amenities provided in the vicinity of the site.

Good connectivity is provided from the site to Cherrybrook Metro Station via cycle friendly roads and paths.

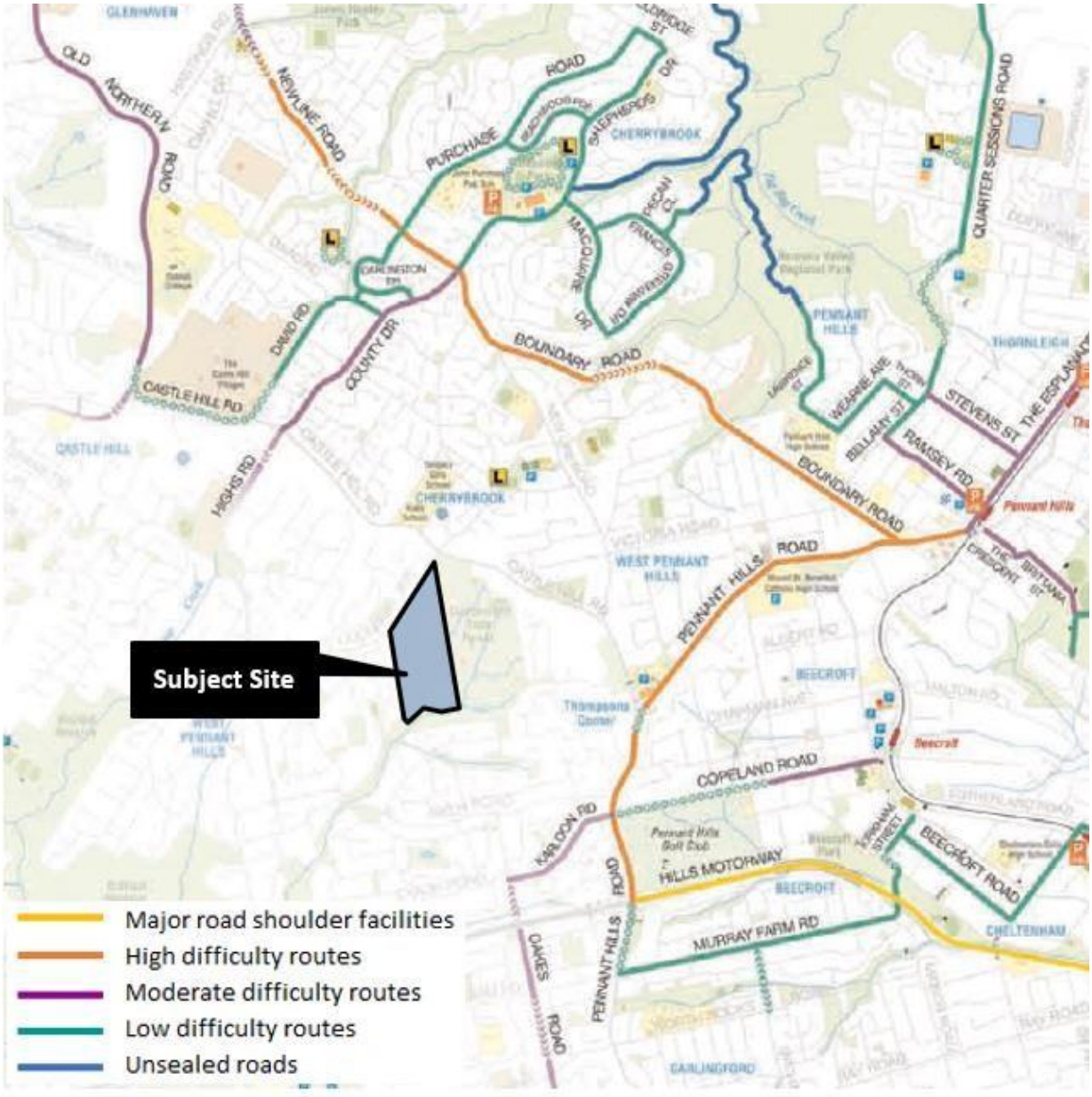


Figure 10: Cycling Infrastructure surrounding the site

Traffic Management Plan

Objective

The traffic management plan associated with the civil works aims to ensure the safety of all workers, pedestrians and road users within the vicinity of the construction site and the following are the primary objectives:

Minimise the impact of the construction vehicle traffic on the overall operation of the road network;

Ensure continuous, safe and efficient movement of traffic for both the general public and construction workers;

Installation of appropriate advance warning signs to inform users of the changed traffic conditions;

Provide a description of the construction vehicles and the volume of these construction vehicles accessing the construction site;

Provide information regarding the changed access arrangement and also a description of the proposed external routes for vehicles including the construction vehicles accessing the site; and

Establishment of a safe pedestrian environment in the vicinity of the site.

Therefore, to ensure the safety of all users of the road network, the CTMP is to be adhered to at all times.

Hours of Work

All works associated with the civil works and project generally will be restricted to the following working hours:

Monday to Friday	7:00am to 5:00pm;
Saturday	7:00am to 5:00pm; and
Sunday and Public Holidays	No works to be undertaken without prior approval.

General Requirements

In accordance with TfNSW requirements, all vehicles transporting loose materials will have the entire load covered and/or secured to prevent any items, excess dust or dirt particles depositing onto the roadway during travel to and from the site. All subcontractors shall undergo induction by the lead contractor to ensure all procedures are met for all vehicles entering and exiting the construction site. The lead contractors will monitor the roads leading to and from the site and undertake all necessary steps to rectify any road deposits caused by the construction activity.

Vehicles operating to, from and within the site shall do so in a manner that does not create unreasonable or unnecessary noise or vibration. No tracked vehicles are required nor permitted on any paved roads. Public roads and access points will not be obstructed by any materials, vehicles, refuse skips or the like, under any circumstances.

The applicant/contractor is required to follow and abide the specific standard requirements for construction management.

Civil Works Vehicle Volumes

The civil works will be undertaken in two different stages and will require access and egress for various vehicles depending on the stage. The vehicle types and estimate vehicular trips for each stage have beensummarised in Table 5.

Table 5: Vehicle Types and Estimated Trips

Stage	Works	Vehicle size	Estimated daily trips	Indicative Duration
1	Site Establishment	Low Loader, 19.0m AV, Truck& Dog, HRV & MRV	Average – 60 trucks* Peak – 85 trucks*	1 month
2	Civil Works			18 months

*Note: 1 truck = 2 trips (1 inbound trip & 1 outbound trip)

The movements of trucks to and from the site, and deliveries to the site are to be managed such that notemporary standing on the public roadway / domain occurs in the vicinity of the site.

Once distributed throughout the day, the relatively low vehicle movements will have minimal impact on theperformance of the local road network during the morning and evening peaks.

Civil Works Vehicle Routes

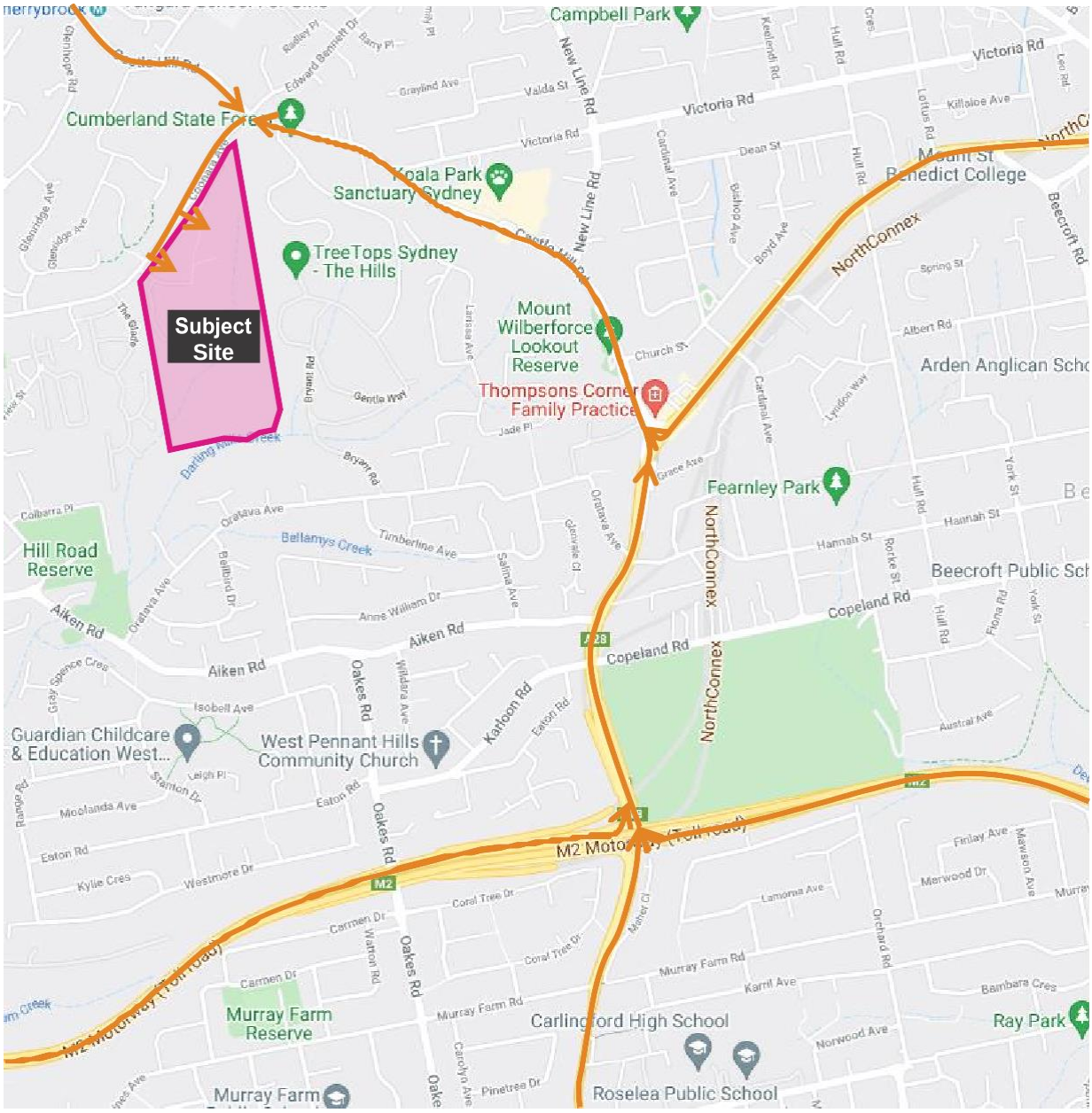


Figure 11: Civil Works Vehicle Ingress Route

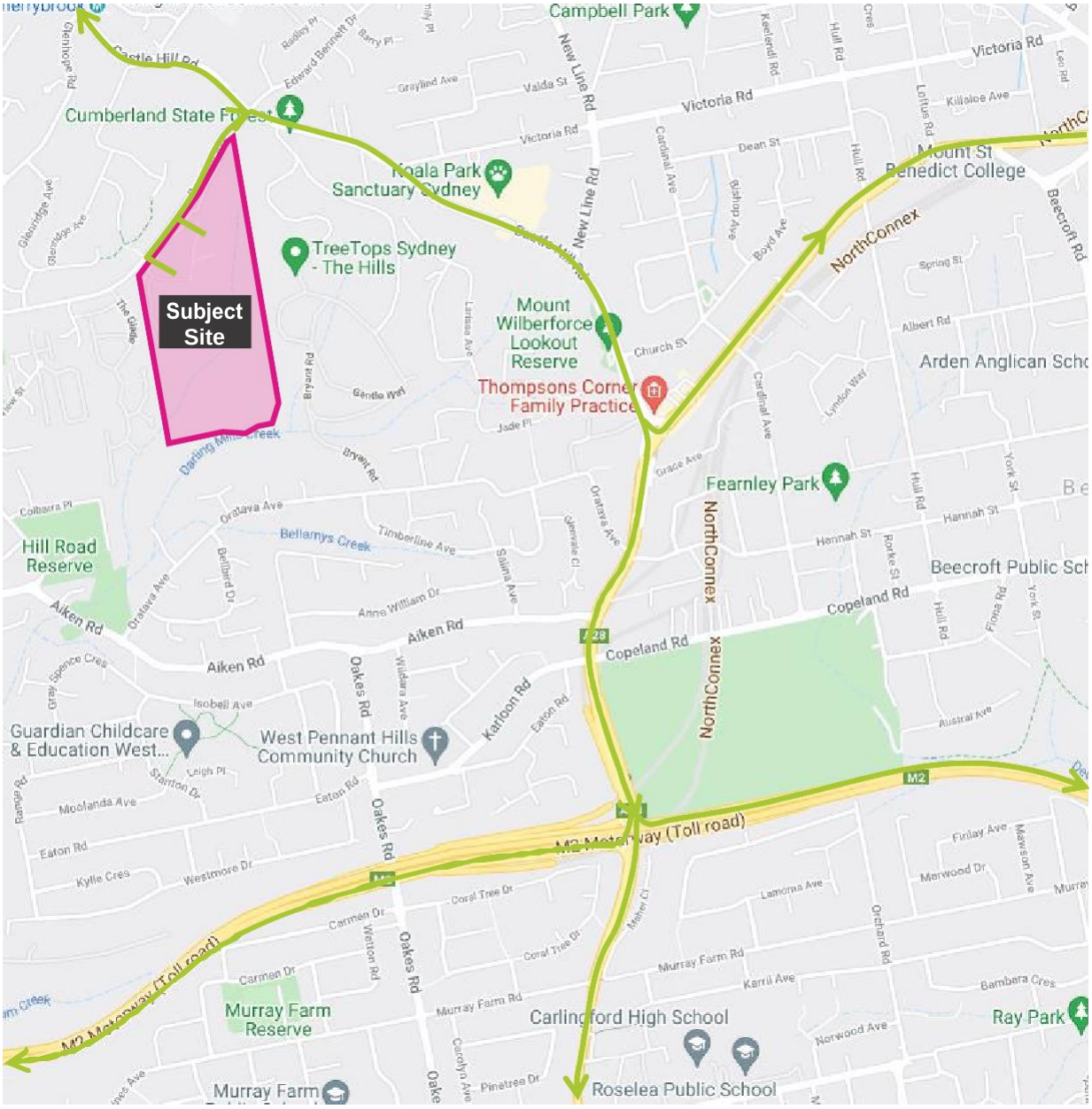


Figure 12: Civil Works Vehicle Egress Route

Access and Egress to Site

Three potential ingress and egress routes are available being the following:

M2 Motorway, Pennant Hills Road, Castle Hill Road and Coonara Avenue;

M2, Old Northern Road, Castle Hill Road and Coonara Avenue; and

Old Northern Road, Castle Hill Road and Coonara Avenue.

The trucks will typically enter via the southern gate with the exit from the site via the northern of southerngate depending on the stage of the works. It is noted that these are existing gates which will be used throughout the civil works and all vehicles will enter and exit the site in a forward direction. The access to these entry points will be restricted during upgrade works to the entry points. During these times a single

entry point will be utilised for access and egress from the site. E.g. Works occurring at the northern gate to upgrade the intersection and completing works around the area will require truck movements to only occurat the southern gate and vice versa.

A swept path assessment has been undertaken using a 19.0m Articulate Vehicle (AV) and 19.0m Truck & Dog which are anticipated to be the largest vehicles accessing the site. The assessment indicates that the left turn manoeuvre from Castle Hill Road into Coonara Avenue. the left turn manoeuvre from Coonara Avenue into Castle Hill Road and the right turn manoeuvre from Coonara Avenue into Castle Hill Road will require the use of multi-lanes. However, as per the *Road Rules 2014 – NSW Legislation Regulation 28* suchmanoeuvring is permissible. Therefore, the assessment indicates that the existing roadways are able to accommodate the turning manoeuvres of the construction vehicles.

Road Rules 2014 – NSW Legislation Regulation 28

The following has been extracted from the road rules which allows for the use of multi-lanes to perform aleft turn manoeuvre for the proposed heavy vehicles.

A driver may approach and enter the intersection from the marked lane next to the left lane as well, orinstead of, the left lane if:

the driver's vehicle, together with any load or projection, is 7.5 metres long, or longer, and

the vehicle displays a do not overtake turning vehicle sign, and

any part of the vehicle is within 50 metres of the nearest point of the intersection, and

it is not practicable for the driver to turn left from within the left lane, and

the driver can safely occupy the next marked lane and can safely turn left at the intersection byoccupying the next marked lane, or both lanes.

The construction vehicles that require the use of multi-lanes all exceed 7.5m in length and also meets all other requirements stipulated in the regulation. Therefore, the swept path assessment has been undertakenutilising multi-lanes to perform turning manoeuvres when necessary.

Restricted Access Vehicle (RAV) Routes

The civil works vehicles will access/egress the site via Castle Hill Road, M2 Motorway, Old Northern Road and Pennant Hills Road. It is noted that these roads are approved routes with restrictions for heavy vehicle access as shown in Figure 13. Therefore, as these routes are approved for use by vehicles up to 25/26m B-Doubles, no swept path assessment has been undertaken along these roads.

However, the roads have restrictions which will need to be adhered to and approved by the National Heavy Vehicle Regulator (NHVR). The Principal Controller is to ensure that all vehicles travelling to/from the site areto seek approval from NHVR prior to commencement of works.

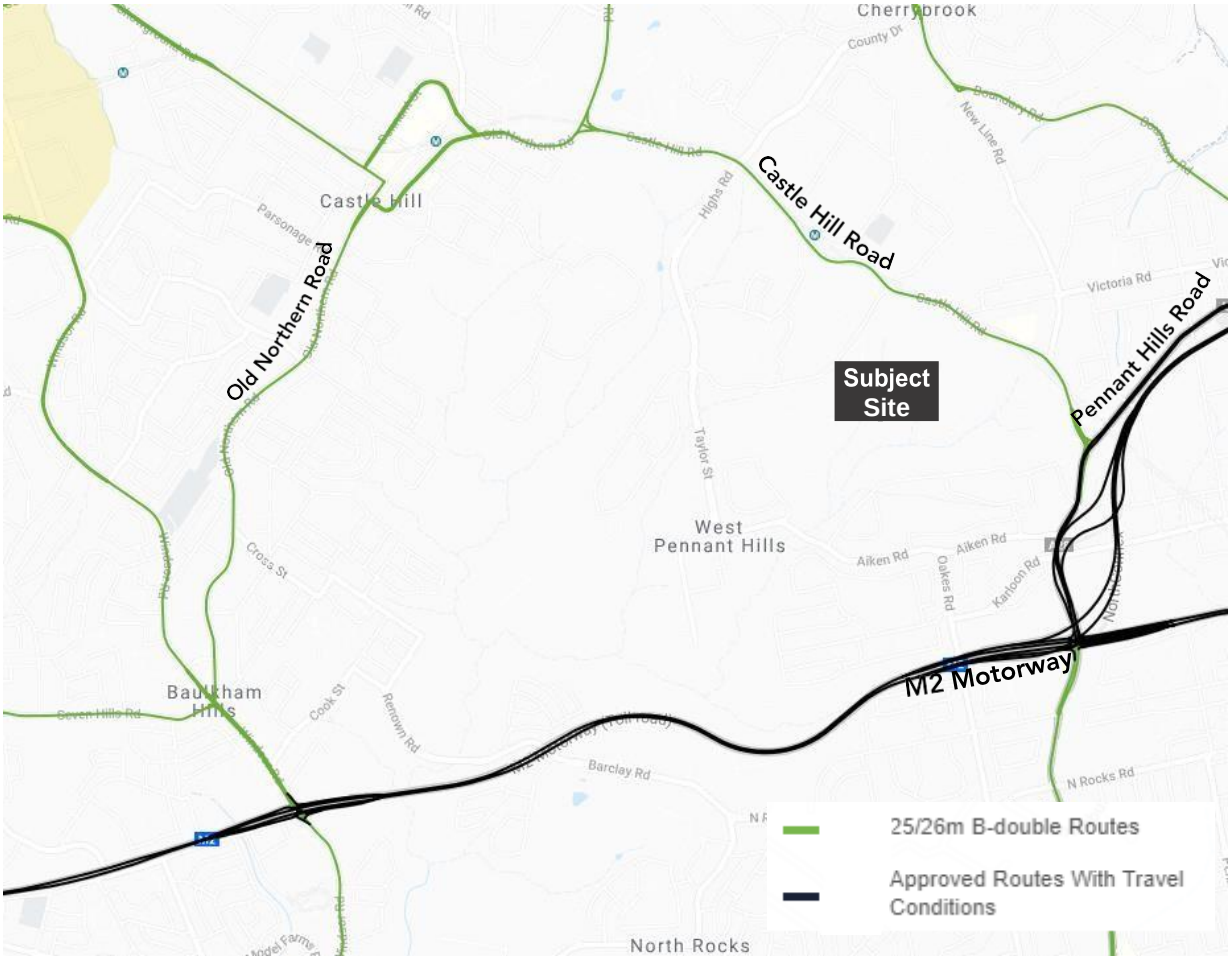


Figure 13: Restricted Access Vehicle Interactive Map

Work Zone

There are proposed works to update the two existing entry points to the site at Coonara Avenue. The worksinclude the following:

Authority connections;

Kerb adjustments to the entry points;

Final wearing course upgrade.

The proposed works will require approximately 30m long Work Zone on either side of the existing driveways. All relevant road occupation applications and Traffic Guidance Schemes (TGS) will be submittedto The Hills Shire Council and seek approval prior to commencement of works.

Traffic Control Measures

Traffic Guidance Schemes (TGSs) outline the proposed traffic management to inform road users of the changed traffic conditions in the vicinity of the works site. The TGSs must be set out in accordance withIssue 6.0 of the Traffic control at work sites Technical Manual, November 2020 (TCAWS).

A TGS is to be implemented on Coonara Avenue throughout the project to warn road users that

trucks willbe turning into and out of the site, in accordance with TCAWS TGS D.4.7 (refer to Attachment 2). The

project will maintain a spotter at the gates to supervise vehicles entering and exiting the site to ensurevehicles enter and exit the site safely.

It is noted that any changes to the existing parking restrictions will require a minimum fourteen (14) daysnotification to adjoining property owners prior to the implementation of any temporary traffic control measures.

The final TGSs must be prepared by the traffic management contractor upon engagement prior to commence of works on site.

Special Deliveries

Any oversized vehicles that are required to travel to the site will be dealt with separately, with the submission of relevant permits to and subsequent approval by TfNSW and The Hills Shire Council prior toany delivery. As part of the approval process local residents adjacent to the site on Coonara Ave will be notified by letter at least 48hrs prior.

Staff Parking

The site has sufficient room to provide parking to accommodate the parking demand generated by the sitepersonnel for the civil works. All site personnel are to be advised that they are not to park on-street in the vicinity of the development site. Also, site personnel will be advised to carpool (wherever practicable) and site personnel will be informed of the public transport options available in the vicinity of the site (refer to Section 3.3) and advised to utilise these facilities.

It is anticipated that up to approximately 100 - 150 workers will be present on-site at any one time during civil works. The site is to make provision for parking onsite as soon as practicable. All staff and contractorsare to use the designated parking areas.

Work Site Security

The site is to be secured by the use of appropriate fencing or hoarding along the frontage of the site on Coonara Avenue for segregation and protection for pedestrians and the work area throughout the entire construction stage. The fencing or hoarding is to be erected along the frontage of Coonara Avenue at thebeginning of civil works prior to excavation.

All access points will be securely locked and monitored when site activities are not in progress.

Plant/Equipment Management

At the commencement of civil works, plant and equipment, including construction hoarding/scaffolding material, site sheds, mobile cranes and machinery will be required to be delivered to the site. The deliveryand removal of plant and equipment to and from the site will be undertaken from the on-site materials handling/loading area, via the use of machine floats.

The delivery and removal of plant and equipment that requires a wide or long load vehicle will be subject toa separate application/permit and separate prior approval from The Hills Shire Council and other relevant authorities. In order to minimise traffic disruption during the delivery of the plant

and equipment, it is proposed to undertake this work outside peak periods. All plant and equipment deliveries will be carried out in accordance with Council’s requirements and the NSW Police regulations.

Spoil Management

All trucks removing any spoil from the site will be loaded to prescribed weight limits and loose material willbe covered during transport from the site. Loose material will be removed from all vehicles and/or machinery before leaving the site and entering the road system.

All vehicles leaving the site will be cleaned to prevent the tracking of mud and materials onto the roadway.The civil works contractor will be responsible for locating a truck cleaning facility or other appropriate cleaning mechanism adjacent to the construction access driveways. Any run-off from the washing down of vehicles will be directed to the sediment control system to be located within the site.

The loading of spoil onto trucks will be carried out on-site in an approved and controlled manner. The management of the on-site materials handling/loading area and the movement of trucks on and off the sitewill be the responsibility of the contractor.

Staff Induction

All staff and subcontractors engaged on site will be required to undergo a site induction. The induction willinclude permitted access routes to and from the site for all vehicles, parking requirements for workers as well as standard environmental, OH&S, driver protocols and emergency procedure. Additionally, the lead contractor will discuss TMP requirements regularly as part of toolbox talks and advise workers of public transport and carpooling opportunities.

Adjoining Properties

Access to all adjoining properties will be maintained throughout the proposed civil works.

Occupational Health and Safety

Any workers required to undertake works or traffic control within the public domain shall be suitably trained and will be covered by adequate and appropriate insurances. All traffic control personnel will be required tohold TfNSW accreditation in accordance with Section 8 of Traffic Control at Worksites.

Method of Communicating Traffic Changes

Traffic control plans in accordance with Australian Standards (AS 1742.3 — Traffic Control Devices for Workson Roads) and RMS Traffic Control at Worksites manual will advise motorist of any required changes in the road network.

The contractor shall each morning, prior to work commencing, ensure all signage is erected in accordancewith the TGS and clearly visible. Each evening, upon completion of work, the contractor is to ensure signage is either covered or removed as required. Sign size is to be size “A”.

No deviation from the approved TGS shall be permitted, unless otherwise approved by Council andcertified by an RMS accredited personnel.

The associated TGS road signage will inform drivers of works activities in the area including

truckmovements in operation.

Prior to commencement of civil works on site the contractor is to inform neighbouring properties of proposed works and provide site contact information by means of a letter box distribution. Additionally, a

minimum fourteen (14) days notification must be provided to adjoining property owners prior to theimplementation of any temporary traffic control measures.

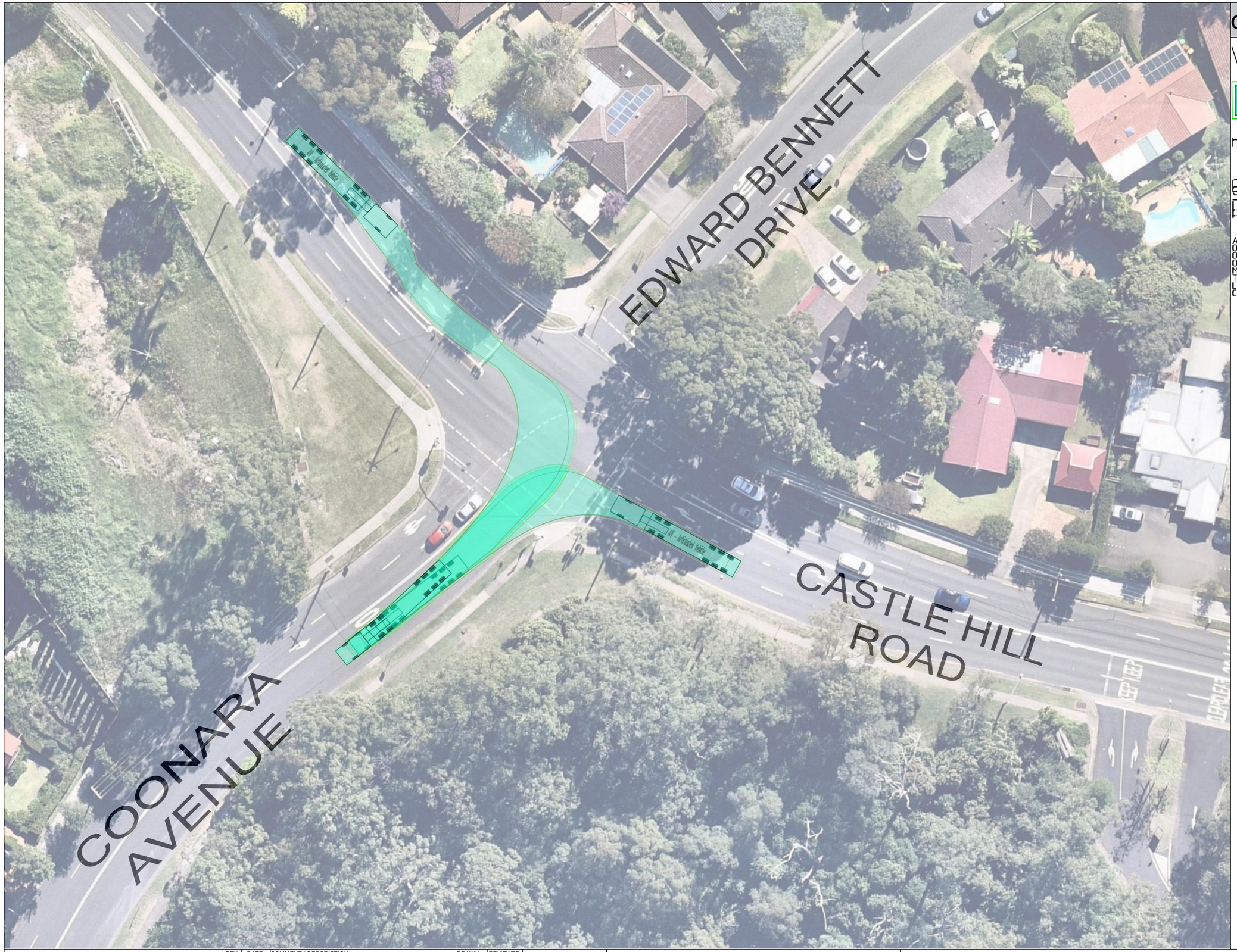
Contact Details for On-Site Enquiries and Site Access

A civil works contractor has not yet been appointed. Mirvac will contract a civil works contractor to be the Principal Controller of the site during the proposed works phase and will provide the contact details of an on-site personnel to The Hills Shire Council prior to commencement of works. The site personnel will needto have a Prepare Work Zone Traffic Management Plan (PWZTMP) card.

Summary

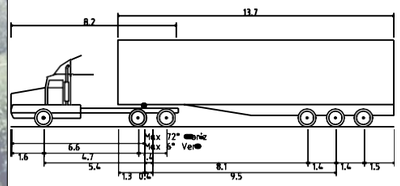
This CTMP has been prepared for the Concept Development Application including the detailed First Stagecomprising the Civil Works for the proposed redevelopment of Coonara Avenue, West Pennant Hills. This report outlines requirements in order to facilitate the proposed civil works at the site and the traffic processassociated with the civil works, as well as the traffic management measures to improve and regulate the safety of pedestrians, cyclists, motorists, and works in the site vicinity.

From our expert perspective the proposed civil works are supportable from a traffic and transport perspective.



comments A3

VEHICLE PROFILE



AV - Articulated Vehicle	
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-Lock time	6.00s
Curb to Curb Turning Radius	12.500m

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REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
3	23/07/21	FOR REVIEW	JJ	DB
2	20/07/21	FOR REVIEW	JJ	DB
1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

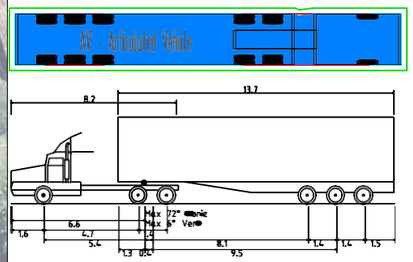
DRAWING TITLE
Castle Hill Road / Coonara Avenue / Edward Bennett Drive Intersection
Swept Path Assessment
19.0m Articulated Vehicle

CLIENT	MIRVAC
DRAWING #	PTC-001
PROJECT #	21-3056
SCALE	1 : 500 @ A3

PRELIMINARY
REV 3

comments A3

VEHICLE PROFILE



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PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Castle Hill Road / Coonara Avenue / Edward Bennett Drive Intersection
Swept Path Assessment
19.0m Articulated Vehicle

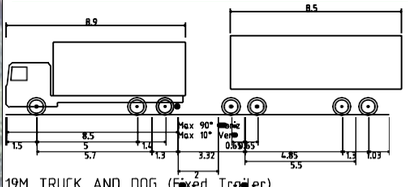
CLIENT MIRVAC
DRAWING # PTC-002
PROJECT # 21-3056
SCALE 1 : 500 @ A3

PRELIMINARY
REV 3

comments

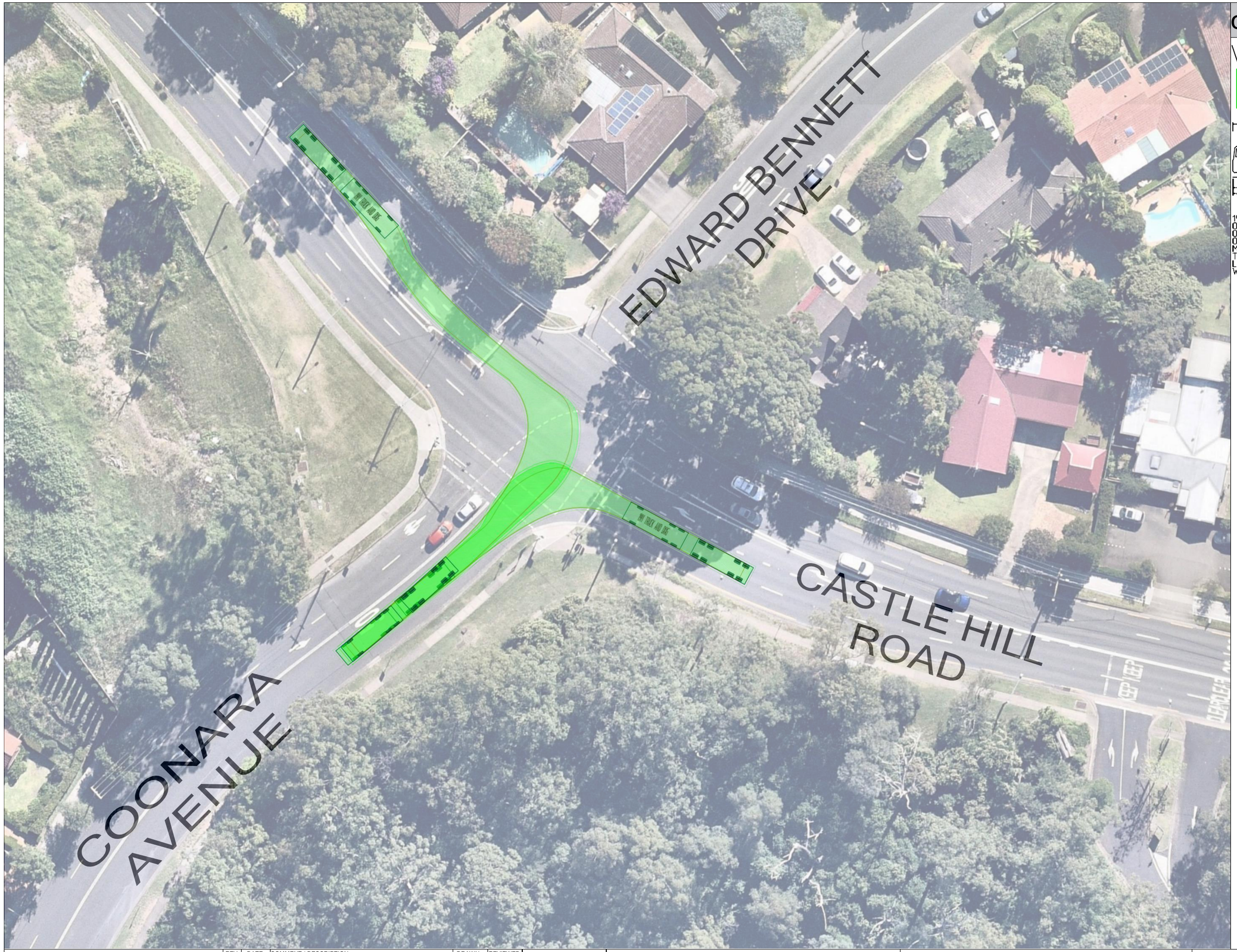
A3

VEHICLE PROFILE



19M TRUCK AND DOG (Fixed Trailer)

Overall Length	19.000m
Overall Width	2.600m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-Lock time	4.00s
Wall to Wall Turning Radius	12.000m



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PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Castle Hill Road / Coonara Avenue / Edward Bennett Drive Intersection
Swept Path Assessment
19.0m Truck & Dog

CLIENT MIRVAC

DRAWING # PTC-003

PROJECT # 21-3056

SCALE 1 : 500 @ A3

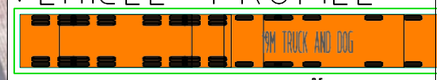
PRELIMINARY

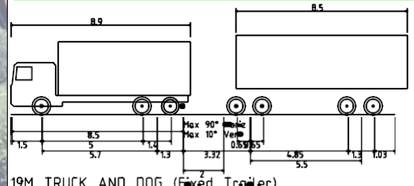
REV 3

comments

A3

VEHICLE PROFILE





19M TRUCK AND DOG (Fixed Trailer)

Overall Length	19.000m
Overall Width	2.600m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-Lock time	4.00s
Wall to Wall Turning Radius	12.000m

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PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Castle Hill Road / Coonara Avenue / Edward Bennett Drive Intersection
Swept Path Assessment
19.0m Truck & Dog

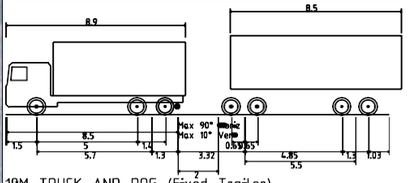
CLIENT	MIRVAC
DRAWING #	PTC-004
PROJECT #	21-3056
SCALE	1 : 500 @ A3

PRELIMINARY

REV 3

comments A3

VEHICLE PROFILE



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Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-Lock time	4.00s
Wall to Wall Turning Radius	12.000m

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1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Northern Site Access Swept Path Assessment19.0m Truck & Dog

CLIENT MIRVAC
DRAWING # PTC-005
PROJECT # 21-3056
SCALE 1 : 500 @ A3

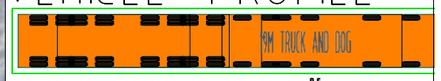
PRELIMINARY

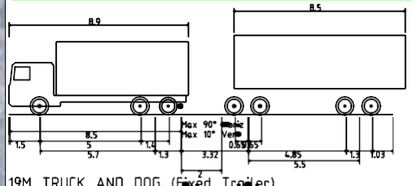
REV 3

comments

A3

VEHICLE PROFILE





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1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Northern Site Access Swept Path Assessment19.0m Truck & Dog

CLIENT MIRVAC

DRAWING # PTC-006

PROJECT # 21-3056

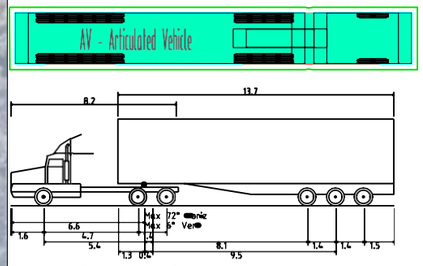
SCALE 1 : 500 @ A3

PRELIMINARY

REV 3

comments A3

VEHICLE PROFILE



AV - Articulated Vehicle	
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Track Width	2.500m
Lock-to-Lock time	6.00s
Curb to Curb Turning Radius	12.500m

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PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Northern Site Access Swept Path Assessment 19.0m Articulated Vehicle

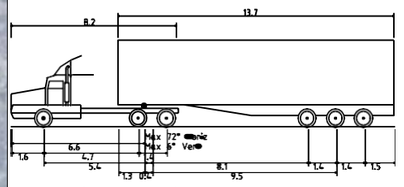
CLIENT	MIRVAC
DRAWING #	PTC-007
PROJECT #	21-3056
SCALE	1 : 500 @ A3

PRELIMINARY

REV 3

comments A3

VEHICLE PROFILE



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2	20/07/21	FOR REVIEW	JJ	DB
1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Northern Site Access Swept Path Assessment 19.0m Articulated Vehicle

CLIENT MIRVAC

DRAWING # PTC-008

PROJECT # 21-3056

SCALE 1 : 500 @ A3

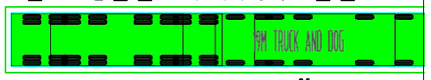
PRELIMINARY

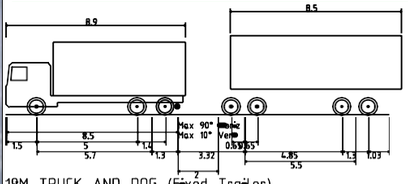
REV 3

comments

A3

VEHICLE PROFILE





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Track Width	2.500m
Lock-to-Lock time	4.00s
Wall to Wall Turning Radius	12.000m

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2	20/07/21	FOR REVIEW	JJ	DB
1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Southern Site Access Swept Path Assessment19.0m Truck & Dog

CLIENT	MIRVAC
DRAWING #	PTC-009
PROJECT #	21-3056
SCALE	1 : 500 @ A3

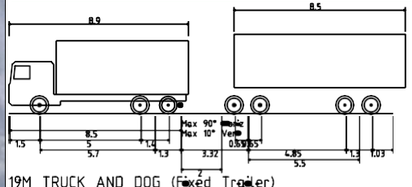
PRELIMINARY

REV 3

comments

A3

VEHICLE PROFILE



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Overall Width	2.600m
Overall Body Height	3.738m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock-to-Lock time	4.00s
Wall to Wall Turning Radius	12.000m

Suite 502, 1 James PlaceNorth Sydney NSW 2060
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REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
3	23/07/21	FOR REVIEW	JJ	DB
2	20/07/21	FOR REVIEW	JJ	DB
1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Southern Site Access Swept Path Assessment19.0m Truck & Dog

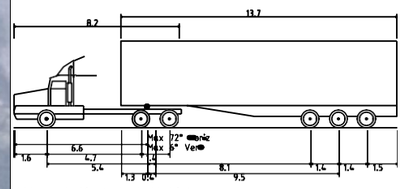
CLIENT	MIRVAC
DRAWING #	PTC-010
PROJECT #	21-3056
SCALE	1 : 500 @ A3

PRELIMINARY

REV 3

comments A3

VEHICLE PROFILE



AV - Articulated Vehicle	
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-Lock time	6.00s
Curb to Curb Turning Radius	12.500m

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REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
3	23/07/21	FOR REVIEW	JJ	DB
2	20/07/21	FOR REVIEW	JJ	DB
1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Southern Site Access Swept Path Assessment 19.0m Articulated Vehicle

CLIENT	MIRVAC
DRAWING #	PTC-011
PROJECT #	21-3056
SCALE	1 : 500 @ A3

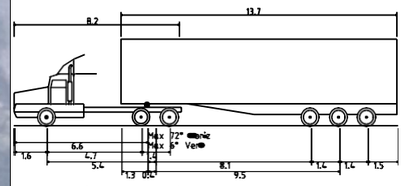
PRELIMINARY

REV 3

comments

A3

VEHICLE PROFILE



AV - Articulated Vehicle	
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-Lock time	6.00s
Curb to Curb Turning Radius	12.500m

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REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
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1	19/05/21	FOR INFORMATION	JJ	DB

PROJECT
55 COONARA AVENUE, WEST PENNANT HILLS

DRAWING TITLE
Southern Site Access Swept Path Assessment 19.0m Articulated Vehicle

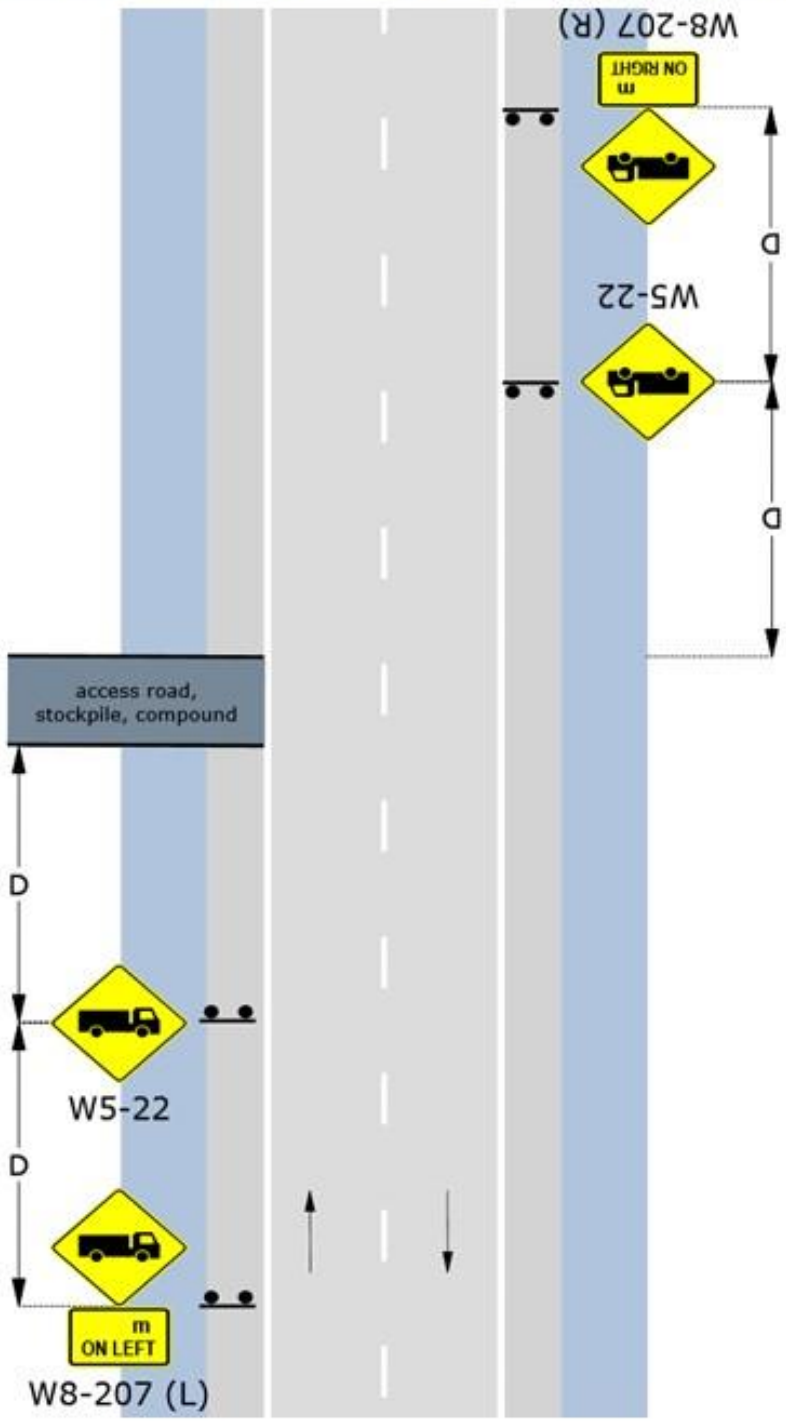
CLIENT	MIRVAC
DRAWING #	PTC-012
PROJECT #	21-3056
SCALE	1 : 500 @ A3

PRELIMINARY

REV 3

Attachment 1 - Swept Path Assessment

D.4.7 Static: Access to depot, stockpile, quarry, gravel pit etc. all roads (formerly TCP 195)

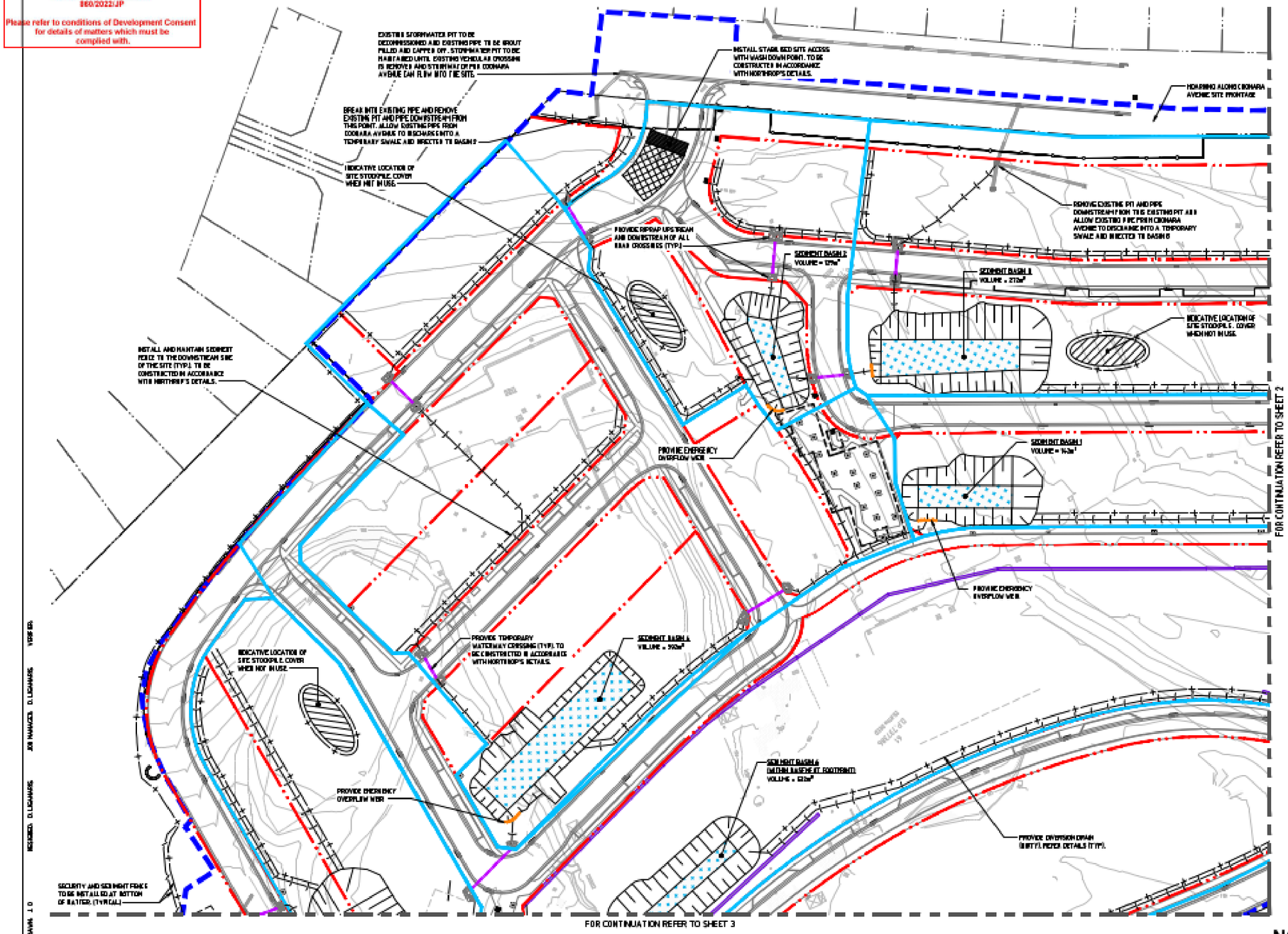


APPENDIX C – SEDIMENT & EROSION CONTROL PLAN (NORTHROP)

THE HILLS SHIRE COUNCIL

APPROVED
DEVELOPMENT CONSENT
860/2022/JP

Please refer to conditions of Development Consent for details of matters which must be complied with.



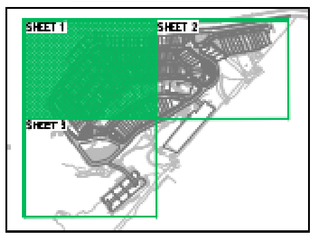
LEGEND

- EXISTING SITE BOUNDARY LINE
- PROPOSED SUPER LOT BOUNDARY LINE
- CATCHMENT AREA
- SITE EXTENT OF WORKS
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- 'A' CLASS HOARDING
- BAYBALES
- ROADWALL
- DIVERSION DRAIN (DIRTY)
- SWIMMING WALL
- WATERWAY CROSSING
- STABILISED SITE ACCESS WITH WASH DOWN POINT
- STOCKPILE
- SEDIMENT BASIN
- OVERFLOW WEIR FOR BASIN
- SEDIMENT BASIN BATTER
- EXTENT OF PROPOSED OSD

GENERAL NOTES

1. REFER SPECIFICATIONS NOTES FOR SEDIMENT AND SOIL EROSION CONTROL GENERAL REQUIREMENTS.
2. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.
3. CONTRACTOR TO PROVIDE 'WIRE MESH AND GRAVEL SEDIMENT FILTER' TO ALL PAVED / ROAD AREAS BOTH PROPOSED AND EXISTING IN ACCORDANCE WITH THE 'BLUE BOOK'.
4. CONTRACTOR TO PROVIDE 'GEOTEXTILE INLET FILTER TRAPS' TO ALL STORMWATER DRAINAGE INLETS BOTH PROPOSED AND EXISTING IN ACCORDANCE WITH THE 'BLUE BOOK'.

SHEET LAYOUT PLAN



NOT FOR CONSTRUCTION

DESIGNED: D.LIGHMARS
JOB MANAGER: D.LIGHMARS
DRAWN: J.O
VERIFIED:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
P1	ISSUED FOR REVELOPMENT APPLICATION	JO		BL	16.09.21
P2	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	28.09.21
P3	RE-ISSUED FOR DEVELOPMENT APPLICATION	UH		BL	22.04.22
P4	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	25.05.22
P5	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	15.09.22

CLIENT: mirvac
DRAWING NOT TO BE ISSUED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURES HAS BEEN ADDED

ARCHITECT: MIRVAC DESIGN

SCALE: 1:500@A1

NORTHROP
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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: 55 COONARA AVENUE, WEST PENNANT HILLS
CONCEPT DEVELOPMENT APPLICATION STAGE 01 CIVIL WORKS

DRAWING TITLE: CONCEPT SEDIMENT AND EROSION CONTROL PLAN - SHEET 01

JOB NUMBER: 172528
DRAWING NUMBER: C-MP-8205
REVISION: P5
DRAWING SHEET SIZE - A1

THE HILLS SHIRE COUNCIL

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DEVELOPMENT CONSENT
860/2022/JP

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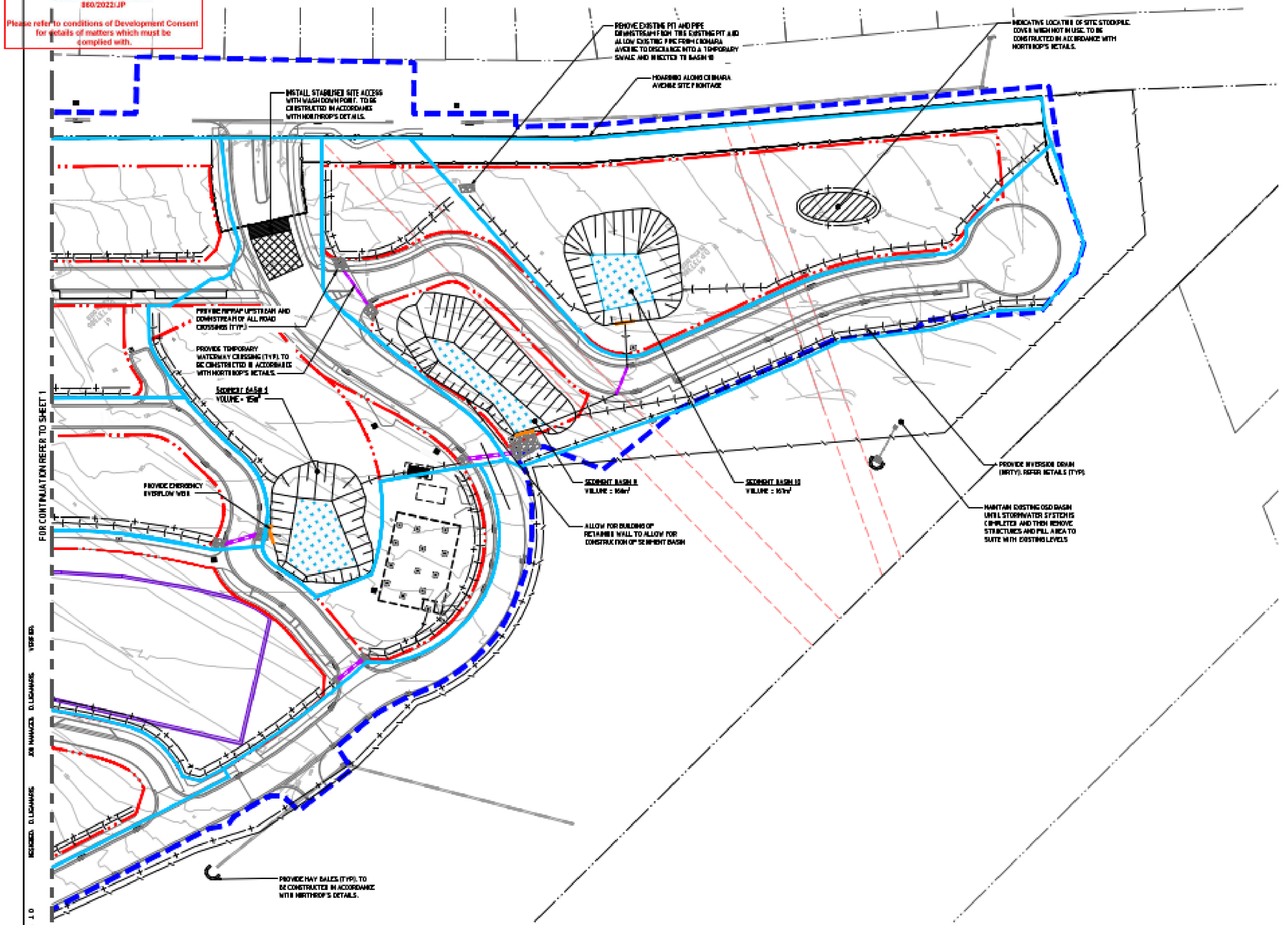


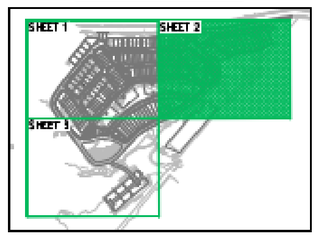
LEGEND

- EXISTING SITE BOUNDARY LINE
- PROPOSED SUPER LOT BOUNDARY LINE
- CATCHMENT AREA
- SITE EXTENT OF WORKS
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- 'A' CLASS HOARDING
- BAYBALES
- HEADWALL
- INVERSION DRAIN (INRTY)
- SWIMMING POOL
- WATERWAY CROSSING
- STABILISED SITE ACCESS WITH WASH DOWN POINT
- STOCKPILE
- SEDIMENT BASIN
- OVERFLOW WEIR FOR BASIN
- SEDIMENT BASIN BATTER
- EXTENT OF PROPOSED OSD

GENERAL NOTES

1. REFER SPECIFICATIONS NOTES FOR SEDIMENT AND SOIL EROSION CONTROL GENERAL REQUIREMENTS.
2. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.
3. CONTRACTOR TO PROVIDE 'WIRE MESH AND GRAVEL SEDIMENT FILTER' TO ALL PAVED / ROAD AREAS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.
4. CONTRACTOR TO PROVIDE 'GEOTEXTILE INLET FILTER TRAPS' TO ALL STORMWATER DRAINAGE INLETS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.

SHEET LAYOUT PLAN



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REVISION	DESCRIPTION	ISSUED	VERIF	APP'D	DATE
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P2	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	28.09.21
P3	RE-ISSUED FOR DEVELOPMENT APPLICATION	UH		BL	22.04.22
P4	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	25.05.22
P5	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	16.09.22

CLIENT: mirvac
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ARCHITECT: MIRVAC DESIGN

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PROJECT: 55 COONARA AVENUE, WEST PENNANT HILLS
CONCEPT DEVELOPMENT APPLICATION STAGE 01 CIVIL WORKS

DRAWING TITLE: CONCEPT SEDIMENT AND EROSION CONTROL PLAN - SHEET 02

JOB NUMBER: 172528
DRAWING NUMBER: C-MP-8206
REVISION: P5
DRAWING SHEET SIZE = A1

DRAWN: J.O | DESIGNED: D.LEONARDS | JOB MANAGER: D.LEONARDS | VERIFIED:

THE HILLS SHIRE COUNCIL

APPROVED
DEVELOPMENT CONSENT
[illegible]/2021/JP

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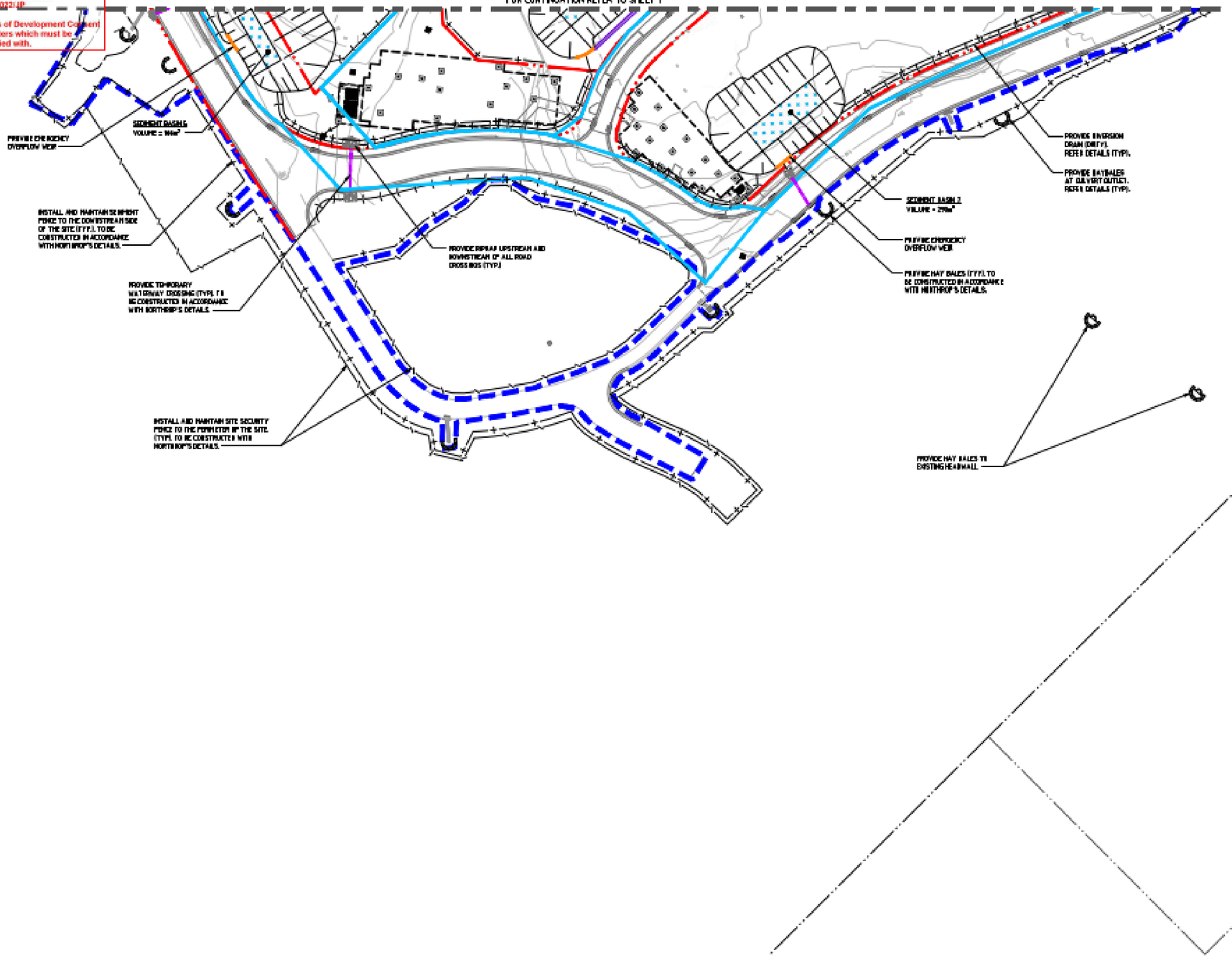
FOR CONTINUATION REFER TO SHEET 1



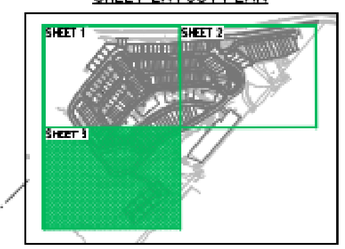
LEGEND

- EXISTING SITE BOUNDARY LINE
- PROPOSED SUPER LOT BOUNDARY LINE
- CATCHMENT AREA
- SITE EXTENT OF WORKS
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- 'A' CLASS HOARDING
- BAYBALES
- HEADWALL
- DIVERSION DRAIN (DIRT)
- SHORING WALL
- WATERWAY CROSSING
- STABILISED SITE ACCESS WITH WASH DOWN PAD
- STOCKPILE
- SEDIMENT BASIN
- OVERFLOW WEIR FOR BASIN
- SEDIMENT BASIN BATTER
- EXTENT OF PROPOSED OSD

GENERAL NOTES

1. REFER SPECIFICATIONS NOTES FOR SEDIMENT AND SOIL EROSION CONTROL GENERAL REQUIREMENTS.
2. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.
3. CONTRACTOR TO PROVIDE 'WIRE MESH AND GRAVEL SEDIMENT FILTER' TO ALL PAVED / ROAD AREAS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.
4. CONTRACTOR TO PROVIDE 'GEOTEXTILE INLET FILTER TRAPS' TO ALL STORMWATER DRAINAGE INLETS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.

SHEET LAYOUT PLAN



NOT FOR CONSTRUCTION

DRAWN: J.O | DESIGNED: D.LISHMARE | JOB MANAGER: D.LISHMARE | VERIFIED:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
P1	ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	18.01.21
P2	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	20.09.21
P3	RE-ISSUED FOR DEVELOPMENT APPLICATION	LH		BL	22.04.22
P4	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	23.05.22
P5	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	16.09.22

CLIENT: mirvac

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ARCHITECT: MIRVAC DESIGN

SCALE: 1:500@A1

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PROJECT: 55 COONARA AVENUE, WEST PENNANT HILLS

CONCEPT DEVELOPMENT APPLICATION STAGE 01 CIVIL WORKS

DRAWING TITLE: CONCEPT SEDIMENT AND EROSION CONTROL PLAN - SHEET 03

JOB NUMBER: 172528

DRAWING NUMBER: C-MP-8207

REVISION: P5

DRAWING SHEET SIZE = A1

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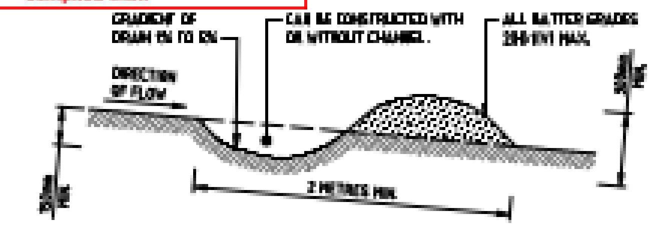
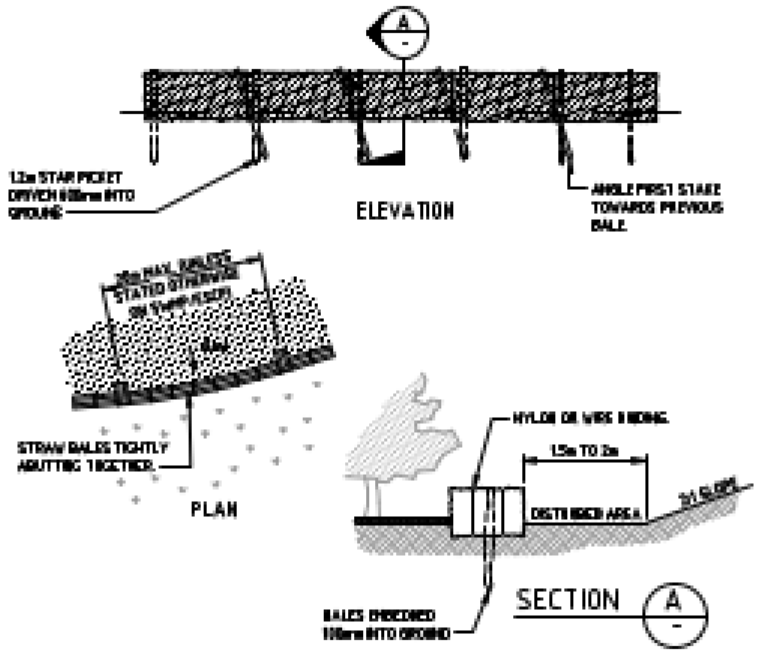


CONSTRUCTION NOTES
1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

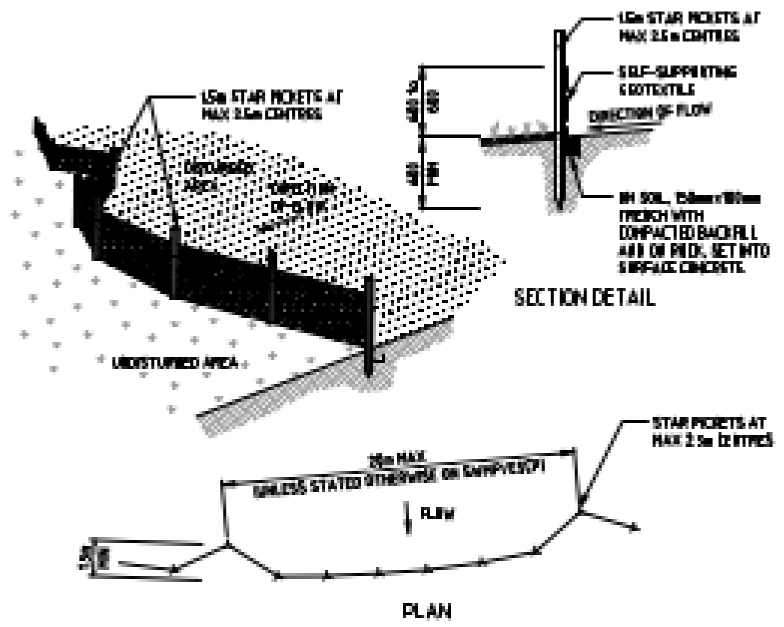
NOTE: ONLY TO BE USED AS TEMPORARY BANK WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

EARTH BANK - LOW FLOW (SD 5-5)



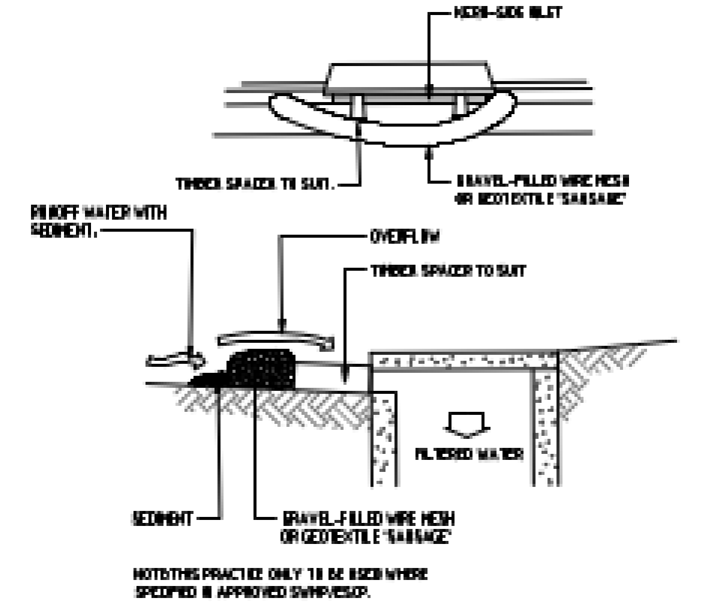
CONSTRUCTION NOTES
1. CONSTRUCT THE STRAW BALE FILTER AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE.
2. PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS ARE TO BE PLACED PARALLEL TO GROUND.
3. ENSURE THAT THE MAXIMUM HEIGHT OF THE FILTER IS ONE BALE.
4. EMBED EACH BALE IN THE GROUND 75mm TO 100mm AND ANCHOR WITH TWO 1.2 METRE STAR PICKETS OR STAKES. ANGLE THE FIRST STAR PICKET OR STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BALE. DRIVE THEM 600mm INTO THE GROUND AND, IF POSSIBLE, FLUSH WITH THE TOP OF THE BALES. WHERE STAR PICKETS ARE USED AND THEY PROTRUDE ABOVE THE BALES, ENSURE THEY ARE FITTED WITH SAFETY CAPS.
5. WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWNSLOPE FROM A DISTURBED BATTER, ENSURE THE BALES ARE PLACED 1 TO 2 METRES DOWNSLOPE FROM THE TOE.
6. ESTABLISH A MAINTENANCE PROGRAM THAT ENSURES THE INTEGRITY OF THE BALES IS RETAINED - THEY COULD REQUIRE REPLACEMENT EACH TWO TO FOUR MONTHS.

STRAW BALE FILTER (SD 6-7)



CONSTRUCTION NOTES
1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

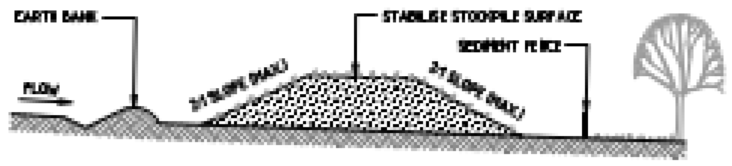
SEDIMENT FENCE (SD 6-8)



NOTE: THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN APPROVED SWMP/ESCP.

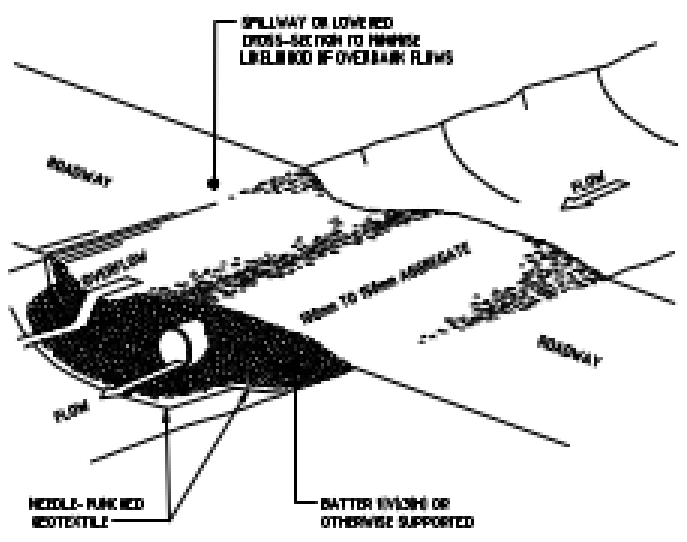
CONSTRUCTION NOTES
1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL INLET FILTER (SD 6-11)



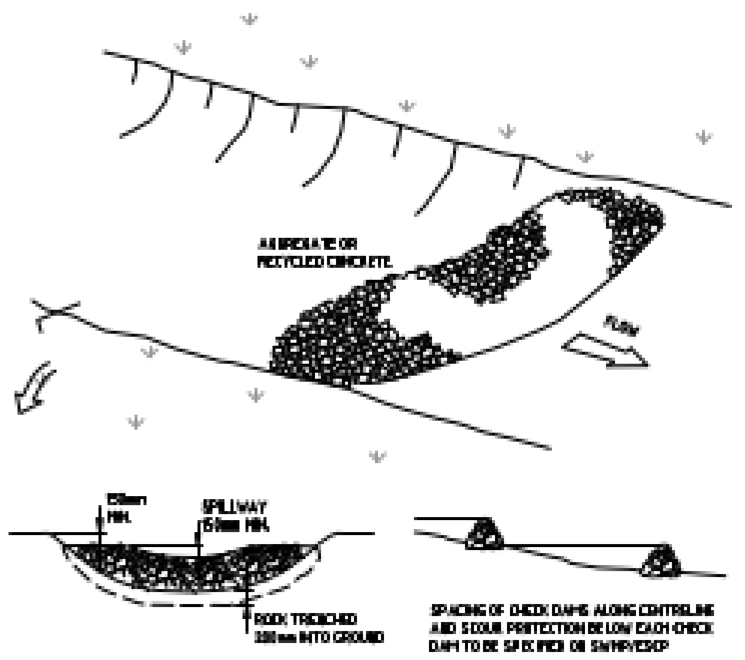
CONSTRUCTION NOTES
1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE WITH HYDROSEED FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)



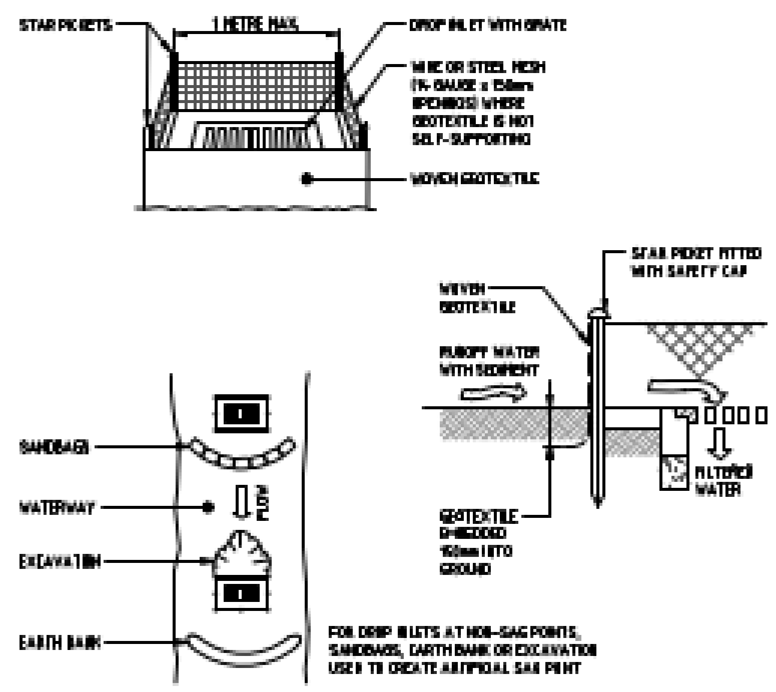
CONSTRUCTION NOTES
1. PROHIBIT ALL TRAFFIC UNTIL THE ACCESS WAY IS CONSTRUCTED.
2. STRIP ANY TOPSOIL AND PLACE A NEEDLE-PUNCHED TEXTILE OVER THE BASE OF THE CROSSING.
3. PLACE CLEAN, HARD, NON POLLUTING AGGREGATE OR GRAVEL IN THE 100mm TO 150mm SIZE CLASS OVER THE FABRIC TO A MINIMUM DEPTH OF 200mm.
4. PROVIDE A 3m WIDE CARRIAGEWAY WITH SUFFICIENT LENGTH OF CULVERT PIPE TO ALLOW LESS THAN A 3(H):1(V) SLOPE ON SIDE BATTERS.
5. INSTALL A LOWER SECTION TO ACT AS AN EMERGENCY SPILLWAY IN GREATER THAN DESIGN STORM EVENTS.
6. ENSURE THAT CULVERT OUTLETS EXTEND BEYOND THE TOE OF FILL EMBANKMENTS.

TEMPORARY WATERWAY CROSSING (SD 5-1)



CONSTRUCTION NOTES
1. CHECK DAMS CAN BE BUILT WITH VARIOUS MATERIALS, INCLUDING ROCKS, LOGS, SANDBAGS AND STRAW BALES. THE MAINTENANCE PROGRAM SHOULD ENSURE THEIR INTEGRITY IS RETAINED, ESPECIALLY WHERE CONSTRUCTED WITH STRAW BALES. IN THE CASE OF BALES, THIS MIGHT REQUIRE THEIR REPLACEMENT EACH TWO TO FOUR MONTHS.
2. TRENCH THE CHECK DAM 200mm INTO THE GROUND ACROSS ITS WHOLE WIDTH. WHERE ROCK IS USED, FILL THE TRENCHES TO AT LEAST 100mm ABOVE THE GROUND SURFACE TO REDUCE THE RISK OF UNDERCUTTING.
3. NORMALLY, THEIR MAXIMUM HEIGHT SHOULD NOT EXCEED 600mm ABOVE THE GULLY FLOOR. THE CENTRE SHOULD ACT AS A SPILLWAY, BEING AT LEAST 150mm LOWER THAN THE OUTER EDGES.
4. SPACE THE DAMS SO THE TOE OF THE UPSTREAM DAM IS LEVEL WITH THE SPILLWAY OF THE NEXT DOWNSTREAM DAM.

ROCK CHECK DAM (SD 5-4)



CONSTRUCTION NOTES
1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER (SD 6-12)

GENERAL NOTES
ALL DETAILS ON THIS SHEET REFERENCE THE 'BLUEBOOK'

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
P1	ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	16.09.21
P2	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		BL	28.09.21
P3	RE-ISSUED FOR DEVELOPMENT APPLICATION	UH		BL	22.04.22
P4	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		BL	23.05.22

CLIENT: mirvac
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ARCHITECT: MIRVAC DESIGN
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Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: 55 COONARA AVENUE, WEST PENNANT HILLS
CONCEPT DEVELOPMENT APPLICATION STAGE 01 CIVIL WORKS

DRAWING TITLE: SEDIMENT AND EROSION CONTROL DETAILS - SHEET 01

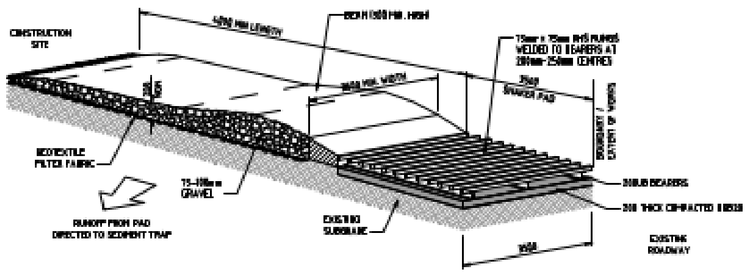
JOB NUMBER: 172528
DRAWING NUMBER: C-MP-8208
REVISION: P4
DRAWING SHEET SIZE = A1

DRAWN: J.O. DESIGNED: D.LIGHARIS JOB MANAGER: D.LIGHARIS VERIFIED:

THE HILLS SHIRE COUNCIL

APPROVED
DEVELOPMENT CONSENT
860/2022/JP

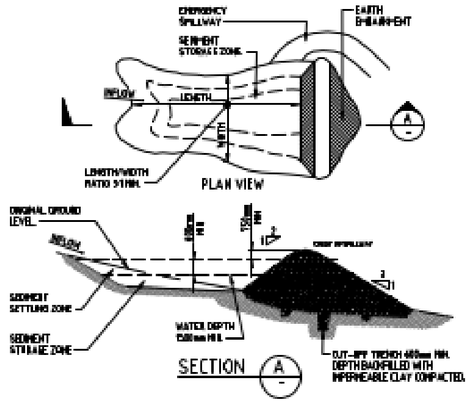
Please refer to conditions of Development Consent for details of matters which must be complied with.



STABILISED SITE ACCESS WITH SHAKER PAD

MAINTENANCE

- THE TEMPORARY ACCESS SHALL BE MAINTAINED IN A CONDITION THAT PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY.
- THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
- ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY.
- INSTALL BARRIER ON EITHER SIDE OF SHAKER PAD TO ENSURE VEHICLES ARE GUIDED ON TO THE PAD.
- INVERT OF SHAKER PAD TO BE DRAINED VIA AGRICULTURAL PIPE WRAPPED IN GEOTEXTILE FABRIC.



CONSTRUCTION NOTES

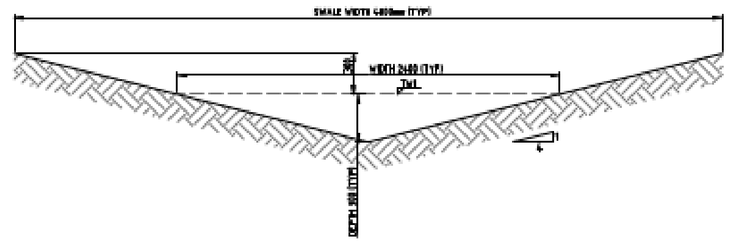
1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND PAVEMENT WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 600mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95 PER CENT STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, RUBBISH, LARGE STONE OR OTHER UNSUITABLE MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO A DEPTH OF AT LEAST 150mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

SEDIMENT BASIN - WET (SD6.4)

GENERAL NOTES

ALL DETAILS ON THIS SHEET REFERENCE THE 'BLUEBOOK'



DIVERSION DRAIN DETAIL

DRAWN: J.O REVIEWED: D.LIGHMARS JOB MANAGER: D.LIGHMARS VERIFIED:

NOT FOR CONSTRUCTION

ISSUE	DESCRIPTION	ISSUED	VERIF	APPD	DATE
P1	ISSUED FOR DEVELOPMENT APPLICATION	JO		DL	16.09.21
P2	RE-ISSUED FOR DEVELOPMENT APPLICATION	JO		DL	20.09.21
P3	RE-ISSUED FOR DEVELOPMENT APPLICATION	LM		DL	22.04.22
P4	RE-ISSUED FOR DEVELOPMENT APPLICATION	AS		DL	25.05.22

CLIENT: mirvac

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ARCHITECT: MIRVAC DESIGN

NORTHROP
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PROJECT: 55 COONARA AVENUE, WEST PENNANT HILLS

CONCEPT DEVELOPMENT APPLICATION STAGE 01 CIVIL WORKS

DRAWING TITLE: SEDIMENT AND EROSION CONTROL DETAILS - SHEET 02

JOB NUMBER: 172528

DRAWING NUMBER: C-MP-8209

REVISION: P4

DRAWING SHEET SIZE = A1

APPENDIX D – CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN (ACOUSTIC LOGIC)

Concept Development Application Stage 1 Civil Works of 55 Coonara Ave, West Pennant Hills NSW

Construction Noise and Vibration Management Plan - Civil Works

SYDNEY
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MASCOT NSW 2020
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Project ID	20201245.1
Document Title	Construction Noise and Vibration Management
Attention To	Mirvac Constructions Pty Ltd

Revision	Date	Document Reference	PreparedBy	Checked By	ApprovedBy
0	18/11/2020	20201245.1/1811A/R0/OB	OB		
1	20/11/2020	20201245.1/2011A/R1/OB	OB		
2	1/12/2020	20201245.1/0112A/R2/OB	GW		GW
3	8/12/2020	20201245.1/0812A/R3/OB	OB		GW
4	14/12/2020	20201245.1/1412A/R4/OB	OB		GW
5	19/02/2021	20201245.1/1902A/R5/OB	OB		TS
6	12/07/2021	20201245.1/1207A/R6/OB	OB		GW
7	27/08/2021	20201245.1/2708A/R7/OB	OB		OB
8	3/09/2021	20201245.1/0309A/R8/OB	OB		OB
9	8/09/2021	20201245.1/0809A/R9/OB	OB		OB
10	6/06/2022	20201245.1/0606A/R10/LA	LA		GW
11	7/06/2022	20201245.1/0706A/R11/LA	LA	LL	GW

TABLE OF CONTENTS

INTRODUCTION

This Construction Noise and Vibration Management Plan presents the results of potential noise and vibration effects associated with the civil works at 55 Coonara Avenue, West Pennant Hills.

Noise control strategies have been formulated within this report to ensure effects from site works are minimised. In particular, a detailed outline of the community consultation procedures proposed for the site which has been included which will form the basis of the noise control strategy.

SITE BACKGROUND

55 Coonara Ave West Pennant Hills is a 25.87 Ha site located in Sydney's north west and currently comprisesa 34,000m^2 low rise commercial premises, associated carparks and ancillary structures.

The site received rezoning in June 2020 to facilitate development of up to 600 residential dwellings with a mixture of homes and apartments, associated infrastructure and public open space utilising the existing developed area. The remainder of the site is zoned for environmental conservation.

SITE DESCRIPTION

Onsite acoustic investigation has been carried out by this office in regard to the surrounding acoustic environment which has been detailed below:

The proposed subject site is bounded by Coonara Avenue to the north western boundary, with residential housing across Coonara Avenue;
Situated along the eastern boundary of the project site is the Cumberland state forest, the forestbounds the entirety of the eastern boundary of the proposed subject site;
The southern boundary of the project site is bounded by Cumberland State Forest; and
The western boundary of the project site is bounded by residential housing.

For a detailed description please see the detailed figure below.

RECEIVER LOCATIONS

The potentially most impacted sensitive receiver locations are presented below. In addition, these have been identified in figure 2-1 below.

Receiver 1 – Residential dwellings located along the northern boundary of the project site at 66 – 116 Coonara Avenue, West Pennant Hills located across Coonara Avenue along the northern boundary of the project site;

Receiver 2 – Residential dwellings located along the western boundary of the project site at 2 and 4 Eldon Green, 3,4,5,6,8 Malton Green, 7 – 20 Lynton Green, 12-24 The Glade and 10-12 Sutton Green.

For a detailed description please see the detailed figure below.

3.1 ENVIRONMENTAL CONSIDERATIONS

As detailed in the Biodiversity Assessment Report complete for the site by Keystone Ecological, potential nesting locations for the endangered Powerful Owl have been identified. With the known proximity of these potential habitat locations, control measures have been detailed in Section 10 to ensure minimal impact to the Powerful Owl habitat.

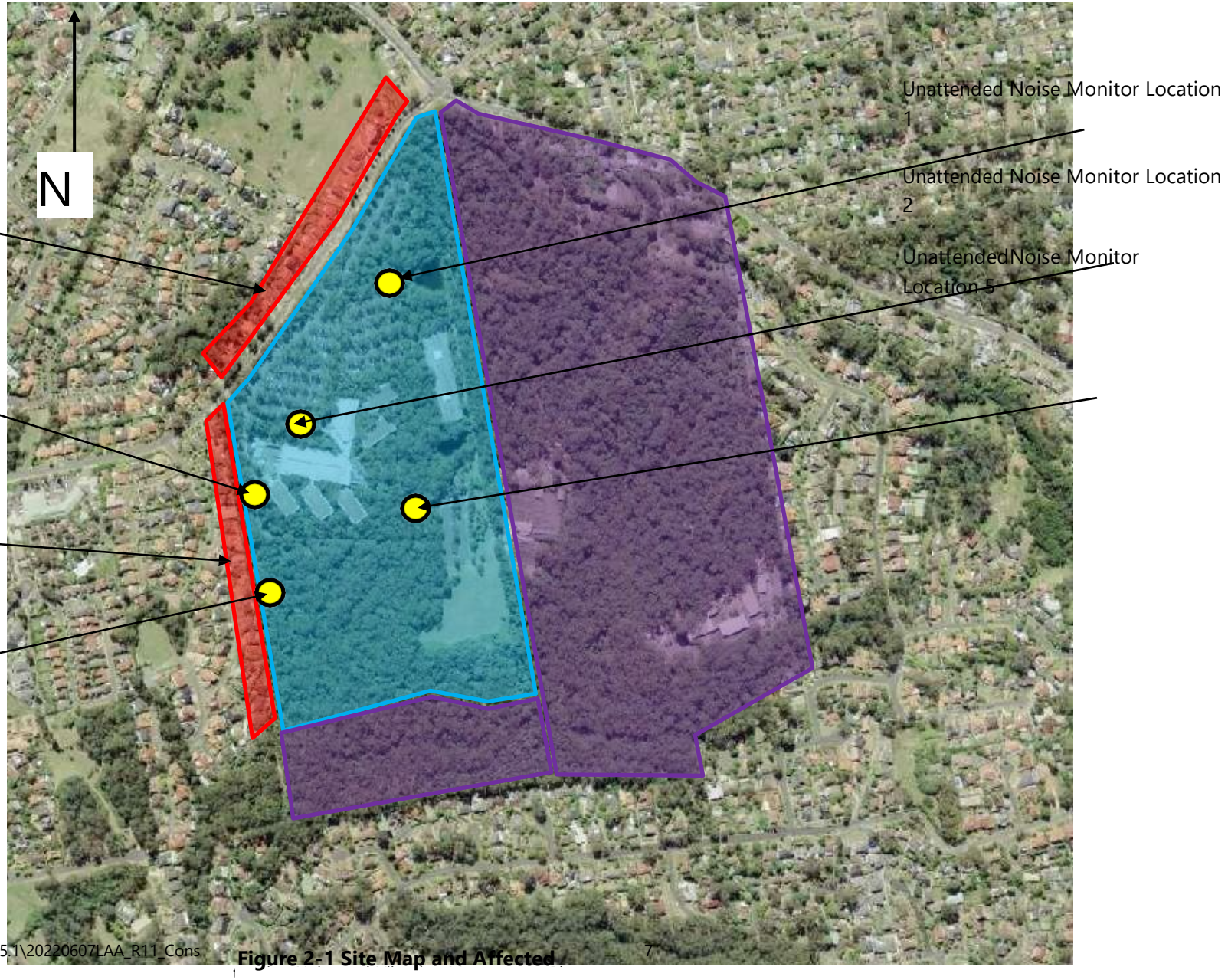

Figure 2-1 Site Map and Affected Receivers

Site map sourced SIX MapsNSW

PROPOSED CIVIL WORKS

The scope of works proposed to be carried out under this Development Application relates to Civil Works. These works generally consist of the following:

Bulk Earthworks, Piling Works, detailed excavation, drainage and services infrastructure and theconstruction of roads and retaining walls.
Infrastructure services lead in works and intersection works to Coonara Avenue.

Bulk Earthworks, Piling and Civil works are proposed to be completed within the area marked with a blue dotted line in Figure 4.1 below.

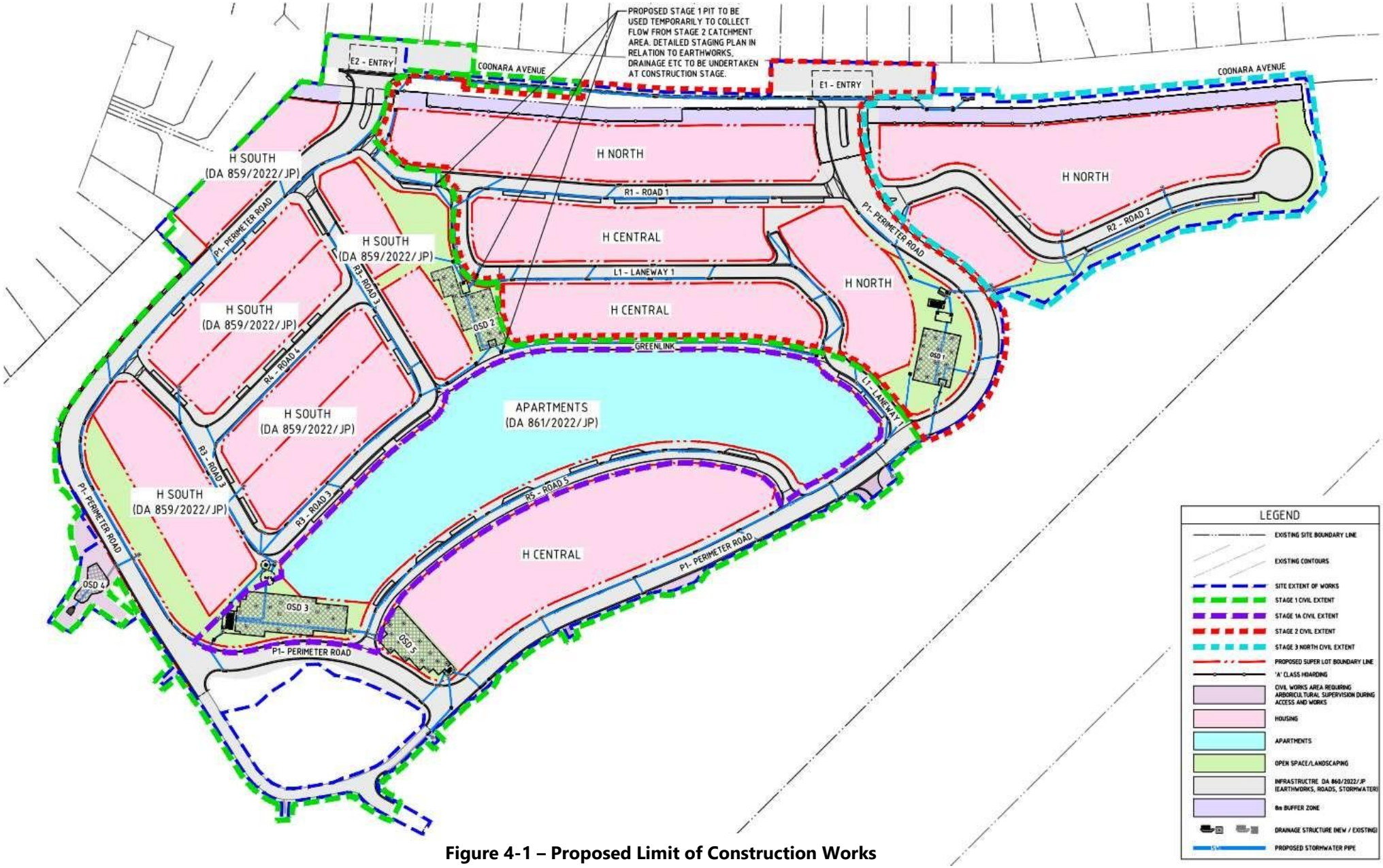

Figure 4-1 – Proposed Limit of Construction Works

The proposed works have been divided into a number of main work phases, along with the main noise producing equipment and activities likely to occur in each phase, please see below for outline of works:

Table 1 – Equipment Noise Data

Construction Activity	Equipment	Sound Power Level dB(A)L_{Aeq}
Civil Works	Excavator Mounted Hydraulic Hammer	118
	Excavator with Bucket	105
	CFA Piling Rig	103
	Concrete Pump	105
	Concrete Truck	105
	Wheel Trailer Scraper	118
	Grader	112
	Rock Saw	114

The Noise levels presented in the above table are derived from the following sources:

Table D2 of Australian Standard 2436-1981
Data held by this office from other similar studies.

CONSTRUCTION NOISE CODES AND GUIDELINES

The NSW EPA *Interim Construction Noise Guideline (ICNG) 2009* details specific construction noise and vibration management levels applicable to construction sites within NSW.

Where feasible and practical measures may be applied to the construction site is to endeavour to comply with the noise management levels outlined in the guideline. A summary of the code is detailed below.

NSW EPA INTERIM CONSTRUCTION NOISE GUIDELINE (ICNG) 2009

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

"Noise affected" level. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
10dB(A)$L_{eq(15\ minutes)}$ for work during standard construction hours (7:00am-6:00pm Monday to Friday and 8am to 1pm on Saturdays); and
5dB(A)$L_{eq(15\text{-}minutes)}$ for work outside standard construction hours (6:00pm-7:00pm Monday to Friday and 1:00pm to 4:00pm on Saturdays); and
"Highly noise affected level". Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)Leq(15min) at nearby residences. Highly noise affected level only applies during standard construction hours.

A summary of noise management levels for standard hours of construction are presented below:

Table 2 – Construction Noise Management Level (Residents)

Receiver Type	"Noise Affected" Level dB(A) $L_{eq(15minutes)}$	"Highly Noise Affected" Level dB(A) $L_{eq(15Minutes)}$
Residential Receiver	Background + 10dB(A) (Standard Construction Hours)	75
	Background + 5dB(A) (Outside Standard Construction Hours)	N/A

AUSTRALIAN STANDARD AS 2436:2010 "GUIDE TO NOISE CONTROL ON CONSTRUCTION, MAINTENANCE AND DEMOLITION SITES"

Australian Standard AS 2436 provides guidance on noise and vibration control in respect to construction and demolition sites, the preparation of noise and vibration management plans, work method statements and impact studies.

The Standard states that:

"Some construction and demolition activities are by their very nature noisy. The authorities responsible for setting noise level criteria for essential works will take note of the constraints imposed by such activities, especially when they are of short duration."
Construction, demolition and maintenance works pose different problems of noise and vibration control when compared with most other types of industrial activity, since (a) they are mainly carried on in the open; (b) they are often temporary in nature although they may causeconsiderable disturbance whilst they last; (c) the noise and vibration arise from many different activities and kinds of plant, and their intensity and character may vary greatly during different phases of the work; and (d) the sites cannot be separated by planning controls, from areas that are sensitive to noise and vibration.

The standard provides advice and guidelines for the prediction of impacts and the methods available to manage impacts. The guideline promulgates feasible and reasonable mitigation strategies and controls, and stakeholder liaison, in the effort to reach a realistic compromise between site activities and impacts on neighbouring properties.

EXISTING BACKGROUND NOISE LEVELS

Five unattended noise monitors were installed on ground level around the project site (55 Coonara Avenue, West Pennant Hills) with detailed locations below:

Location 1-North western corner along Coonara Ave.
Location 2- Middle point of western boundary along Coonara Ave.
Location 3- along western boundary of complex with microphone adjacent to the boundary fence
Location 4- along turning point of Perimeter Rd with microphone located close to residential boundary.
Location 5- along the proposed eastern facade of Building A2.

Existing rating background noise levels (RBL) have been measured by Acoustic Logic for this project. Rating background noise levels have been determined using unattended monitoring around the site. Unattended noise monitoring was conducted using five Acoustic Research Laboratories Pty Ltd noise loggers. The loggers were programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was

calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

The results of the monitoring are summarised in the following table.

Table 3 – Measured Rating Background Noise Level

Location	Time Period	Noise Level
Location 1	7:00am-6:00pm	50*
Location 2	7:00am-6:00pm	52
Location 3	7:00am-6:00pm	37**
Location 4	7:00am-6:00pm	45
Location 5	7:00am-6:00pm	37

Note: *Measured RBL is adopted for Receiver 1; **Measured RBL is adopted for Receiver 2Please

see figures below for photos of unattended noise monitors

Figure 6-1 Logger Location 1

Figure 6-2 Logger Location 2

Figure 6-3 Logger Location 3

Figure 6-4 Logger Location 4

Figure 6-5 Logger Location 5

CONSTRUCTION NOISE AND VIBRATION MANAGEMENT LEVELS

NOISE

Resultant Noise Management Levels (NMLs) have been summarised below, these have been determined based on the information in section 5 and rating background noise levels in section 6.

Table 4 – Resultant Noise Management Levels (NML's)

Hours of Work	Receivers	Noise Management Trigger Level dB(A)$L_{eq(15\text{-}minute)}$
Standard Construction Hours(7am-6pm Monday – Friday 7am-5pm Saturday)	R1	60dB(A)$L_{eq(15\text{-}minute)}$(BG + 10dB(A)) (50dB(A)$L_{90(Period)}$ + 10dB(A)
	R2	47dB(A)$L_{eq(15\text{-}minute)}$(BG + 10dB(A)) (37dB(A)$L_{90(Period)}$ + 10dB(A)

VIBRATION

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

For structural damage vibration, German Standard DIN 4150-3 Structural Vibration: Effects of Vibration on Structures; and

For human exposure to vibration, British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz.)

The criteria and the application of this standard are discussed in separate sections below.

Damage Criteria

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effectsof vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 2.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 5 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Human Comfort and Amenity

The British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz) will be used to assess construction vibration for human comfort.

This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings. The recommendations of this guideline should be adopted to assess and manage vibration from the site. Where vibration exceeds, or is likely to exceed, the recommended levels then an assessment of reasonable and feasible methods for the management of vibration should be undertaken.

Table 6 – BS 6472 Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. occasional loading and unloading, or dropping of heavy equipment (DECC, 2006).

PREDICTED CONSTRUCTION NOISE LEVELS

Noise from the worst-case works for each phase of the development have been predicted to the nearest most affected sensitive receiver.

Noise emissions from the operation of the proposed substation have been predicted at the receiver locations using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation Standard. Substation noise data used in the SoundPlan™ modelling is based on data in Section 2 of this report. The following weatherconditions are included in the modelling based on the requirements of ISO9613:

Wind speed of between 1m/s and 5m/s.

10 Degrees with 70% relative humidity.

The predicted A-weighted noise levels at all nearby residential receivers and other sensitive receivers are presented below:

CIVIL WORKS

Stage 1

The following table presents the equipment included in the stage 1 noise assessment.

Table 7 – Stage 1 Civil Works Noise Emission Assessment

Activity	**Number of Equipment**	**Sound Power Level**	**Predicted Cumulative Noise Level at Receiver dB(A)$L_{eq(15\text{-}minute)}$**		**Noise Management Trigger Level dB(A)$L_{eq,\ 15min}$**	**Findings**
			Receiver1 (North)	**Receiver2 (West)**		
Excavator Mounted Hydraulic Hammer	3	118	60 – 66	63 – 75	Noise Affected Level to R1- 60 Noise Affected Level to R2- 47 High Affected Noise Level - 75	Noise exceed the "affected noise level" but not exceed "high affected noise level"
Excavator with bucket	4	105				
CFA Piling Rig	2	103				
Concrete Pump	4	105				
Concrete Truck	4	105				
Wheel Trailer Scraper	3	118				
Grader	5	112				

The following figures present the SoundPLAN modelling predicted noise levels at different receiver heights.

8.1.1.1 Ground Floor (1500mm above ground level):

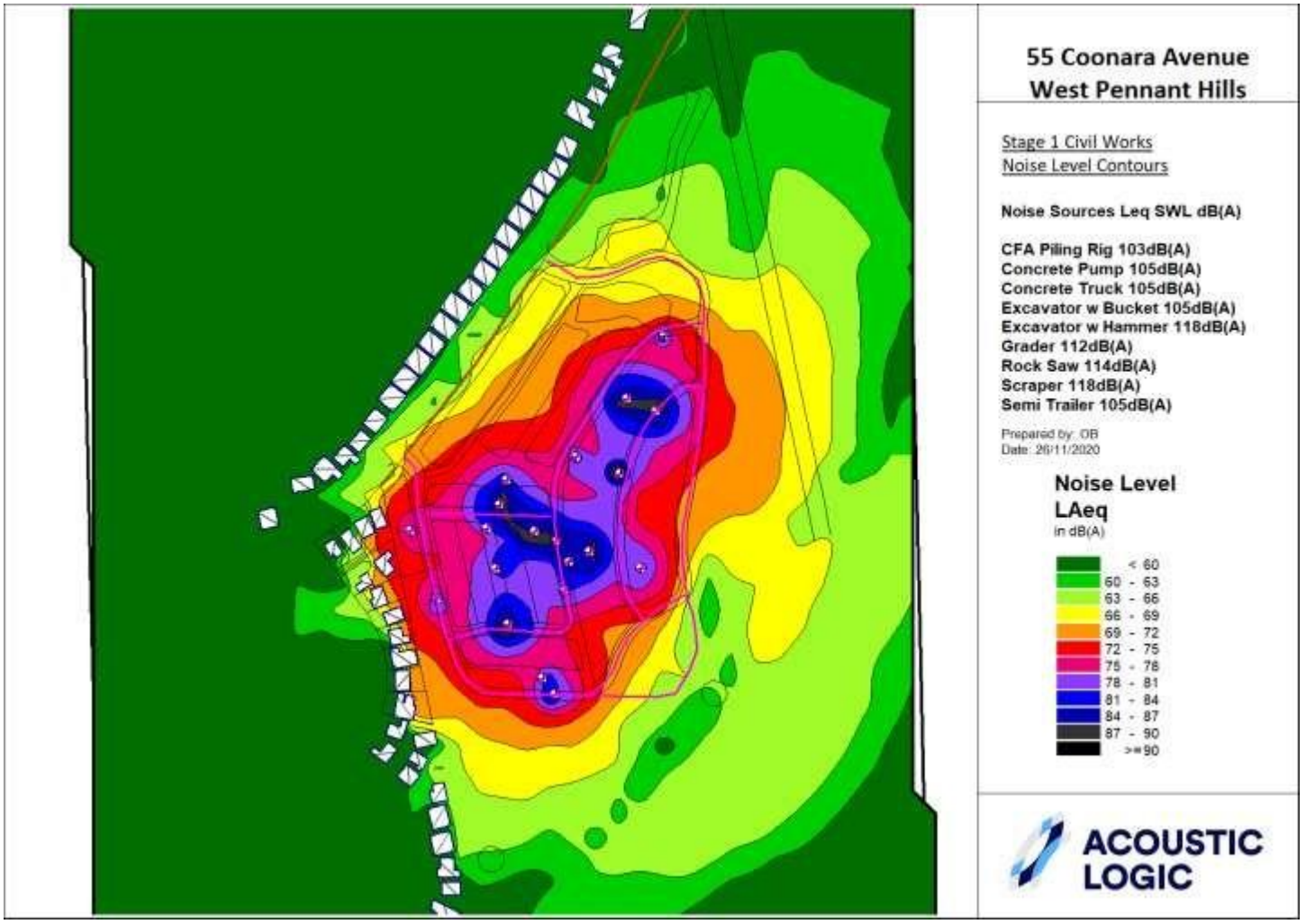

Figure 1 – SoundPLAN™ Stage 1 predicted noise impacts at Height 1500mm

◯ Owl Nest location

8.1.1.2 Level 1 (4500mm above ground level)

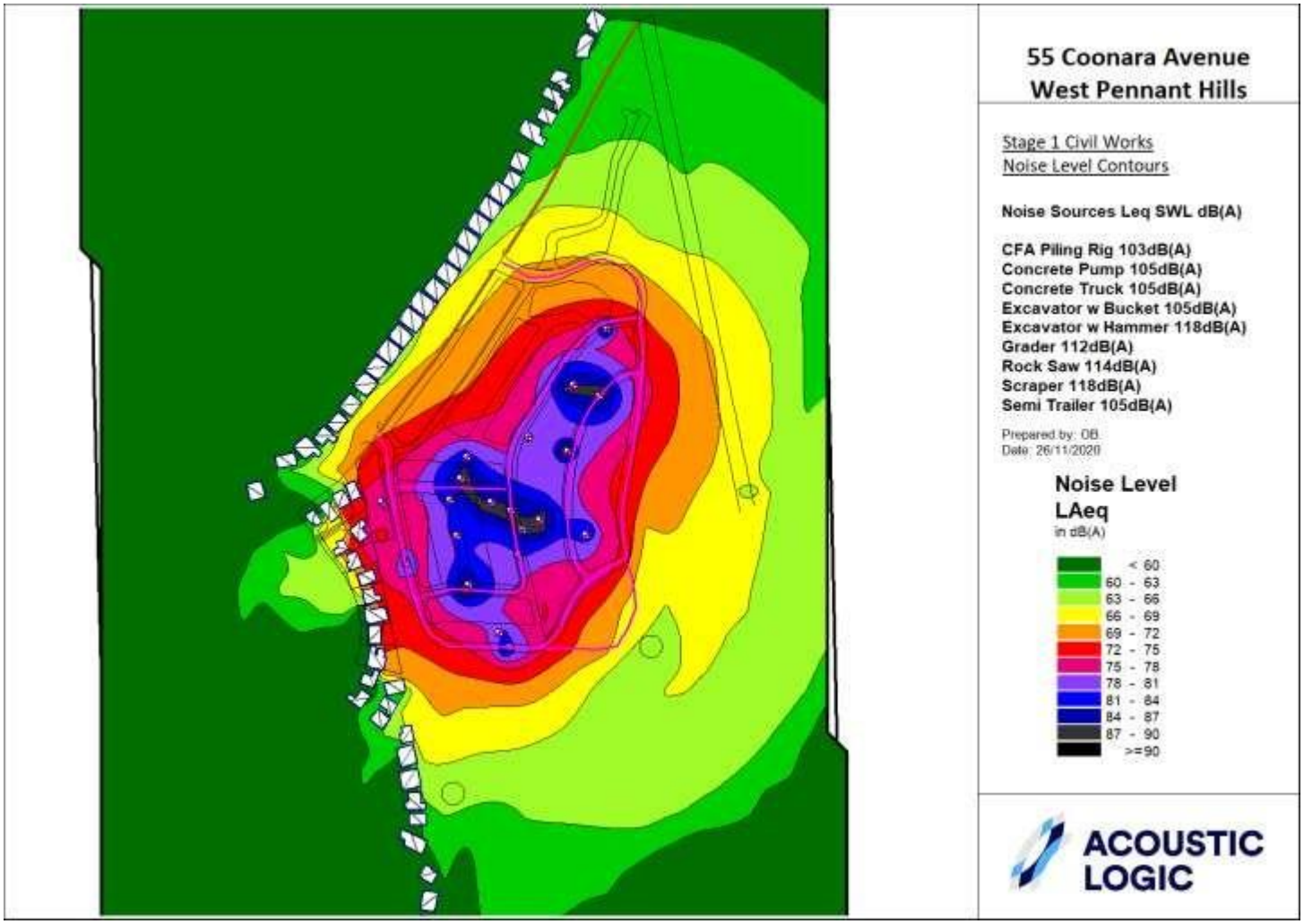

Figure 2 – SoundPLAN™ Stage 1 predicted noise impacts at Height 4500mm

◯ Owl Nest location

Stage 2 and Stage 3

The following table presents the equipment included in the stage 2 and stage 3 noise assessment.

Table 8 – Stage 2 and Stage 3 Civil Works Noise Emission Assessment

Activity	Number of Equipment	Sound Power Level	Predicted Level at Receiver dB(A)$L_{eq(15min)}$		Noise Management Trigger Levels dB(A)$L_{eq,(15min)}$	Findings
			Receiver1 (North)	Receiver2 (West)		
Excavator Mounted Hydraulic Hammer	4	118	60 – 69	60-69	Noise Affected Level to R1- 60 Noise Affected Level to R2- 47 High Affected Noise Level - 75	Noise exceed the "affected noise level" but not exceed "high affected noise level
Excavator with bucket	2	105				
Concrete Pump	1	105				
Concrete Truck	1	105				
Wheel Trailer Scraper	1	118				
Grader	2	112				

The following figures present the SoundPLAN modelling predicted noise levels for the different construction activities.

8.1.2.1 Ground Floor (1500mm above ground level):

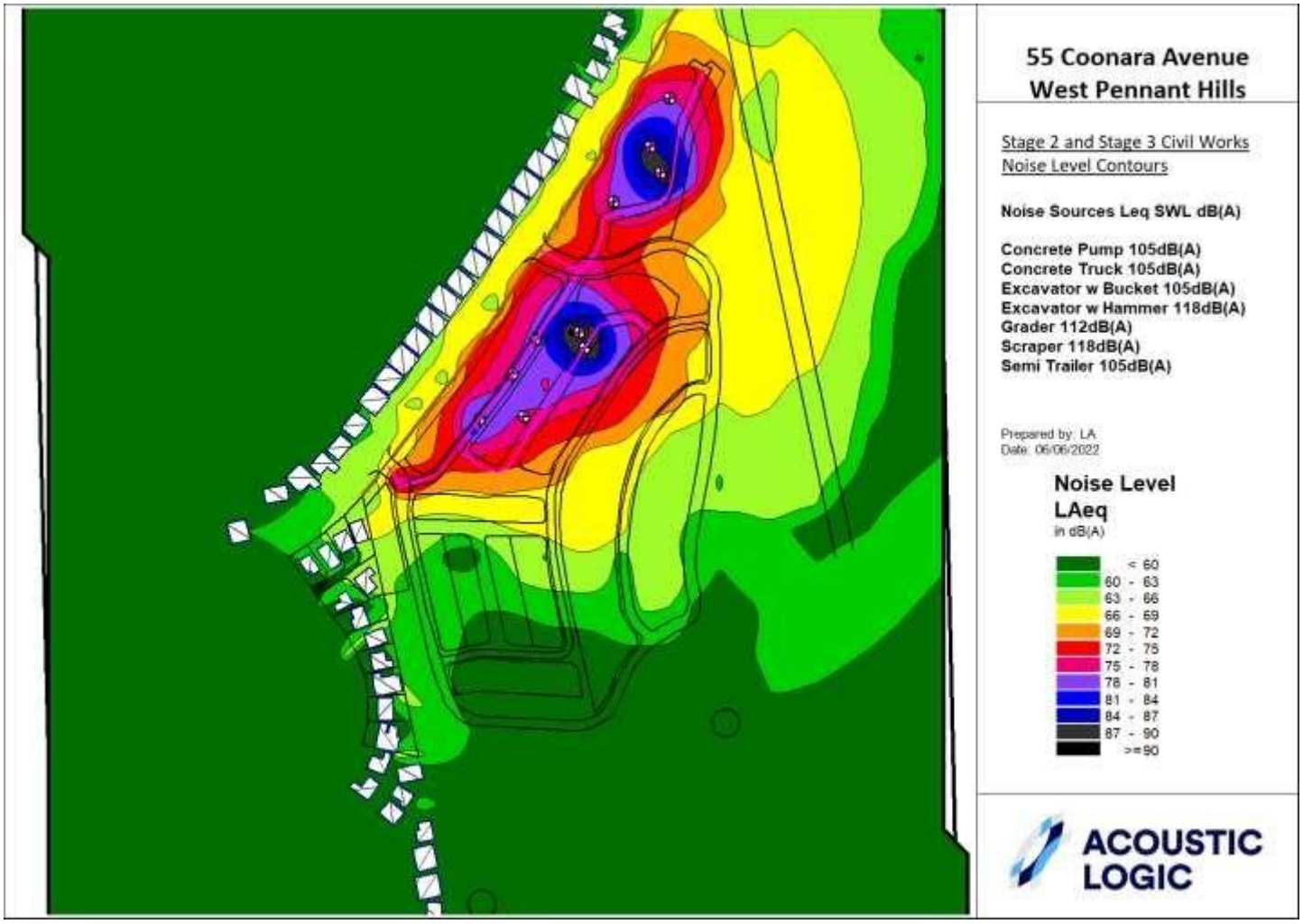

Figure 3 – SoundPLAN™ Stage 2 and Stage 3 predicted noise impacts at Height 1500mm

◯ Owl Nest location

8.1.2.2 Level 1 (4500mm above ground level)

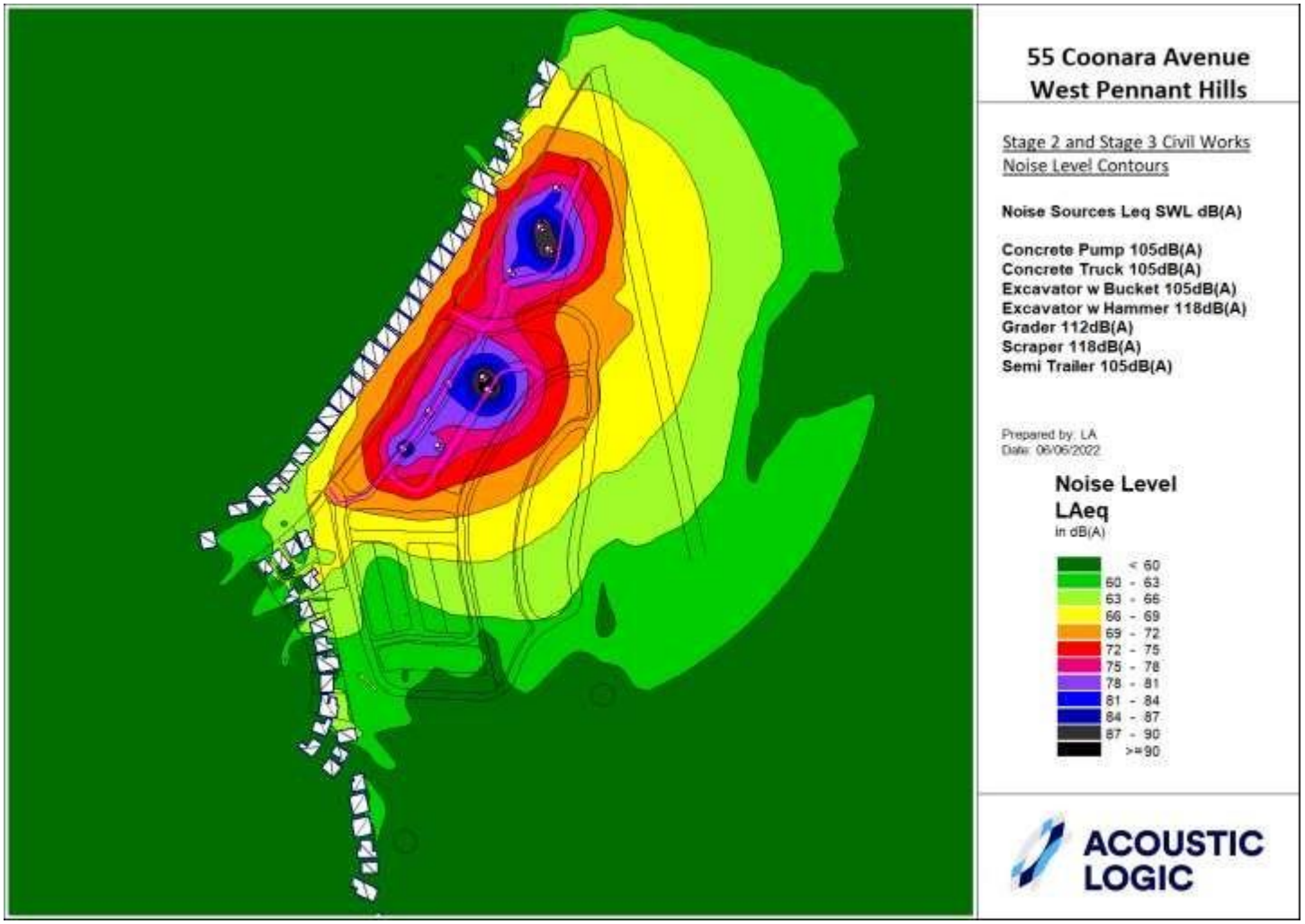

Figure 4 – SoundPLAN™ Stage 2 and Stage 3 predicted noise impacts at Height 4500mm

◯ Owl Nest location

NOISE IMPACT ON POWERFUL OWL NEST TREES

Location of Powerful Owl Nest Trees

Unattended noise monitoring was conducted to determine background noise conditions within the construction site. The figure below demonstrates the potential owl nest locations known to be in the site area but which are not located with the development footprint.

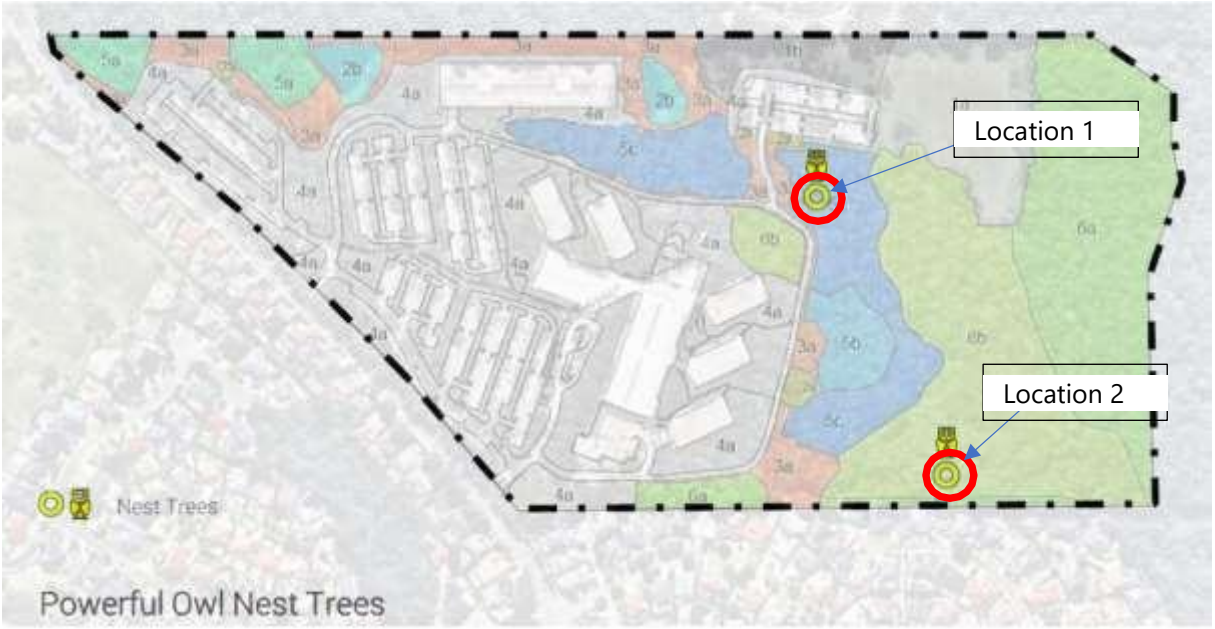

Figure 5 – Noise Monitoring Locations in Relation to the Powerful Owl Nest Trees

Measured Existing Noise Levels and Predicted Noise Level from Construction Activities

The measured ambient noise levels and predicted noise impacts at the tree locations marked up in Figure 5 are shown in the following table.

Table 9 – Measured Ambient Noise Levels and Predicted Noise Impacts

Location	Measured Highest Ambient Noise Levels LAeq Day	Predicted Noise Impacts	
		Stage 1	Stage 2 & Stage 3
1	58 dB(A)	63-66 dB(A)	57-58 dB(A)
2	54dB(A)	63-65 dB(A)	55-58dB(A)

Findings:

The predicted noise levels at Tree location 1 are 5-8dB higher for Stage 1 than the current highest measured ambient noise levels in the location. However, Stage 2 and Stage 3 predicted noise levels arenot higher than the measured highest ambient noise levels.

Tree location 2 will have Stage 1 predicted noise levels 9-11dB higher than the highest ambient noise levels. However, Stage 2 and Stage 3 predicted noise levels will only be marginally higher at 1-4dB abovethe highest existing ambient noise levels.

VIBRATION LIMIT

VIBRATION PRODUCING ACTIVITIES

Proposed activities that have the potential to produce significant ground vibration include:

Excavator mounted hydraulic hammer;

Excavator mounted saw;

Excavator with bucket.

RECOMMENDED VIBRATION CRITERIA

It is recommended to adopt maximum 5mm/s PPV criteria to protect residential buildings adjacent to the project site based on requirements of DIN 4150.

Alarm Level – 3mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project managershall respond immediately by taking courteous work methodology.

Stop work level -5mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project managershall stop the work at amenity of geophone immediately.

SAFEGUARDS TO PROTECT SENSITIVE STRUCTURES

Vibration monitoring is recommended with geophone located along the nearest boundary. The monitor sends a notification to the site management team if a vibration alarm level is triggered.

RECOMMENDED NOISE AND VIBRATION CONTROLS

ECOLOGICAL CONTROL MEASURES

Powerful Owl

To minimise impact to owl nesting areas mapped in Figure 5, the following control measures are proposed to be implemented during civil works if the owl is identified as nesting:

Hours of work will be restricted when within 100m during the breeding season (March – September) to commence 1 hour after sunrise (8:00am) and finish before 4:00pm; and
Noise monitoring is to be established during the breeding period in these areas.

EXCAVATOR MOUNTED HAMMER AND ROCK SAWING

If complaints arise, it is advised that the respite periods be reviewed such that these activities occur further away from sensitive hours or days and continuous works be shortened.

COMMUNITY CONSULTATION/NOTIFICATION:

For any noise management programme to work effectively, continuous communication is required between all parties, which include sensitive receivers that may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and management levels for the benefit of all parties.

The objective in undertaking a consultation process is to:

Inform and educate the groups about the project and the noise controls being implemented;

Increase understanding of all acoustic issues related to the project and options available;

Identify group concerns generated by the project, so that they can be addressed;

Notification (leaflet or similar) of nearby residents is recommended, detailing the description of works, duration on the day, and expected completion date;

Ensure that concerned individuals or groups are aware of and have access to a Complaints Register which will be used to address any construction noise related problems should they arise. Community consultation would be undertaken prior to works commencing including the receivers identified in Section 3.

MATERIALS HANDLING/VEHICLES:

Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.

Avoid careless dropping of construction materials into empty trucks.

Trucks, trailers and concrete trucks should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).

Construction vehicles accessing the site should not queue in residential streets and should only use the designated construction vehicle routes. Loading of these vehicles should occur as far as possible from any sensitive receiver.

COMPLAINTS HANDLING:

In the event of complaint, the procedures outlined in Section 11 should be adopted.

ACOUSTIC BARRIER:

Barriers or screens can be an effective means of reducing noise. Barriers can be located either at the sourceor receiver. The placement of barriers at the source is generally only effective for static plant (tower cranes).Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuatedby placing barriers at the source.

Barriers can also be placed between the source and the receiver. The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiveris totally shielded from the noise source reductions of up to 15 dB(A) can be achieved. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8 dB(A) may be achieved. Where no line of sightis obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructedfrom should have a noise reduction performance which is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10 or 15mm plywood would beacceptable for the barriers.

EXCAVATOR NOISE

Excavators are expected to be used for most of the civil works period.

Where prolonged excavator use is necessary, excavators could be moved to another part of the site to offer the receiver closest to the excavator some respite. Where practical and feasible, by moving the excavator from working on one part of the site to the opposite side of the site can provide up to a 10dB(A) reduction in noise levels impacting residential receiver locations. Management processes include;

All surrounding receivers should be notified of the duration and extent of the works proposed commencement during the excavation stage via letterbox drops, with a detailed engagement plan and contact information for all relevant personnel on site.

VEHICLE NOISE AND CONCRETE PUMPS

Trucks must turn off their engines when on site to reduce impacts on adjacent land use (unless truck ignition needsto remain on during concrete pumping).

Where feasible locate concrete pumping plant away from site boundaries.

VIBRATION MONITORING

It is recommended that attended monitoring be carried out at the commencement of civil work if rock excavation using hydraulic hammers is undertaken to confirm vibration levels at sensitive receivers. If this assessment indicates that vibration levels may be exceeded, then either modify work practices or install continuous monitors with alarms so that works can cease if the trigger levels are exceeded.

It is recommended that the monitors (if required) are fitted with GSM modem for vibration exceedance. In addition, the vibration loggers will be downloaded remotely using the GSM modem and reports to be issued fortnightly.

The following alarm levels and stop work levels are recommended if vibration monitors are installed:

Recommended Vibration Criteria

Alarm Level – 3mm/s PPV for residential receivers. SMS alarm message will be sent to site foreman/engineer, project manager and acoustic engineer if magnitude of vibration events reach orexceed this level. Project manager shall respond and investigate works at amenity of geophone immediately.

Stop work level – 5mm/s PPV for residential receivers. SMS alarm message will be sent to site foreman/engineer, project manager and acoustic engineer if magnitude of vibration events reach orexceed this level. Project manager shall stop the work at amenity of geophone immediately.

Detailed monitor locations will be determined based on the locations of civil work machines.

Downloading of Vibration Logger

Downloading of the vibration logger will be conducted on a regular basis. In the event exceedance of vibration criteria via a SMS alert system occurs, downloading of logger should be conducted more frequently. Results obtained from the vibration monitor will be presented in a graph formant and will be forwarded to Mirvac for review. It is proposed that reports are provided fortnightly with any exceedance in the vibration criteria reported as detailed in this report.

Presentation of Vibration Logger Results

A fortnightly report will be submitted Mirvac via email summarising the vibration events. The vibration exceedanceof limit is recorded the report shall be submitted within 24 hours. Complete results of the continuous vibration logging will be presented in fortnight reports including graphs of collected data.

Persons to Receive Alarms

The following personnel will receive GSM alarms:

Acoustic consultant/advisor (1 person)

Civil Works Principal Contractor (Site Manager)

Excavation site foreman

Other Activities

In the event of non-compliances, noise management techniques identified in this report should beemployed to minimise the level of noise impact. This may include community consultation and schedulingof loud construction processes.

Notwithstanding above, general management techniques and acoustic treatments are included below which may be implemented on a case-by-case basis to reduce noise emissions to surrounding receivers.

CONTROL OF CONSTRUCTION NOISE AND VIBRATION

The execution of this work will facilitate the formulation of noise control strategies for this project.

The flow chart presented in Figure 2 illustrates the process that will be followed in assessing construction activities.

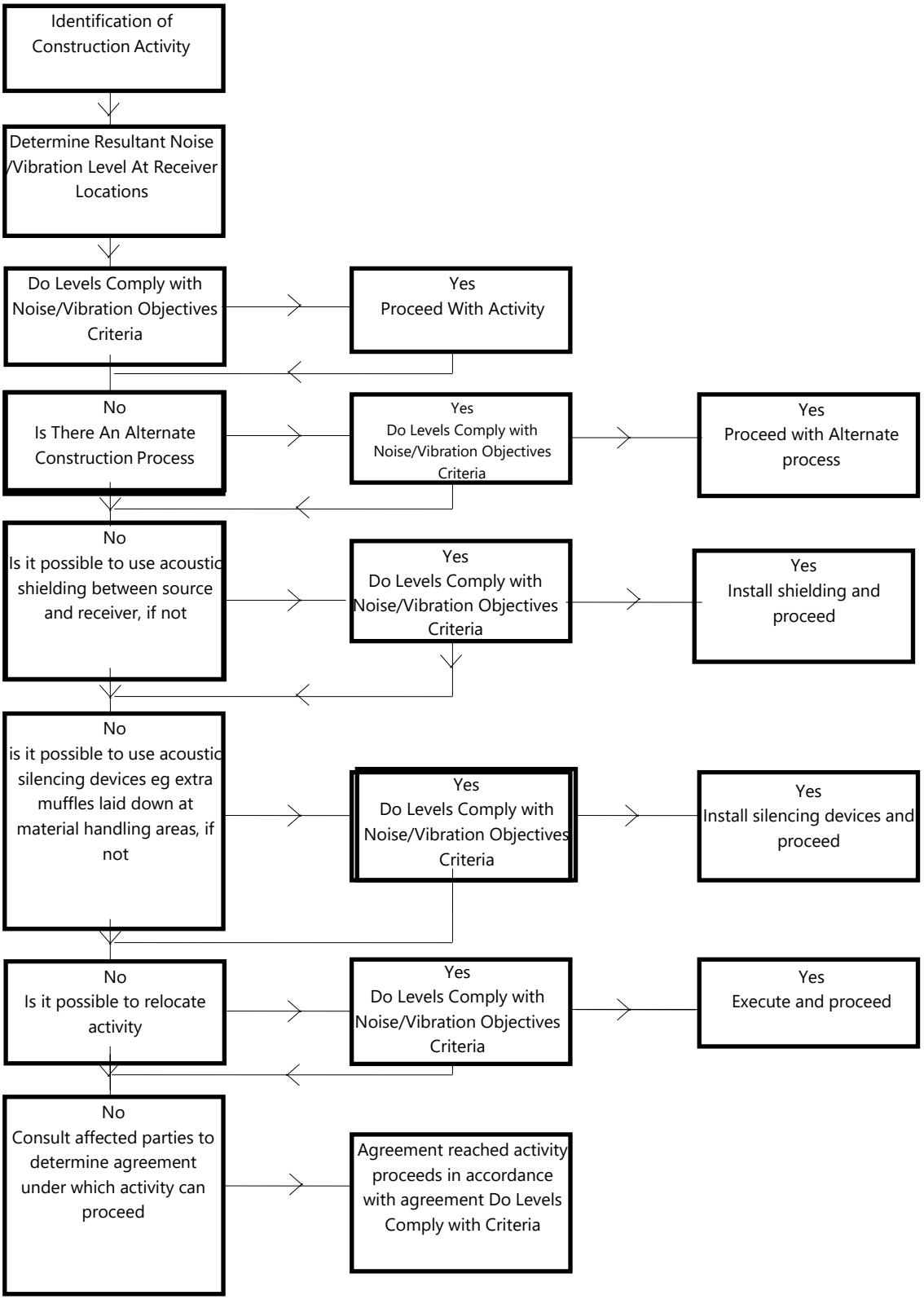

Figure 2 – Process Flowchart

TYPICAL NOISE AND VIBRATION CONTROL METHODS

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possibleto select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of thesite may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

SILENCING DEVICES

Where construction process or appliances are noisy, the use of noise reducing devices may be possible. These may take the form of engine shrouding, or special industrial noise reducers fitted to exhausts.

MATERIAL HANDLING

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

TREATMENT OF SPECIFIC EQUIPMENT

In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. It is recommended that all available and reasonable treatments and mitigation strategies presented in this report be adopted to minimise noise emissions from the excavation and construction activities on site.

COMBINATION OF METHODS

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

MAINTENANCE OF PLANT, EQUIPMENT AND MACHINERY

All plant, equipment and machinery should be regularly serviced and maintained at optimum operating conditions,to ensure excessive noise emissions are not generated from faulty, overused or unmaintained machinery.

STAFF TRAINING AND REPORTING MECHANISM

All construction staff (including subcontractors) on site, as part of the site induction process, will be informed of the surrounding sensitive receivers on site and the site-specific recommendations to reduce noise and vibration impacts to these receivers.

COMMUNITY INTERACTION AND COMPLAINTS HANDLING

ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continuous communication is required between all parties, which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

Inform and educate the groups about the project and the noise controls being implemented;

Increase understanding of all acoustic issues related to the project and options available;

Identify group concerns generated by the project, so that they can be addressed; and

Ensure that concerned individuals or groups are aware of and have access to a Constructions Complaints Register which will be used to address any construction noise related problems should they arise.

Community consultation should be conducted prior to any works commencing on site, with letterbox notificationsto all identified however not limited to surrounding sensitive receivers (refer section 3).

DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertakento investigate the complaint, the cause of the exceedances and identify the required changes to work practices. Inthe case of exceedances of the vibration limits all work potentially producing vibration shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

If a noise complaint is received the complaint should be recorded on a Noise Complaint Form. The complaint form should list:

The name and address of the complainant (if provided);

The time and date the complaint was received;

The nature of the complaint and the time and date the noise was heard;

The name of the employee who received the complaint;

Actions taken to investigate the complaint, and a summary of the results of the investigation;

Required remedial action, if required;

Validation of the remedial action; and

Summary of feedback to the complainant.

A permanent register of complaints should be held. All complaints received should be fully investigated and reported to management. The complainant should also be notified of the results and actions arising from the investigation.

The investigation of a complaint shall involve where applicable;

Noise measurements at the affected receiver;

An investigation of the activities occurring at the time of the incident;

Inspection of the activity to determine whether any undue noise is being emitted by equipment; and

Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an item of plant is found to be emitting excessive noise, the cause is to be rectified as soon as possible. Where work practices within established guidelines are found to result in excessive noise being generated then the guidelines should be modified so as to reduce noise emissions to acceptable levels. Where guidelines are notbeing followed, the additional training and counselling of employees should be carried out.

Measurement or other methods shall validate the results of any corrective actions arising from a complaint where applicable.

REPORTING REQUIREMENTS

The following shall be kept on site:

A register of complaints received/communication with the local community shall be maintained and kepton site with information as detailed in section 14.2.

Where noise/vibration complaints require noise/vibration monitoring, results from monitoring shall beretained on site at all times.

Any noise exceedances occurring including, the actions taken and results of follow up monitoring.

CONTINGENCY PLANS

Where non-compliances or noise complaints are raised the following methodology will be implemented.

Determine the offending plant/equipment/process

Locate the plant/equipment/process further away from the affected receiver(s) if possible.

Implement additional acoustic treatment in the form of localised barriers, silencers etc where practical and reasonable.

Selecting alternative equipment/processes where practical

CONCLUSION

A Noise and Vibration Management Plan has been produced to assess the noise and vibration effects associated with civil works included as part of the Stage 1 Concept Plan Application for 55 Coonara Ave, West Pennant Hills NSW.

Based on our assessment, predicted external noise levels at surrounding receivers may potentially exceed the noise management trigger level, especially for activities such as concrete breaking/sawing and piling, but will have varying degrees of impact depending on the location of the activity. This can be expected due to the close proximity of receivers and because they are 1-2 storey, there will still be direct line of sight to the project site, evenwith the proposed hoarding along Coonara Avenue. In addition, ecological constraints have been considered andcontrol measures proposed to mitigate impact to ecologically sensitive environments in proximity of the site.

Recommendations have been provided to minimise and monitor the noise impacts on surrounding receivers whilst monitoring has also been elected at selected locations to work within the site parameters.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Lachlan Abood

APPENDIX E – WASTE MANAGEMENT PLAN

Waste Management Plan –

Concept Development Application that includes the detailed first stage comprising the Civil Works

55 Coonara Avenue, West Pennant Hills

Revision		Date
A	Stage 1 Concept Plan and Civil Development Application	23rd April 2021
B	Stage 1 Concept Plan and Civil Development Application	31st August 2021
C	Stage 1 Concept Plan and Civil Development Application	18th May 2022

Table of Contents

1 INTRODUCTION

This Waste Management Plan (WMP) has been prepared to accompany the Concept Plan and Civil Development Application submission to address the civil related items for the proposed redevelopment of the site located at 55 Coonara Avenue, West Pennant Hills (Lot 61 DP737386).

The Civil Works Contractor will utilize the following waste management principles:

- Avoid the use of excess materials and production of waste
- Reduce the amount of waste generated
- Reuse materials on site where possible
- Recycle waste
- Dispose of waste correctly

1.1 PURPOSE OF THIS REPORT

The objectives of this plan are to consider the following:

- Will construction/civil works generate surplus material that can be recycled?
- Will construction/civil works generate waste material that can be disposed of onsite?
- Will construction/civil works generate waste that will have to be disposed off-site?
- Will site personnel generate litter or rubbish?

Periodic review of this Waste Management Plan will be undertaken to ensure continual compliance with environmental regulations and standards.

2 WASTE MANAGEMENT

The Waste Management Plan involves four major steps:

1. Estimating the type and quantity of waste generated on site;
2. Identifying who is responsible for recycling or disposal
    - The Principal Contractor will be responsible for all on site management of waste and recycled materials.
    - The Principal Contractor is responsible for on-site processing of material
3. Specifying whether the waste is:
    - Re-used on site;
    - Re-use or recycled off-site;
    - Disposed off-site (landfill)
4. Recording the type and quantity of waste recycled.
    - Tipping dockets to be received from Recycled Waste Facility
    - Materials Tracking for import and export of any materials to site

During site establishment, the Principal Contractor will set up skip bins or other appropriate receptacles to contain waste materials, litter and spoil. Separate bins will be provided for recyclable material and non-recyclable material ensuring recycling potential is optimized with efficient material sorting, processing and stockpiling. Refer to Figure 1 for location of on-site storage for recycling and disposal.

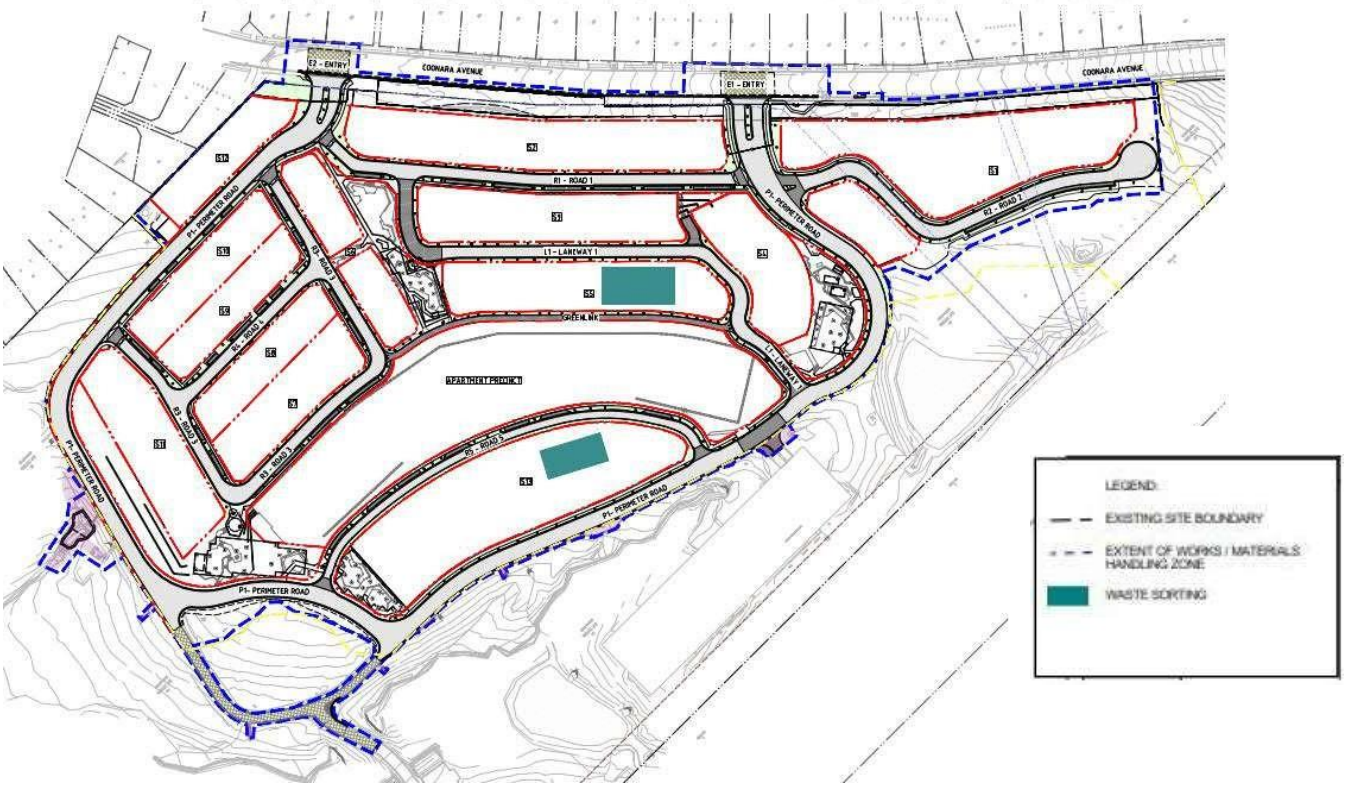

Figure 1 – Waste Sorting during civil. Materials handling to entire extent of works footprint

3 WASTE STREAMS

3.1 CLASSIFICATION

The Civil Works for the project will produce the following waste streams having the following classifications:

- Excavation (e.g. soil, rock) – Virgin Excavated Natural Material (VEMN) and Excavated Natural Material (ENM)
- Concrete and Pavement Materials – Recycled General Solid Waste ("non-putrescible"- Not Liable to become putrid);
- Miscellaneous Construction Waste - General Solid Waste ("non-putrescible"- Not Liable to become putrid);
- Plant and Vegetation Matter – Green Waste

3.2 RE-USE OF WASTE

Excavation (soil and rock): As part of the works, minimal soil is requiring export off site with majority of material being excavated and compacted as fill elsewhere on the site. Overall, the site requires import of VENM material. If any excess material is generated to be exported, it will be Tested and exported from site for suitable reuse subject to waste classification.

Concrete – To minimise concrete waste quantities will be accurately measured prior to ordering. All concrete from the existing footing and ground floor slabs will be sent to an appropriately licensed recycling facilities such as Concrete Recyclers and used as raw feed to produce recycled concrete products such as DGB. The recycling potential of waste concrete is 100%.

Non-Reusable Waste - Through the course of the project, some non-reusable waste is likely to be generated these include:

Green Waste - As part of the works, green waste will be generated during the regrading of the site. Green waste generated as a result of the regrading works will be sorted and reused across the site as part of the civil works masterplan as mulch and fill where possible.

General waste e.g. food scraps, cleaning waste etc.

General waste will comprise of food waste, packaging and other general household waste. The general waste will primarily be generated by construction workers and site amenities. Waste bins will be provided around the site amenities that will be periodically emptied into a large covered waste bin which will be emptied as needed and taken to land fill. It is anticipated that waste bins will be provided by Suez Recycling.

3.3 STORAGE, CONTROL AND REMOVAL OF CONSTRUCTION WASTE

The Construction phase of the development will require the storage and management of the following waste streams.

- Green Waste
- Concrete
- General Waste

The above waste streams will be stockpiled on site to ensure effective separation on site. Where practical and quantities permit, the wastes will be stored in bins for collection. Stockpiling waste stream separately allows personnel to maximise the recycling potential of waste produced and minimise material sent to landfill. General waste will go directly to suitable waste bins to be taken to landfill.

3.4 STOCKPILE MANAGEMENT

Bulk Earthworks materials will be excavated, stockpiled and reused onsite to future levels and grades.

Earth moving equipment will relocate material from the point of generation to fill locations for compaction across the site.

The stockpiling of material throughout the earth works process is required to ensure efficiency during processing on site, Movement of material, and relocation to suit future levels.

Water will be sprayed over the concrete and soil stockpile prior to and during (if required) the loading out process to mitigate dust. During the concrete processing stage where concrete is either hammered or pulverized to extract the steel reinforcement from the concrete water will be sprayed over the processing area and stockpiles.

Material stockpiles will be kept to a manageable volume with progressive loading out. Water for the project will be sourced from appointed locations within the site boundaries.

3.5 HAZARDOUS WASTE MANAGEMENT

Environmental site assessments have been undertaken and determined that there are no hazardous substances on the site. Any hazardous substations that are identified during Civil Works stage will be handled in accordance with industry and WHS standards and disposed of in accordance with all statutory requirements at appropriately licensed facilities and in accordance with the unexpected finds procedure.

APPENDIX F – MIRVAC GROUP POLICIES

ALCOHOL AND OTHER DRUGS POLICY

August 2020

DRUGS AND ALCOHOL POLICY
Policy Authorised by: Executive Leadership Committee on 09/09/2016
Policy Maintained by: Group HSE
Version Number: MG-CS-HSEPOL9.5-F
Last Revised Date: 5 August 2020 by Vanessa Harper – Mathews

Mirvac is committed to providing safe, healthy and productive workplaces**.**

It is well recognised that alcohol and other drugs (AOD) can affect a person's health and wellbeing. AOD usecan also impair a person's work performance, exposing themselves and others to injury. It is therefore essential that all workers are fit to perform the requirements of their work and that they are not impaired by AOD.

To address those risks associated with the use of AOD and to enable Mirvac to provide safe, healthy and productive workplaces, Mirvac shall:

Apply this Policy and the related business unit specific procedures (Procedures) across all Mirvac workplaces and operations as applicable;

Ensure all workers are aware of this Policy and the Procedures;

Promote education and awareness of risks associated with AOD use and inform Mirvac employeesof help avenues available, including access to Mirvac's Employee Assistance Program;

Ensure that consultation remains confidential between management and workers in the ongoing prevention, education, counselling and rehabilitation of workers affected by AOD use;

Inform workers via this Policy that the following activities are prohibited at Mirvac workplaces and operations:
undertaking safety critical roles or work at high risk workplaces under the influence of AOD;
driving a motor vehicle or operating any plant or equipment whilst impaired by AOD;
using illegal drugs or prescription drugs that impairs their capacity to perform their duties,including their responsibility to work safely.

Include AOD screening for individuals seeking employment in safety critical roles as determined byBusiness Unit risk identification and mitigation processes;

Implement monitoring activities that may include AOD testing for workers undertaking safety criticalroles or attending high risk workplaces as determined by Business Unit risk identification and mitigation processes; and

Manage work related social or entertainment events in a responsible manner by adhering to theMirvac Code of Conduct as well as the Procedures that support this Policy.

To ensure Mirvac's commitment to a safe, healthy and productive workplace, all managers shall promote and administer compliance with this Policy and Procedures. All employees and workers shall abide by the provisions of this Policy as a condition of their employment or contract.

Sue Lloyd-Hurwitz

Susan Lloyd-HurwitzCEO and Managing Director

BULLYING AND HARRASSMENT PREVENTION POLICY

April 2019

Contents

PURPOSE

Purpose

Mirvac is committed to protecting the health, safety and wellbeing of its employees, service providers and other workers by creating a work environment that is free of bullying or unlawful harassment behaviour. Each of Mirvac's employees, service providers and other workers has a legal obligation not to (and must not) bully or unlawfully harass any employee, service provider, other worker, customer, supplier or visitor. Mirvac does nottolerate such behaviour and expects all employees, service providers and other workers to treat each other with dignity, courtesy and respect.

Commencement of Policy

This Policy will commence from 1 April 2019. It replaces all other similar policies whether written or not.

Mirvac reserves the right to vary, replace or terminate this Policy from time to time.

Application of Policy

This Policy applies to all workplace participants of Mirvac.

This Policy does not form part of any employee's contract of employment.

POLICY

Bullying

Bullying is repeated, unreasonable behaviour directed towards a person or group of persons that creates a risk to their health, safety or wellbeing. *Repeated behaviour* is defined as persistent in nature and can refer toa range of behaviours over time. *Unreasonable behaviour* means behaviour that a reasonable person, havingregard for the circumstances, would see as unreasonable, including behaviour that is victimising, humiliating,intimidating or threatening.

Examples can include,

abusive, insulting or offensive language
spreading rumours, unjustified criticism
cyber-bullying through emails, texts and social media
setting deadlines that are unrealistic or exceptionally difficult to achieve.

Unlawful Harassment

Unlawful harassment is a type of unlawful discrimination. In general, unlawful harassment is any form of conduct or behaviour which affects a person that,

is unwelcome (not wanted) or uninvited (not asked for), and

is based on one of the unlawful reasons (such as age, race, religion, sex), and

is behaviour that a reasonable person would have anticipated might humiliate, offend or intimidatethe person being harassed.

Unlawful harassment may make another person feel embarrassed, offended or degraded and does not have to be repeated.

Reasonable Management Action

Many things that happen at work are generally not considered to be bullying or harassment, even where some experiences can be uncomfortable for those involved. For instance, performance and conduct management,or related management assessment which is reasonable, does not constitute bullying or harassment. Managers have a right to use reasonable management action that is to reasonably direct the way work is carried out and to monitor and give feedback on performance and conduct.

Possible Actions

Where an employee, service provider or other worker is confronted by an issue which they perceive to be bullying or harassment, they should in the first instance try to address the issue directly with the person involved, if appropriate.

If this action proves too difficult they should then raise the issue with their immediate manager. Alternatively the issue can be raised with a Human Resources Manager, a Bullying and Harassment Contact Officer, an elected Health and Safety Representative, a Health Safety Environment Manager or by telephoning the MirvacOpen Line on 1300 790 228.

As part of our commitment in preventing bullying or harassment behaviour Mirvac treats all reported complaints of such behaviour as a serious matter and applies the Mirvac Group Grievance Resolution Procedure in resolving reported complaints as well as allegations that come to its attention.

sustainability

CORPORATE RESPONSIBILITY AND SUSTAINABILITY POLICY

Mirvac is a top 50 ASX-listed company and leading Australian real estate investment trust with activities across the investment and development spectrums.

Our commitment to sustainability is outcomes-based, innovative and founded on the belief that we have a wider responsibility for our contribution to have a lasting impact. Mirvac strives for sustainability excellence in all our operations to build a lasting legacy for the planet and for our people. We recognise the increasing relationship between sustainability performance and company performance. Through sustainable building practices Mirvac seeks to deliver value to investors, as well as the wider community

Mirvac recognises that acting in a responsible and sustainable manner creates new opportunities, enhances investor value, and improves social and environmental returns.

Commitments

Mirvac is committed to:

Maintaining high standards of honest, ethical and legal business behaviour at all times.

Establishing performance improvement targets against our six sustainability priority areas – Business Conduct,Mirvac People, Stakeholders, Supply Chain, Environmental Impact and Climate Change and regularly reviewing and reporting publicly on progress.

Providing our customers, investors, suppliers and business partners with an experience that delivers excellence, meets or exceeds expectations of sustainable performance and engenders loyalty.

Engaging with our suppliers to improve the sustainability performance of our supply chain.

Enhancing the communities in which we operate through actions including active engagement, offering innovative and sustainable products, preserving heritage and enhancing culture and a focussed program of community contributions, investments and initiatives.

Developing, recognising and rewarding our staff to facilitate optimal performance, achieve career objectives andfoster a high performance culture committed to sustainability.

Preventing harm to people.

Improving resource efficiency and minimising the environmental impacts of activities, including the prevention of pollution.

Positioning Mirvac to operate in a changing climate and carbon-constrained economy.

Contributing to advancing the sustainability of the real estate investment management, asset management and development sectors.

Pursuing continual improvement in corporate responsibility and sustainability management and performance.

Regularly reviewing our Sustainability policies and procedures to ensure compliance with legislation and ongoing relevance across the Group.

Working with government and industry to improve performance outcomes for the benefit of our stakeholders andwider industry goals.

Accountability

The Mirvac Group Board has ultimate responsibility for reviewing and approving the sustainability strategy and monitoring the achievement of sustainability objectives through reviewing regular performance reporting. All Business Units are accountable for developing and driving implementation of the Group Sustainability Strategy and targets structured under this policy.

Progress against our sustainability strategy is independently assured where appropriate.

I commit Mirvac to the implementation of this policy and task all divisions and personnel across Mirvac with contributing to this goal.

Susan Lloyd-Hurwitz

Susan Lloyd-HurwitzCEO and Managing Director

February 2013

HEALTH SAFETY ENVIRONMENT POLICY

July 2019

HEALTH SAFETY ENVIRONMENT POLICY
Policy Authorised by: Executive Leadership Committee on 1 August 2019
Policy Maintained by: Group HSE
Version Number:
Last Revised Date: 26 July 2019

Mirvac is committed to protecting – and striving to improve - the health, safety and wellbeing of its employees, suppliers (includes service providers) and communities and providing healthy, safe and productive places. Mirvac is committed to protecting and minimising the impact on the environments in whichwe operate. This includes the prevention of pollution and fulfilling our environmental compliance obligations while adopting a product lifecycle approach.

Our HSE vision is simple – to continue to pursue safety excellence and move beyond preventing harm and ill health to improve the overall wellbeing of our employees, suppliers, communities and theenvironment including mental, social and psychological wellbeing. To help us achieve this vision we makeHSE a strategic business priority and require the active commitment to, and accountability for, HSE fromour employees, suppliers and partners.

We demonstrate our commitment to HSE through:

Leadership

We continually look for ways to improve HSE performance outcomes for the benefit of our workforce, suppliers, the industry and the communities we work with. Our line managers have a leadership role in the communication and implementation of HSE policies, procedures, systems and expectations and are held to account through agreed objectives and metrics.

Culture and Consultation

We expect our employees to take responsibility for and play an active role in ensuring a healthy and safe place of work and the promotion of a positive workplace culture.

We encourage employees to demonstrate initiative, to challenge, communicate and explore the safest wayto work and make decisions on issues that affect their health and safety, or impact on communities and the environment. We commit to active consultation with employees and where appropriate their representatives on safety and health related matters. We will work collaboratively to manage risks and ask the same of our suppliers and partners.

Capability

We provide training, information and guidance to enable our workforce to perform their roles safely and competently. We ensure our employees are fit for work and we provide support in the event of injury and ill health. We commit to pre-qualify our suppliers to ensure their HSE competence in the delivery of goods and services to Mirvac.

Effective Integration and Governance

We integrate risk management principles as a core element in our planning, design, development, construction and operations so that everyone is focused on managing risk. We are committed to ensuring compliance with Mirvac systems, legislative and industry standards that we assure through our governance structures, audit programs and periodic reviews of policies and procedures.

We strive to continually improve our HSE performance through the regular review and measurement of objectives and metrics and by sharing information across workplaces and divisions to promote awareness and encourage learning from each other.

I commit Mirvac to the implementation of this policy and task all divisions and personnel across Mirvac with the responsibility for achieving our vision.

Susan Lloyd-Hurwitz

Susan Lloyd-HurwitzCEO and Managing Director

Related Policies

A copy of Mirvac's Inclusion Policy can be accessed **here**.

A copy of Mirvac's Bullying & Harassment Prevention Policy can be accessed **here.**

Employees who are personally experiencing the effects of and directly affected by domestic and family violence can view what support is provided through the Leave Policy which can be accessed **here.**

INJURY MANAGEMENT & RETURN TO WORK POLICY

November 2020

Mirvac recognises the benefits of sound injury management principles and practices and commits to implementing such practices in all its workplaces. In conjunction with this commitment Mirvac acknowledges all legislative frameworks which govern and support injury management and return to work activities across all business units and regions of operation by Mirvac.

Experience demonstrates that early intervention and management of workplace injury through sound injury management practices, assists the recovery process and restores workers to normal duties sooner. Workplace injury management includes early provision of timely and appropriate resources, (including suitable duties, equipment or treatment).

The Injury Management & Return To Work program aims to:

retain injured or ill workers at work; or

facilitate a timely return to work; or

maximise the worker's independent functioning and provide for durable employment.

This policy constitutes a joint workforce-management agreement in which Mirvac commits to:

Providing suitable duties at the workplace, or other workplaces, which may be modified, or alternativeduties supported by medical opinion;

Providing support to the injured worker(s) through the provision of meaningful and suitableemployment and where necessary, attend medical appointments;

Maintaining confidentiality over medical and injury management information including verbal andwritten communication;

Educating the injured worker(s) on rights, responsibilities and obligations;

Communicate and co-ordinate with all stakeholders to assist in retaining the injured worker at work orplanning for their return to work;

Ensure that where disputes arise during the return to work process, undertake the dispute resolutionprocess prescribed by the Mirvac Return To Work Program displayed in the workplace;

Ensure that participation in the return to work process will not disadvantage the injured worker's employment;

Regularly review this policy and associated programs to ensure Mirvac's commitment continues tomeet legislative requirements and the needs of all Injury Management & Return To Work stakeholders.

I commit Mirvac to the implementation of this Policy and its supporting framework of workplace injury management procedures, which outline key terms, roles and responsibilities and stages in the return to work process.

APPENDIX G – DUST AND ODOUR MANAGEMENT PLAN (JBS&G)

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Mirvac Dust and Odour Management Plan

55 Coonara Avenue, West Pennant Hills, NSW

15 February 2023

54393 - 135587 (Rev B) JBS&G Australia Pty Ltd

Table of Contents

List of Figures

Abbreviations

Term	Definition
AHD	Australian Height Datum
CEMP	Construction Environmental management Plan
CSWMP	Construction Soil and Water Management Plan
DPIE	Department of Planning, Infrastructure and Environment
JBS&G	JBS&G Australia Pty Ltd
OSD	Onsite Stormwater Detention
PAH	Polycyclic Aromatic Hydrocarbons
RAP	Remedial Action Plan
SINSW	School Infrastructure New South Wales
TRH	Total Recoverable Hydrocarbon

1. Introduction

1.1 Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac (the client), to prepare a Construction Dust and Odour Management Plan (DMP) for the proposed redevelopment of 55 Coonara Avenue, West Pennant Hills, NSW (the site). The site location and site layout are presented on **Figures 1** and **2**, respectively.

This DMP has been prepared with consideration to Condition 55 of The Hills Shire Council DA (Ref No: 860/2022/JP) to form part of Mirvac's Construction Environmental Management Plan (CEMP) (Mirvac 2021) for the redevelopment of the site.

1.2 Objectives

The purpose of this DMP is to provide a description of the measures to be implemented to mitigate potential dust and odour emissions from the site during demolition and site redevelopment works. This DMP has been designed to ensure, via the implementation of a number of monitoring and management measures pertaining to the works, that the risks to the surrounding environment are negligible.

1.3 Relevant Activities

Activities which have the potential to generate dust and/or odours during development are summarised following:

- Demolition of site structures and hardstand pavements;
- Earthworks associated with cut and fill, site grading, construction of infrastructure, etc;
- Stockpiling of soils for future placement/offsite disposal;
- Landscaping activities, including any removal of existing flora, preparation of surfaces, importation and placement of soils; and
- General site activities (vehicle washout, etc.).

Further discussion of relevant activities as sources of air emissions is provided in **Section 2.1**.

1.4 Application and Responsibilities

The period of application is from the commencement of construction works until the cessation of works that have the potential to significantly disturb the site surface or site structures.

Construction works at the site will be undertaken under the guidance of the Principal Contactor. The Principal Contactor will be responsible for the implementation of the majority of procedures provided in this DMP.

It is noted that where the specific procedures are technical or complex in nature then the Principal Contactor may appoint appropriately qualified agents (i.e. competent person[1]/environmental consultants) to fulfil the requirements of the procedure or advise the appropriate implementation of the procedure.

Prior to commencement of any activities listed in **Section 1.4**, the Principal Contractor, and relevant contractors and consultants, should refer to the CEMP (Mirvac 2021). The list in **Section 1.4** is not intended to be exhaustive, an assessment should be made prior to the commencement of works by

[1] Competent Person means a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

the Principal Contractor regarding whether those works are likely to involve the handling of soils (either site based or imported) or have the potential to generate dust/odour emissions from the site.

2. Dust and Odour Management Plan

2.1 Sources of Emissions to Air

Construction activities have the potential to generate fugitive dust emissions particularly during drier conditions. With due consideration to the proposed development the following dust generation activities have been identified:

- Removal of Site pavements (i.e. exposed surfaces).
- Site grading/excavation activities to reach the required construction levels.
- Movement of heavy vehicles/plant on unsealed areas.
- Handling of materials including:
  - Excavation to Stockpile;
  - Excavation to Placement;
  - Import to Placement;
  - Import to Stockpile;
  - Stockpile to Stockpile; and
  - Offsite disposal.
- Wind Erosion.

Dust emissions from sources which are dependent on operational activities would be limited to work hours permitted by the development consent. Wind erosion from exposed surfaces could occur outside these times, subject to Site management practices, but would generally be limited to periods of moderate to strong winds (wind speeds greater than ~ 5 m/s) depending on the material properties (i.e. moisture content and threshold friction velocity).

Emissions of fugitive dust from construction activities will comprise of mostly coarse particle size fractions, that is, in the PM10 and TSP range. While construction does generate fine particulate (i.e. PM2.5 and less) the bulk of these fine particulates are typically derived from combustion sources such as diesel-powered plant and equipment.

Emission of carbon monoxide (CO), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) would also occur from diesel powered plant and equipment on Site and vehicle movements to Site, but is anticipated to be minor.

3. Environmental Management Controls

3.1 Dust Management and Mitigation Measures

The following dust mitigation measures are required to be implemented:

- Dust cloth must be installed along the perimeter fencing of the site.
- Covering of truck loads during transport.
- Road sweeping, vehicle speed limits, truck washes and rumble grids at Site (or stage sites) exits to avoid tracking of dirt onto public roads.
- Sealing of trafficable areas and areas susceptible to windblown dust, including the use of stockpile covers, application of water via water cart and/or water cannons/misters to suppress dust potential, etc.
- For large, unsealed areas of the site (or stages) where works are not occurring or are not planned to have works occurring for a lengthy period of time (e.g. one month) consideration to the application of seeding/hydro-mulching to provide a barrier to mitigate dust generating potential of these areas.
- Where weather forecasts predict adverse conditions (e.g. high winds), the frequency and duration of dust control measures should be increased, or where required, the cessation of relevant works under adverse meteorological conditions such as high winds where dust control measures are not working as intended.
- Consideration of these and other best practice controls will be incorporated into operating procedures to ensure compliance with regulatory criteria. These measures are outlined below.

3.1.1 General

- Under no circumstances should any material be burnt on Site.
- Silt and other materials will be removed from around erosion control structures following any significant rain events to ensure sediment deposits do not become dust sources.

3.1.2 Vehicular/Wheel Generated Dust

- All vehicles on Site shall be confined to a designated route with a maximum speed limit of 20 km/h strictly enforced.
- Material should be, where possible, loaded directly into a truck for off-site disposal rather than excavation, stockpiling and then load out.
- Where materials have been identified as suitable for beneficial re-use, materials should be excavated and taken to their emplacement location rather than excavation, stockpiling, transport and emplacement. This approach reduces the double handing of materials and potential for excessive dust generation.
- A designated route to works area(s) (i.e. stockpile/materials storage areas, emplacement locations etc.) shall be established. When conditions are dry the use of a water truck (or similar) should be implemented.
- It is recommended that a minimum of one water truck/cart be kept on Site at all times for utilisation during bulk earthwork excavations and the wetting down of haul roads. It is recommended that the water truck/cart complete wet-down of haul roads and trafficable areas at least three times a day, including at the commencement of daily activities, or as haul roads/trafficable areas become dry. This frequency is required to be modified based

on meteorological conditions and water retention properties of the haul roads/trafficable areas of the site.

- At Site exit points and/or as trucks move onto sealed roads, rumble grids should be installed to remove excess dirt from truck/plant wheels. The rumble grids should be cleaned regularly.
- In the event of dirt being tracked onto pavements, the road will be cleaned prior to the material drying out and becoming a dust source.

3.1.3 Wind Erosion

- Wind erosion from temporary stockpiles can be limited by covering stockpiles when left for a period greater than 24 hours.
- When conditions are dry and windy, wind erosion from exposed surfaces and stockpiles should be controlled via application of a water spray/mist.
- Finished surfaces should be compacted and care taken not to re-disturbed, to reduce wind erosion.
- Installation of water cart spray or sprinkler system for the stockpile area which can be activated during adverse weather.

3.1.4 Excavation and Materials Handling

- During excavation activities, excavation areas will be wetted down using the water truck/cart and/or continuous water spray cannons/misters directed towards the excavation area to minimise the potential for dust to be generated.
  - Care should be taken to not over-wet excavations and/or stockpiles such that excess runoff is generated.
- Any excess soil/fill excavated during the works must be securely stockpiled on a sealed surface (e.g. concrete pad) or on plastic sheeting away from all storm water infrastructure.
- Stockpiles must be placed in a secure location on Site and covered with plastic sheeting if they are to remain for more than 24 hours, unless specifically advised otherwise by the consultant.
- Should excess soils be stockpiled on Site, sediment control measures (e.g. silt fences, hay bales) must be installed to protect run off from stockpiled/exposed soil materials into stormwater infrastructure.
- Material should be, where possible, loaded directly into a truck for off-site disposal rather than excavation, stockpiling and then load out. Where materials have been identified as suitable for beneficial re-use, materials should be excavated and taken to their emplacement location rather than excavation, stockpiling, transport and emplacement. This approach reduces the double handing of materials and potential for excessive dust generation.
- When dust cannot be effectively controlled using application of a water spay/mist (or similar), consideration should be given to modifying the works by limiting the use of significant dust generating equipment (i.e. dozers, loading/unloading fill) during periods of high wind.
- If any excess excavated soil/fill material is to be disposed off-site, it should be classified in accordance with NSW EPA (2014) Waste Classification Guidelines by the environmental consultant. Waste must be managed in accordance with the provisions of the *Protection of the Environment Operations (Waste) Regulation 2014*.

3.1.5 Vehicle Exhaust Emissions Management and Mitigation Measures

- Trucks and construction plant entering the Site should be well maintained in accordance

with the manufacturer's specifications to comply with relevant regulations. Vehicles which are identified to be or considered to be defective (i.e. high exhaust levels) should be stood down for maintenance.

- Unnecessary idling for delivery trucks and plant should be avoided with engines turned off during periods of inactivity.
- Delivery of materials should be planned and coordinated to avoid congestion and excessive truck queuing/idling.
- The number of trucks and distance they are required to travel should be controlled and reduced where possible.

3.2 Ambient Air Monitoring

In addition to the above management controls, ambient air dust levels (PM_{10}) will be recorded during demolition and bulk earthworks activities at the site utilising continuous dust monitoring equipment which will be established at the northern and western site boundaries (site boundaries closest to sensitive receptors including residential dwellings).

In accordance with the National Environment Protection (Ambient Air Quality) Measure (NEPC 2013), guidance values for PM_{10} in ambient air is 50 $\mu g/m^3$ will be adopted for the assessment of ambient air quality for redevelopment activities.

Where the guidance values for PM_{10} are exceeded in ambient air across the works period, modification of the dust management controls will be required, and consideration for increased frequency of water application via use of the water truck/cart and/or the addition of additives to water prior to its application to haul roads/trafficable areas/excavation faces to aid in dust suppression may be required.

4. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

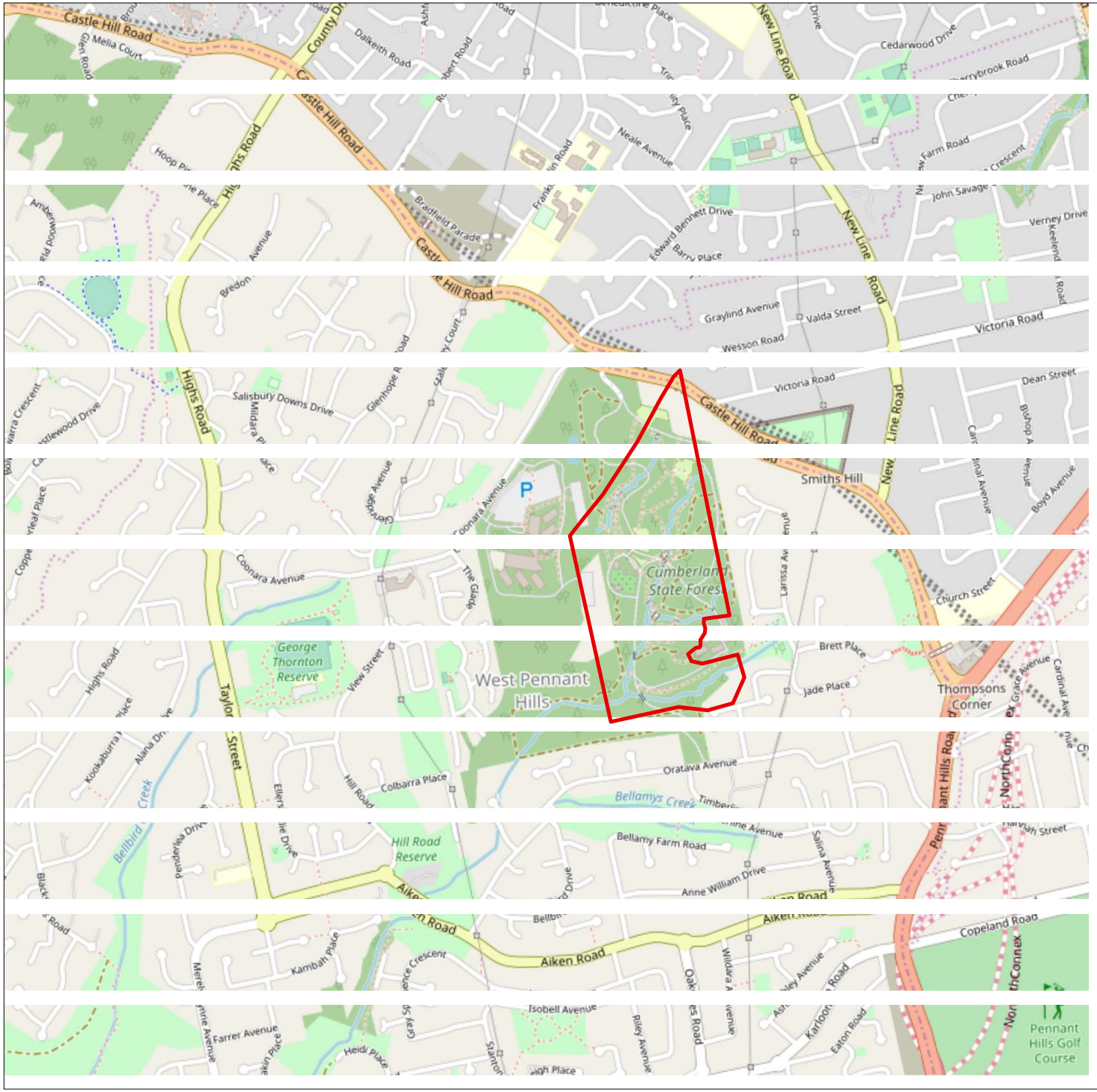
JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site. Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend:

Approximate Site Boundary

JBS&G

Job No: 54393	
Client: Mirvac	
Version: R06 Rev A	Checked By: RL
Date 11/02/2021	Drawn By: DD
Scale 1:15,000	Z

0 175 350
metr

Coor. Sys. GDA 1994 MGA Zone 56

55 Coonara Avenue
West Pennant Hills, NSW
(Lot 61 DP737386)

SITE LOCATION

FIGURE: 1

Legend:

- Approximate Site Boundary
- Building
- Carpark
- Dam
- USTs
- Ring Road

JBS&G

Job No: 54393

Client: Mirvac

Version: R06 Rev A	Checked By: DD
Date: 11/02/2021	Drawn By: DD
Scale 1:5,250	Z

0 60 120
metr

Coor. Sys. GDA 1994 MGA Zone 56

55 Coonara Avenue
West Pennant Hills, NSW
(Lot 61 DP737386)

SITE LAYOUT

FIGURE: 2

Document Distribution

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B	1 x Electronic Copy	Robert Malcolm (Mirvac)	15/02/2023

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		Name	Name	Signature	Date
A	Daniel Denaro	Matthew Bennett	Matthew Bennett	Draft for client review	12/02/2021
B	Daniel Denaro	Matthew Bennett	Matthew Bennett	Draft for client review	15/02/2023


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APPENDIX H – FAUNA MANAGEMENT PLAN (CUMBERLAND ECOLOGY)

55 Coonara Avenue, West Pennant Hills

Fauna Management Plan for Concept Masterplan DA

Mirvac

10 March 2023

Final

(02) 9868 1933 | PO Box 2474 Carlingford Court NSW 2118 | cumberlandecology.com.au

Report No. 21108RP7

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Version	Date Issued	Amended by	Details
1	9/02/2023	BC/GK	Draft for Council comment.
2	10/03/2023	HG/GK	Final for submission to Council

Approved by:	Gitanjali Katrak
Position:	Senior Project Manager/Ecologist
Signed:	
Date:	10 March, 2023

Table of Contents

Table of Tables

Table of Photographs

Table of Appendices

Table of Figures

Glossary

Approved Works	The areas approved for the proposed works for Concept Masterplan under the approved Development Application number 860/2022/JP
APZ	Asset Protection Zone
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BGHF	Blue Gum High Forest
Council	The Hills Shire Council
FMP	Fauna Management Plan
ha	hectares
LGA	Local Government Area
MP	Monitoring Point
SHT	Significant Habitat Tree
STIF	Sydney Turpentine Ironbark Forest
The Property	Land located at 55 Coonara Avenue, West Pennant Hills. Legally known as Lot 61 DP 737386
VMP	Vegetation Management Plan

1. Introduction

Cumberland Ecology has been commissioned by Mirvac (the 'client') to prepare a Fauna Management Plan (FMP) in accordance with Condition 44 of the approved Concept Masterplan Development Application DA860/2022/JP (the Consent) for proposed works at 55 Coonara Avenue, West Pennant Hills NSW (the 'Property').

The Property is located in the Hills Local Government Area (LGA) and is identified as Lot 61 DP 737386 (see **Figure 1**). The proposed works (hereafter referred to as the Approved Works') includes the development of 417 dwellings, comprising 252 apartments and 165 dwelling houses including civil works comprising new roads, earthworks, stormwater and services infrastructure, landscaped areas and Asset Protection Zones (APZs). The location of areas subject to the Approved Works within the Property, is shown in **Figure 1**.

The Property contains significant areas of native bushland immediately adjacent to the Approved Works area. Some parts of the bushland are proposed to be dedicated to the NSW State Government and managed by NSW Forestry Commission with the remainder retained within a Community Lot and placed under community title. The areas under community title as well as areas of retained vegetation, such as vegetated APZs, are to be managed in accordance with a Vegetation Management Plan (VMP) that is to be submitted to Hills Shire Council (Council) for approval. The location of vegetated areas, including vegetated APZs within the Approved Works area that are to be managed under a VMP are shown in **Figure 1**.

A Biodiversity Development Assessment Report (BDAR) was prepared for submission to Council by Keystone Ecological Pty Ltd (Keystone Ecological) dated June 2022 to support the DA for the Approved Works. The Approved Works were given consent by the Local Planning Panel in November 2022 subject to Conditions of Consent. Of relevance to this report, Condition 44 of the Consent requires that a FMP is prepared for submission and approval by Council before its implementation (see ***Section 1.3***).

The purpose of this document is to provide a FMP for the Approved Works in accordance with Council's consent conditions. This FMP provides a description of the faunal biodiversity values of the Approved Works area and wider Property, and measures to be implemented to avoid and minimise impacts on these values. This includes:

- Conducting pre-clearance surveys for fauna,
- Relocation of individuals (if found) into areas of retained native vegetation within the Property;
- Fauna handling protocols;
- Methodology for the identification, numbering and marking of habitat proposed to be removed
- Targeted surveys for habitat including process for recording details of survey effort and timing, and procedures for protection of encountered fauna;
- Targeted searches for and relocation of the Dural Land Snail;
- Mapping and details of proposed installation of nest boxes or augered hollows to supplement habitat for displaced hollow-dependent species (including replacement type, design, and quantity for use by displaced fauna; and

- Procedures for the rescue and relocation of fauna encountered during the clearing process, including number and type of personnel required to undertake each task, including recording of details for the treatment and rehabilitation of any injured fauna.

Project works are proposed to be undertaken in stages. Prior to any works associated with the Approved Works commencing onsite, a primary pre-clearance survey of the entire Approved Works area is to be completed by the project ecologists in accordance with ***Section 3.1*** of this FMP with the accompanying report to be provided to Council in accordance with ***Section 5.1*** of this FMP, before commencing with the staged work. Additional pre-clearance surveys will be conducted at each stage of the approved works in line with the procedures outlined in this FMP.

All fauna surveys are to be undertaken by an Ecologist with a minimum of a Tertiary qualification in Biology, Conservation, Ecology or similar. Where appropriate, less qualified staff may work under the direction and supervision of the Project Ecologist. These staff are to have a minimum qualification of TAFE Certificate III in Conservation and Land Management or equivalent and have undergone appropriate fauna 'Spotter-Catcher training to undertake fauna works. Only appropriately vaccinated personnel are to handle bats.

All personnel undertaking fauna works required under this FMP will hold/be covered by appropriate licences to conduct ecological works.

1.1. Description of the Property and Approved Works

1.1.1. The Property

The Property is approximately 26 hectares (ha) in area and was previously a business park (now vacated and demolished) within former B7 Business Park zoned land. The Property is currently rezoned as a mix of R3 – Medium Density Residential, R4 – High Density Residential and C2 – Environmental Conservation under *The Hills Shire Council Local Environment Plan 2019* (The Hills LEP 2019). It is irregular in shape and is bound by Coonara Avenue to the north and north-west, residential development (the Glades residential development) to the west and bushland areas of Cumberland State Forest to the south and east (**Figure 1**).

1.2. The Approved Works

The Approved works include the following:

- Establishment of the works site and security including establishment of site facilities for workers and hoarding along the Coonara Avenue boundary;
- Installation of stormwater and environmental controls to manage stormwater flows and sediment runoff, including treatment, prior to discharge into the creek downstream;
- Installation of wildlife friendly site security fencing, and temporary services, including stockpiles, within the Approved Works area;
- Installation of stormwater and environmental controls to manage stormwater flows and sediment runoff, including treatment, prior to discharge into the creek downstream;

- Removal of the existing trees and other associated vegetation within the Approved Works area required to safely facilitate the construction works and establish approved APZ zones;
- Bulk Earthworks of the site to meet approved design levels including shoring walls to the apartments precinct area to establish the basement footprint.
- Construction of civil infrastructure, including sewer, stormwater, gas, electrical, telecommunication reticulation services, road pavement (including kerb and gutter), footpaths, and retaining walls;
- Construction of the residential buildings and open spaces;
- Landscaping of street verges and public spaces;
- Ongoing management of vegetation within the Asset Protection Zone (APZ); and
- Conservation management of vegetation retained within the Approved Works area.

The location of the Approved Works within the Property is shown in **Figure 1**. The Approved Works area is largely located in historically disturbed/modified parts of the Property, adjacent to and surrounding the now demolished business park office buildings and is largely comprised of outdoor car parks and landscaping. The Approved Works area is approximately 10.01 ha in area and is largely located in the northern and western section of the Property (see **Figure 1**).

Parts of the previously approved Demolition DA (DA 585/2021/HC) lie within the Approved Works area (see **Figure 1**). These areas have been cleared under a separate FMP that has been approved by Council and therefore are excluded from this FMP. The existing multistorey carpark in the eastern parts of the Property is also covered by the Demolition DA FMP and therefore excluded from this VMP.

Bushland areas within the Property but outside of the Approved works area have been identified as potentially being appropriate areas for the relocation of native fauna that may occur within the Approved Works area. These areas either comprise lands zoned C2 under the Hills LEP 2019 that are to be retained and managed as part of this DA or comprise the approximately 10 ha of the Property proposed for dedication to the NSW Government to be managed by the Forestry Corporation of NSW as an extension of the Cumberland State Forest. These bushland areas comprise a mix of Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest (STIF) and extend beyond the Property into Cumberland State Forest.

1.3. Relevant Conditions of Consent

The project was approved by the Sydney Central City Planning Panel in November 2022 subject to several consent conditions. Of these, Consent Conditions 14, 36a, 44, 63, 81 and 100 contain conditions related to ecology. Of particular relevance is Condition 44, that stipulates the preparation of an FMP (this document) and the mitigation measures to be included therein. The relevant Consent Conditions are reproduced verbatim below.

14. Tree Removal

A suitably qualified Project Ecologist shall be onsite during all tree, vegetation, and habitat removal, to rescue and re-locate any displaced fauna that may be disturbed during this activity.

36a. Fauna Friendly Construction Fencing

All fencing used throughout the development must comply with the Fauna Friendly Construction Fencing requirements of the Fauna Management Plan. This includes tree protection fencing, barrier fencing, exclusion fencing and any other fence used during the construction period.

44. Fauna Management Plan

A Fauna Management Plan (FMP) is to be prepared and submitted to Council's Manager – Environment & Health for approval. The fauna management plan must contain relevant details for pre-clearance surveys, fauna protection, rescue, relocation and installation of fauna nest boxes and timelines for work. The FMP is to include (but is not limited to) the following:

a) *Methodology for the identification, numbering and marking of hollow-bearing trees and other habitat features such as active nests or hollow logs proposed to be removed. A system for marking native vegetation that does not meet Council's definition of a tree is to be included in the FMP. Details of survey effort and timing must be included.*

b) *Targeted surveys for the Powerful Owl roosting and/or nesting within the surrounding forest (including Cumberland State Forest and C2 land) undertaken by an expert Owl Ecologist in this field (to be approved by Council). Surveys must be completed monthly during the nest selection period and throughout the breeding season (April to September) for the duration of clearing and construction phases in order to identify whether a pair has established a breeding territory and success of the breeding attempt. A map showing the location of roosting/nesting owls in relation to clearing/demolition works is to be included. Consultation with Birdlife and other relevant stakeholders is recommended. Monitoring reports are to be submitted to Council monthly following survey.*

c) *Targeted searches and relocation for Dural Land Snail is to be undertaken by an expert Ecologist in this field. The surveys must be undertaken both during the day and at night, particularly during or after rain. Details of survey effort and personnel must be included. Any Dural Land Snails found within the proposed development area are to be relocated to an area of appropriate habitat onsite (preferably E2 Zone area). Relocation is to be undertaken in accordance with the NSW Office of Environment and Heritage's Translocation Operational Policy (May 2019).*

d) *Requirements for fauna exclusion fencing where appropriate including a plan to detail locations.*

e) *Specific recommendations for the rescue, handling and care of Echidnas that are known to occur within the forest.*

f) *A nest box/habitat supplementation strategy for the salvage and relocation of tree hollows/crevices/habitat features (e.g. Ring-tailed Possum dreys) or substitution with artificial nest*

boxes/habitat features where this cannot be achieved. Nest boxes/habitat features area to be installed at the ratio of 2:1 for every hollow/habitat feature removed. This is to provide displaced fauna a greater variety of options when seeking new habitat. Nest boxes/habitat features are to be installed prior to vegetation removal following the preclearance survey. Where additional hollows or nests are identified during tree removal an appropriate number of nest boxes/habitat features are to be installed. The strategy is to include a map showing the location of installed nest boxes/habitat features and details of nest box/habitat feature type, design and quantity. A monitoring and maintenance program for nest boxes is to be provided.

g) *Procedures for the rescue and relocation of fauna encountered during the clearing/demolition process, including number and type of personnel required to undertake each task.*

h) *Details for the treatment and rehabilitation of any injured fauna including contact information for veterinary surgeries for emergency treatment of injured fauna.*

i) *Details for notifying registered wildlife carer organisations following placement of injured fauna into veterinary care.*

j) *Protocols for dealing with fauna (e.g. macropods) encountered within construction zones post vegetation clearing works.*

k) *Fauna management induction checklist for the induction of all staff involved in vegetation clearance works.*

l) *Details of relevant qualifications and appropriate licences for personnel involved in wildlife rescue and relocation.*

m) *The requirement to provide reports of pre-clearance fauna surveys and relocation on a weekly basis to be provided for the records of The Hills Shire Council.*

n) *The requirement to report all fauna deaths or injuries to The Hills Shire Council within 24 hours of the incident occurring,*

o) *Specifications for fauna friendly construction fencing. This is to include designs that are suitably visible to reduce the likelihood of collision by fauna and no sharp tops or materials that could potentially injure or entangle wildlife.*

The pre-clearance survey, fauna relocation and installation of nest boxes (items a-o) are to be undertaken strictly in accordance with the approved plan and implemented in accordance with the approved timelines. Certification by the project Ecologist shall be submitted to Council's Manager – Environment & Health for endorsement two weeks prior to any work commencing.

63. Project Ecologist

Prior to any works commencing, a Project Ecologist is to be appointed and the following details provided to The Hills Shire Council's Manager – Environment & Health:

a) Name:

b) Qualification/s:

c) Telephone number/s:

d) Email:

If the Project Ecologist is replaced, The Hills Shire Council's Manager – Environment & Health is to be notified in writing of the reason for the change and the details of the new Project Ecologist within 7 days.

81. Tree/Vegetation Removal & Fauna Protection

All tree and vegetation clearance works area to be carried out strictly in accordance with the approved Fauna Management Plan required by this consent unless otherwise approved by Council's Manager – Environment & Health.

The Project Ecologist is to be onsite during all tree, vegetation and habitat removal, to rescue and re-locate any displaced fauna that may be disturbed during this activity. Trees shall be lopped in such a way that the risk of injury or mortality to fauna is minimised, such as top-down lopping, with lopped sections gently lowered to the ground, or by lowering whole trees to the ground with the "grab" attachment of a machine. Following tree felling, the project ecologist is to inspect all hollows/crevices for resident fauna prior to trees being chipped or removed from the site.

Any injured fauna is to be placed into the hands of a wildlife carer or taken to a veterinary clinic for treatment (please note only appropriately vaccinated personnel are to handle bats).

Tree hollows are to be salvaged from trees removed and placed within the bushland areas of the allotment/s. This is to be done by a qualified and experience arborist, under the direction of the Project Ecologist.

100. Biodiversity Certification

Certification that the following measures have been undertaken shall be submitted to The Hills Shire Council's Manager – Environment & Health:

*a) **Fauna Nest Boxes** – Location plan and photographs of installed nest boxes.*

*b) **Tree Removal & Fauna Protection** – Details prepared by the project ecologist demonstrating compliance with the Fauna Management Plan and Tree/Vegetation Removal and Fauna Protection condition/s of this consent.*

1.3.1. Compliance with Conditions of Consent

Table 1 below shows where each of the conditions of consent relevant to this FMP have been addressed in this document.

Table 1 Compliance with Conditions of Consent

Number	Condition of Consent	Where addressed in this FMP
14	A suitably qualified Project Ecologist shall be onsite during all tree, vegetation, and habitat removal, to rescue and re-locate any displaced fauna that may be disturbed during this activity	Addressed in Section 3.4 and 3.5
36a	All fencing used throughout the development must comply with the Fauna Friendly Construction Fencing requirements of the Fauna Management Plan. This includes tree protection fencing, barrier fencing, exclusion fencing and any other fence used during the construction period.	Addressed in Section 3.3
44	A Fauna Management Plan (FMP) is to be prepared and submitted to Council's Manager – Environment & Health for approval. The fauna management plan must contain relevant details for pre-clearance surveys, fauna protection, rescue, relocation and installation of fauna nest boxes and timelines for work. The FMP is to include (but is not limited to) the following:	This document
a)	Methodology for the identification, numbering and marking of hollow-bearing trees and other habitat features such as active nests or hollow logs proposed to be removed. A system for marking native vegetation that does not meet Council's definition of a tree is to be included in the FMP. Details of survey effort and timing must be included.	Addressed in Section 3.4
b)	Targeted surveys for the Powerful Owl roosting and/or nesting within the surrounding forest (including Cumberland State Forest and C2 land) undertaken by an expert Owl Ecologist in this field (to be approved by Council). Surveys must be completed monthly during the nest selection period and throughout the breeding season (April to September) for the duration of clearing and construction phases in order to identify whether a pair has established a breeding territory and success of the breeding attempt. A map showing the location of roosting/nesting owls in relation to clearing/demolition works is to be included. Consultation with Birdlife and other relevant stakeholders is recommended. Monitoring reports	Addressed in Section 3.8 and Section 5.3 (reporting)

Number	Condition of Consent	Where addressed in this FMP
	are to be submitted to Council monthly following survey.	
c)	Targeted searches and relocation for Dural Land Snail is to be undertaken by an expert Ecologist in this field. The surveys must be undertaken both during the day and at night, particularly during or after rain. Details of survey effort and personnel must be included. Any Dural Land Snails found within the proposed development area are to be relocated to an area of appropriate habitat onsite (preferably E2 Zone area). Relocation is to be undertaken in accordance with the NSW Office of Environment and Heritage's Translocation Operational Policy (May 2019).	Addressed in Section 3.4.3
d)	Requirements for fauna exclusion fencing where appropriate including a plan to detail locations.	Addressed in Section 3.3
e)	Specific recommendations for the rescue, handling and care of Echidnas that are known to occur within the forest.	Provided in Section 4.3.4.2i
f)	A nest box/habitat supplementation strategy for the salvage and relocation of tree hollows/crevices/habitat features (e.g. Ring-tailed Possum dreys) or substitution with artificial nest boxes/habitat features where this cannot be achieved. Nest boxes/habitat features area to be installed at the ratio of 2:1 for every hollow/habitat feature removed. This is to provide displaced fauna a greater variety of options when seeking new habitat. Nest boxes/habitat features are to be installed prior to vegetation removal following the preclearance survey. Where additional hollows or nests are identified during tree removal an appropriate number of nest boxes/habitat features are to be installed. The strategy is to include a map showing the location of installed nest boxes/habitat features and details of nest box/habitat feature type, design and quantity. A monitoring and maintenance program for nest boxes is to be provided.	Addressed in Section 3.6

Number	Condition of Consent	Where addressed in this FMP
g)	Procedures for the rescue and relocation of fauna encountered during the clearing/demolition process, including number and type of personnel required to undertake each task.	Addressed in Section 3.5
h)	Details for the treatment and rehabilitation of any injured fauna including contact information for veterinary surgeries for emergency treatment of injured fauna.	Provided in Section 3.5.1
i)	Details for notifying registered wildlife carer organisations following placement of injured fauna into veterinary care.	Provided in Section 3.5.1
j)	Protocols for dealing with fauna (e.g. macropods) encountered within construction zones post vegetation clearing works.	Provided in Section 4.4
k)	Fauna management induction checklist for the induction of all staff involved in vegetation clearance works.	Addressed in Section 3.2
l)	Details of relevant qualifications and appropriate licences for personnel involved in wildlife rescue and relocation.	Addressed in Section 3.1
m)	The requirement to provide reports of pre-clearance fauna surveys and relocation on a weekly basis to be provided for the records of The Hills Shire Council.	Addressed in Section 5.1
n)	The requirement to report all fauna deaths or injuries to The Hills Shire Council within 24 hours of the incident occurring,	Addressed in Section 3.5.1
o)	Specifications for fauna friendly construction fencing. This is to include designs that are suitably visible to reduce the likelihood of collision by fauna and no sharp tops or materials that could potentially injure or entangle wildlife.	Addressed in Section 3.3
44 (cont'd)	The pre-clearance survey, fauna relocation and installation of nest boxes (items a-o) are to be undertaken strictly in accordance with the approved plan and implemented in accordance with the approved timelines. Certification by the project Ecologist shall be submitted to Council's Manager – Environment & Health for endorsement two weeks prior to any work commencing.	Addressed in Chapter 3 and Certification is addressed in Section 5.4
81	Tree/Vegetation Removal & Fauna Protection	

Number	Condition of Consent	Where addressed in this FMP
	All tree and vegetation clearance works area to be carried out strictly in accordance with the approved Fauna Management Plan required by this consent unless otherwise approved by Council's Manager – Environment & Health.	This document
	The Project Ecologist is to be onsite during all tree, vegetation and habitat removal, to rescue and re-locate any displaced fauna that may be disturbed during this activity. Trees shall be lopped in such a way that the risk of injury or mortality to fauna is minimised, such as top-down lopping, with lopped sections gently lowered to the ground, or by lowering whole trees to the ground with the "grab" attachment of a machine. Following tree felling, the project ecologist is to inspect all hollows/crevices for resident fauna prior to trees being chipped or removed from the site.	Addressed in Section 3.5
	Any injured fauna is to be placed into the hands of a wildlife carer or taken to a veterinary clinic for treatment (please note only appropriately vaccinated personnel are to handle bats).	Addressed in Section 3.5 and Section 4.3
	Tree hollows are to be salvaged from trees removed and placed within the bushland areas of the allotment/s. This is to be done by a qualified and experience arborist, under the direction of the Project Ecologist.	Addressed in Section 3.6.1
100	Biodiversity Certification	
	Certification that the following measures have been undertaken shall be submitted to The Hills Shire Council's Manager – Environment & Health:	Addressed in Section 5.4
a)	Fauna Nest Boxes – Location plan and photographs of installed nest boxes.	Addressed in Section 3.6.2 and Section 5.4
b)	Tree Removal & Fauna Protection – Details prepared by the project ecologist demonstrating compliance with the Fauna Management Plan and Tree/Vegetation Removal and Fauna Protection condition/s of this consent.	Addressed in Section 5.4

1.4. Acknowledgements

This FMP was prepared with the assistance and input of Dr Stephanie Clark (Invertebrate Identification Australasia) and Mr Corey Mead (TreeHouse Ecology).

2. Fauna Habitat and Expected Fauna

This chapter presents an overview of the fauna habitats present in the Approved Works area and surrounding Property and a description of the fauna species considered to have potential to occur.

2.1. Fauna Habitat

As described previously, the Property is located directly adjacent to the Cumberland State Forest, a large area of native vegetation that has been allowed to regenerate for over 100 years. This area provides high quality fauna habitat for a wide range of native species including several threatened species. The ecological values present in the areas surrounding the Approved Works area include, but are not limited to:

- A combined open forest extent of over 52 ha confined within the local urban landscape with otherwise only fragmented connectivity to the south-west along Darling Mills Creek;
- Large, recorded hollows of both potential and previous use by Powerful Owl (*Ninox strenua*), Southern Boobook (*Ninox boobook*) and cockatoos;
- Dense stands of gully forest vegetation providing roosting habitat potential for both of the above mentioned owl species;
- Powerful Owl prey species habitat including seasonal foraging by the threatened Grey-headed Flying-fox (*Pteropus poliocephalus*) as well as Sugar Glider (*Petaurus breviceps*), Common Ringtail Possum (*Pseudocheirus peregrinus*) and Brushtail Possum (*Trichosurus vulpecula*);
- Large dams nearby to the east supporting frog breeding habitat as well as concentrated foraging by insectivorous birds and microbats; and
- Riparian gully habitats to the immediate east, below the dams and continuing to the south within the Approved Works area.

Although land adjacent to the Approved Works area has significant biodiversity values, the Approved Works area itself has been highly modified and is currently dominated by car parks and some small areas of landscaped gardens (Keystone Ecological 2022). While these areas do not provide high quality habitat for fauna species, fauna habitat is nonetheless present in the vegetated areas of the Approved Works area. The vacant office buildings, and the vegetation around the outer extent of the buildings have now been demolished and the existing worksite in its current state does not provide habitat for fauna.

As assessed in the Concept DA BDAR (Keystone Ecological 2022), the vegetation present in the Approved Works area is predominantly comprised of landscaped gardens within the remaining carparks with scattered occurrences of BGHF and STIF. The majority of the areas surrounding and within the carparks were extensively landscaped and integrated in the surrounding landscape by the planting of mostly Australian native species (Keystone Ecological 2022). The landscaping is now in a mature state such that it provides potential habitat for a number of fauna species, including potential habitat use by the endangered Dural Land Snail (see ***Section 2.3***). Some sections in the north-eastern parts of the Approved Works area, immediately adjacent to future Forestry dedication areas comprise potential sub-optimal roosting habitat for the threatened Powerful Owl (see ***Section 2.4***).

Some parts of the natural riparian area adjacent to the Approved Works area were "enriched" with plantings of tree ferns and other terrestrial ferns, and understorey plantings were generally restricted to fast-growing species such as *Acacia* (Keystone Ecological 2022). Despite their habitat values, the planted landscaped gardens do not represent a natural system, which reduces their value as fauna habitat compared to the surrounding native bushland. In particular they do not possess large hollow-bearing trees. Hollows are an important habitat feature for many species of fauna, including several threatened species known from the local area including the Powerful Owl, and no suitable hollows for this species are present within the Approved Works area.

As part of the previous business park development trees were also planted in a series of narrow garden beds in the car parking bays. However due to their design and location, development of these trees has been poor and comprise lower habitat value for fauna.

Despite its artificial nature, there are some notable habitat features for fauna within the Approved Works area including the following:

- Dense mid-storey foliage providing suitable and likely periodic roosting opportunity for locally known hawk-owls including Powerful Owl (limited to the north-east parts of the Approved works area) and Southern Boobook;
- Seasonal floristics and fruiting trees for foraging by nectarivore and frugivore species;
- Common Ring-tail Possum dreys (constructed nests) observed within the landscaped vegetation areas;
- Placed rockpiles and rock edges to garden beds, and fallen logs within landscaped areas providing shelter habitat for frogs, reptiles and invertebrate species;
- Potential for small hollows providing shelter habitat for hollow-dependent species; and
- Potential nesting trees for passerine birds.

The Approved Works area provides potential roosting habitat for microbats in small hollows within trees, and several microbat species have been recorded from the Approved Works area (see ***Section 2.2*** below).

2.2. Recorded and Likely Fauna Species

A wide range of species has been recorded within the Property and adjacent Cumberland State Forest. However due to the degradation/modification of habitats within the Approved Works area, a lower diversity has been recorded within the Approved Works area. That notwithstanding, the vegetation and still provide habitat for an array of native species, including several threatened species.

The most abundant native fauna group in the Approved Works area is the birds. A total of 40 bird species have been recorded within and immediately adjacent to the Approved Works area, comprising a wide range of species known from the locality. One of the notable bird species recorded from the Approved Works area is the Australian Brush Turkey (*Alectura lathami*), and several breeding mounds have been recorded in close proximity to the Approved Works area. This species is widespread on the eastern coast of Australia and is

known to inhabit a range of habitats including urban areas. Details of procedures to mitigate any impacts to this species and to prevent it from breeding in the Approved Works area are provided in ***Section 3.9***.

No threatened bird species were recorded directly within the Approved Works area. However, the Powerful Owl utilises the adjacent Cumberland State Forest to the immediate east of the Approved Works area for recent years' nesting and breeding roosts. The species has utilised different large nesting hollows in the nearby surrounds with records now spanning back 20 years. The last recorded breeding event within the now Mirvac lands was located within SHT4 in 2015 (Keystone Ecological 2022), which is located closer to the recent demolitions area to the south.

While this species is unable to nest in the Approved Works area due to the absence of large tree hollows, there are suitable large tree hollows located within 150 m of the Approved Works area including three that are known to have been used in the past for nesting. The Powerful Owl is known to occur in the Cumberland State Forest and is known to forage in a section of the Approved Works area on occasion as part of a much larger foraging range and utilise available dense vegetation for roosting.

Further details of the occurrence and biology of the Powerful Owl are presented later in this chapter in **Section 2.4**. Specific management strategies to avoid impacts to the Powerful Owl are presented in **Section 3.8**.

Five common amphibian species have been recorded from the Property during demolition of the seven office buildings and previous surveys (Keystone Ecological 2021); Peron's Tree Frog (*Litoria peronii*), the Common Eastern Froglet (*Crinia signifera*), the Eastern Dwarf Tree Frog (*Litoria fallax*), the Leaf Green Tree Frog (*Litoria phyllochroa*) and the Striped Marsh Frog (*Lymnodynastes peronii*). Five common reptile species: the Pale-flecked Garden Sunskink (*Lampropholis guichenoti*), the Delicate Skink (*Lampropholis delicata*), the Weasel Skink (*Saproscincus mustelinus*), the Eastern Water Skink (*Eulamprus quoyii*), and the Eastern Water Dragon (*Intellagama lesueurii lesueurii*) have been recorded during demolition of the seven office buildings and surveys to date. No threatened amphibians or reptiles have been recorded or are considered likely to occur.

One threatened invertebrate species has been recorded from the Property, the Dural Land Snail (*Pommerhelix duralensis*). This species has not been recorded from within the Approved Works area to date. However, it has potential to occur due to the presence of suitable habitat. Further details of this species biology and occurrence is presented in **Section 2.3** and specific management strategies to avoid impacts to the Dural Land Snail are presented in **Section 3.7**.

Several common arboreal mammal species have been recorded from the Approved Works area including the Sugar Glider (*Petaurus breviceps*), Common Ringtail Possum (*Pseudocheirus peregrinus*) and Common Brushtail Possum (*Trichosurus vulpecula*). These species are significant in that they are known food sources for the Powerful Owl. Camera monitoring conducted as part of the FMP works for the Demolition DA confirmed that Echidnas (*Tachyglossus aculeatus*) also occur within the Property.

Several microbat species have been recorded during site surveys and others are known from the immediate locality. **Table 2** below provides a summary of the conservation status and roosting habits for the locally occurring microbat species recorded within the Property during surveys and within 1 km of the Approved Works area as per Bionet database records.

Table 2 Roost preference of locally occurring microbat species

Scientific Name	Common Name	BC Act status	Hollow-roosting	Structure roosting
Austronomus australis	White-striped Freetail-bat	Protected	✓	✓
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	x	x
Chalinolobus gouldii	Gould's Wattled Bat	Protected	✓	✓
Chalinolobus morio	Chocolate Wattled Bat	Protected	✓	✓
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	✓	✓
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	✓	✓
Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	x	✓
Nyctophilus geoffroyi	Lesser Long-eared Bat	Protected	✓	✓
Nyctophilus gouldi	Gould's Long-eared Bat	Protected	✓	x
Ozimops ridei	Eastern Free-tailed Bat	Protected	✓	✓
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	✓	✓
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	✓	✓
Scotorepens orion	Eastern Broad-nosed Bat	Protected	✓	✓
Vespadelus pumilus	Eastern Forest Bat	Protected	✓	x
Vespadelus vulturnus	Little Forest Bat	Protected	✓	✓

As indicated in **Table 2**, several microbats listed as Vulnerable under the BC Act have been recorded from the Property, including areas within/near the Approved Works area, or are highly likely to occur, including the Yellow-bellied Sheathtail bat (*Saccolaimus flaviventris*), Eastern Coastal Freetail-bat (*Micronomus norfolkensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Large Bent-wing Bat (*Miniopterus orianae oceanensis*) and Greater Broad-nosed Bat (*Scoteanax rueppellii*). These species are likely able to forage over the vegetated parts of the Approved Works area. Procedures to effectively recover tree roosting microbats during clearing are outlined below in ***Section 3.5***.

The Grey-headed Flying-fox (*Pteropus poliocephalus*) has also been recorded from the Property although this has been limited to observations of individuals flying over the site. This species is listed as Vulnerable under the EPBC Act and the BC Act and has potential foraging habitat in the Approved Works area, although no roosting camps are present.

Several feral animals have been recorded from the Cumberland State Forest adjacent to the Property, and two species have been recorded from the Demolition Footprint (located within the Concept Masterplan Approved Works); the European Red Fox (*Vulpes vulpes*), and the Black Rat (*Rattus rattus*). The fox was likely to have denned underneath Building G and is assumed to have self-relocated during the demolition process. These species have potential to occur in the Approved Works area on occasion.

2.3. Dural Land Snail

2.3.1. Breeding Cycle and Biology

The Dural Land Snail is endemic to the Cumberland subregion in the north western portion of Sydney, from Wisemans Ferry in the north to Parramatta in the south and from Epping in the east to about Kurrajong in the west (Clark 2009). The species is definitely found within the Local Government Areas of The Hills Shire, Hawkesbury Shire and Hornsby Shire (EES 2021). The total number of individuals of this species across its range is unknown, nor the densities that the species can occur. The species can be relatively common when suitable habitat is present. However, most known populations are found on relatively small, isolated patches of habitat that are often surrounded by some combination of industrial, agricultural or urban development.

It is primarily associated with Hawkesbury Sandstone Vegetation, Shale Sandstone Transition Forest and Sydney Turpentine-Ironbark Forest. However, it has also been found in the following listed ecological communities: Shale Sandstone Transition Forest, Sydney Turpentine-Ironbark Forest, Shale Gravel Transition Forest, Castlereagh Scribbly Gum Woodland, Blue Gum High Forest and Agnes Banks Woodland. It can be found in leaf litter, grass tussocks, under logs and non-natural debris such as cardboard and old furniture and so on (Clark 2009, Ridgeway et al. 2014).

Little is known of the reproductive biology, fecundity, and longevity for the Dural Land Snail. It is a hermaphrodite and capable of selfing, it lays clutches of about 20-25 small, round, white eggs (Clark, 2009, Ridgeway et al., 2014) in moist, dark places such as at the base of grass clumps and under logs and are virtually identical to those of *Meridolum corneovirens* (**Photograph 1**). The snails probably live between 2-5 years but can certainly estivate in the soil or under logs etc. for several months, especially when conditions are dry, such as those prevailing in Sydney in 2019. They feed predominately on fungi (**Photograph 2**) but have been observed eating fresh dead individuals of *P. duralensis* and other carrion, paper, plant detritus and old shells (Clark, personal observations; Ridgeway et al., 2014). The snails are generally active at night or on moist, warm overcast days.

Photograph 1 An individual of *Meridolum corneovirens* laying eggs in a grass clump at Mount Druitt (Photo by S.A. Clark)

Photograph 2 An individual of *P. duralensis* feeding on fungus at Hunts Creek Reserve, Carlingford, Sydney (Photo by S.A. Clark)

2.3.2. Occurrence within the Property

A total of 18 live individuals of this species (comprising both adults and juveniles) were recorded from the Property during surveys conducted for the Concept DA BDAR in three areas (see **Figure 2**):

- Along the eastern edge of the multi-storey car park;

- In an area of vegetation between the ring road and the southeastern corner of the (now demolished) main office building; and
- The southern half of the Property

The vegetation found in the above areas has been mapped in the Keystone BDAR as VZ 3a (highly modified edges), VZ 6a (old regrowth/remnant Sydney Turpentine Ironbark Forest, past management) and VZ 6b (old regrowth / remnant STIF, moderate condition).

These were observed over two nights in the first half of December 2020. There had been light rain prior to and during the day of the first survey night and again it had rained prior to the second night survey 11 days later. The temperatures were mild to cool at night and the humidity was relatively high, but the ground layer was not very moist. The conditions were not optimal but were sufficient to detect snail activity at night. Most of the 18 individuals observed over the two nights were observed the first time as it was wetter and a little warmer than the conditions present at the second visit.

A total of 12.81 hectares of potential habitat for this species was identified across the Property, of which 0.42 ha occurs in the Approved Works area (0.22 ha of VZ 3a, 0.19 ha of VZ 4a, 0.002 ha of VZ 5b, 0.008 ha of VZ 5c). Based on the survey results from the BDAR, it has been calculated that there is a density of 8 snails per hectare of suitable habitat in the Property giving a likely total population size of 102 across the 12.81 ha of suitable habitat identified and mapped in the Property. Applying the same density measure to the 0.42 ha of suitable habitat within the Approved Works area means that 3-4 individuals could be expected to be impacted. However, survey conditions were not optimal and therefore the size of the population in the area surveyed is therefore considered to be larger than the 18 live animals observed.

Additional individuals recorded during pre-clearance surveys conducted under the approved Demolition DA FMP were all located along the eastern edge of the multi-storey car park which has been established as the main location for occurrence by Dr Clark.

2.4. Powerful Owl

2.4.1. Breeding Cycle and Biology

The Powerful Owl is listed as vulnerable under the BC Act. The sedentary species inhabits mature rainforest and a wide range of eucalypt forest and woodland types from Queensland to Victoria. It occupies tall, moist productive eucalypt forests of the eastern tableland edge and the mosaic of wet and dry sclerophyll forests occurring on undulating, gentle terrain nearer the coast (Kavanagh 2003). Powerful Owls feed mainly on medium-sized species of arboreal marsupials that are most readily available at any given locality (Lavazanian et al. 1994). Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal mammals.

Roosting (daytime rest) is generally within dense foliage of mid-canopy trees in sheltered gullies, also including rainforest or exotic pine plantations (Garnett and Crowley 2000). Large old trees; usually living Eucalypts, with hollows at least 45cm in diameter and 100cm deep, within or below the canopy, are required for nesting (Higgins 1999). Mated pairs of Powerful Owl roost together or separately, maintaining several roost sites

throughout their territory, which are used in rotation (Lindsey 1992), shifting with the availability of prey. A pair is generally faithful to a traditional nesting hollow. Powerful Owls form pairs for life and are strongly territorial. Estimates of the home range of this species vary greatly, but territories are thought to range from 800 to 1500 hectares (Kavanagh 1997).

Laying is strictly seasonal, typically occurring between mid-May to mid-July. However possibly due to climate change owls in the Sydney region have recently been recorded nesting as early as April (pers com. Dr Kavanagh). The breeding season extends either side of laying, commencing at the early pairing up stage and finishing after fledging of the young. Therefore, local breeding activity may occur between March – September.

The Powerful Owl is widely distributed, albeit at very low population density, throughout the outer suburbs of the greater Sydney metropolitan area, particularly where these suburbs adjoin substantial areas of bushland and reserves (Kavanagh 2003).

2.4.2. Occurrence within the Property

The Powerful Owl is known to occur in the Cumberland State Forest and is known to forage in a section of the Approved Works area on occasion as part of a much larger foraging range and utilise available dense vegetation for roosting. Following a sighting near the boundary with Cumberland State Forest in February 2022, additonal areas of roosting/foraging habitat have been mapped as occurring in the north-east parts of the Approved works area (**Figure 3**). Under the Biodiversity Assessment Method (BAM), the Powerful Owl is classified as a Dual Credit species with breeding habitat requiring species credits and foraging habitat requiring ecosystem credits. As the habitat within the Approved works boundary does not comprise breeding habitat (i.e it is not within a 100m radius of a known nest tree), the removal of this habitat is offset by the retirement of ecosystem credits for removal of the habitat surrogates (namely PCT 1237 credits).

While the Powerful Owl is unable to nest in the Approved Works area due to the absence of large tree hollows, there are suitable large tree hollows located within 150 m of the Approved Works area including three that are known to have been used in the past for nesting.

A breeding pair of Powerful Owls are well known to the combined Cumberland State Forest and the Property areas to the east and south, outside of the Approved Works area. This pair have also been studied by owl expert Dr Rod Kavanagh during his period stationed within the Cumberland State Forest offices from 1977 to 2011. Dr Kavanagh did his PhD on large forest owls (Kavanagh 1997) and together with John Young, the leading naturalist on owls, undertook some surveillance of nesting by the local pair as part of studies. Dr Kavanagh subsequently prepared the Recovery Plan for Large Forest Owls (DEC (NSW) 2006).

It is likely that individuals from the pair have been replaced under natural succession over the last 4 decades, with the combined connective local forest remnant remaining as their core breeding territory. This pair is known to have cycled through at least five nest trees over the past 20 years, including two on the Property identified as SHT4 and SHT7 (see **Figure 3**). Although these two trees are not known to be used since 2015 and 2007 respectively (Keystone Ecological 2022), there is the potential for them to use the nest trees again in future breeding seasons. SHT8, located in the adjacent Cumberland State Forest area, has been utilised in more recent years (see **Figure 3**).

Trees previously known to be utilised for nesting that occur within or close to the 150m buffer distance of the Demolition Footprint are identified in **Figure 3**, These four large hollow-bearing trees are referred to as 'significant habitat trees' (SHT) and have been allocated reference numbers for identification and monitoring purposes.

Field work by TreeHouse Ecology in 2021 led to the nomination of four (4) additional trees within 150m of the Demolition Footprint area for monitoring during the March – October 2022 breeding season. These trees were nominated as Monitoring Points (MPs) as they contain a large opening that could be potentially accessed by large hollow dependent birds. A further four (4) additional trees are also located within 150m of the Concept Masterplan DA footprint. Although no evidence or record of Powerful Owl use exists for these eight trees to date and given other large hollow dependent birds such as Cockatoos have been observed using some of them, as a precautionary measure these trees have been included for monitoring. The identification of an additional SHT9 (used in 2000) is based off a third-party source (Birdlife Australia) however recent field surveys in 2021 and 2022 could not verify this location. Therefore, a location for SHT9 is not shown in Figure 3.

Tree and hollow data associated with these SHTs, and MPs is summarised in **Table 3** below.

Table 3 Relevant Powerful Owl SHT and MP data within 150m of the site

Ref.	Common Name	Hollow(s) size/type	Easting	Northing	Notes
SHT1	Smooth-barked Apple	50cm+ broken trunk	318203	6264577	Used in 2016 and 2017
MP2	Smooth-barked Apple	30-40cm branch, 20cm branch	318206	6264554	
MP3	Sydney Blue Gum	20-30cm trunk, 15-20 trunk	318094	6264446	Cockatoos observed in hollow
SHT4	Sydney Blue Gum	30-40cm trunk, 20-30cm trunk	318087	6264329	Used in 2008, 2014 & 2015
MP5	Sydney Blue Gum	20-30cm trunk	318015	6264231	
MP6	Smooth-barked Apple	20-30cm trunk	318022	6264211	
SHT7	Smooth-barked Apple	20-30cm trunk	317905	6264164	Used in 2007
SHT8	Sydney Blue Gum	20-30cm trunk	318296	6264654	Just outside 150m buffer but used in 2020 and 2022
SHT9	Tree cannot be located				Used in 2000
MP10	Sydney Blue Gum	20-30cm trunk x2	318170	6264799	
MP11	Sydney Blue Gum	20-30cm trunk	318170	6264850	
MP12	Sydney Blue Gum	20-30cm trunk x2	318211	6264856	
MP13	Sydney Blue Gum	20-30cm trunk	318152	6264906	

The owl pair were setting up to nest at a tree further to the south in the Cumberland State Forest area in 2021 (beyond the 150m buffer for the Approved Works area) but this was unsuccessful at this location. Rarely, a replacement clutch may be laid if the first attempt fails early in the egg stage (DEC (NSW) 2006). There is no evidence to date of a repeat attempt or successful nesting by the pair in 2021.

Detailed Powerful Owl monitoring by *TreeHouse Ecology* continued during the 2022 breeding period concurrent with works for the approved Demolition DA. This involved placement of full-covert infra-red and motion sensing cellular cameras on all six hollows located within 100m of the demolition DA area. This was within five trees (SHT1, MP2, MP3, SHT4 (x2) & SHT5) as shown on **Figure 3.**

Cameras were placed out in March prior to hollow selections for nesting and recorded through the entire winter nesting period. The cameras provided real-time images of any nocturnal activity at the hollows to indicate when works may need immediate progressive management to prevent any disturbance. Activity surveys were also extended throughout the remaining connective landscape into Cumberland State Forest, also utilising song-meters at select locations that were analysed with cluster analysis software.

TreeHouse Ecology recorded the nest tree in 2020 at SHT8 and found that nesting at trees close to the male's winter roost site was abandoned in the south of Cumberland Sate Forest in 2021. SHT8 was again selected for nesting in 2022, however excessive rainfall (264mm over 7 days) in early July temporarily flooded the hollows and both of the four-week-old chicks drowned. Similar monitoring will continue during all of the future demolition and construction phases that extend into the winter periods, to advise on any emerging indirect impacts on breeding behaviour. There are expansive areas of suitable roosting habitat outside the Approved Works area throughout the combined connective forest remnant supporting mostly STIF and BGHF communities. Roosting habitat is typically along the moist gully areas specifically supporting Turpentine and Sweet Pittosporum trees which are favoured given their dense mid-storey structure and protective foliage as a diurnal resting shelter. **Figure 3** also shows all quality roosting habitat areas within 150 m of the Approved Works area, as well as the male breeding roost areas over the last two early breeding seasons (2020 & 2021).

2.4.3. Potential Impacts on the Powerful Owl

The proposed works are not likely to cause direct harm to the breeding pair or their young as no large hollows are present. The works do however have potential to cause some indirect impacts on Powerful Owl which are considered in subsequent sections. Specific management strategies to avoid impacts to the Powerful Owl are presented in **Section 3.7**.

2.4.3.1. Indirect Impacts on Nesting Behaviour

Indirect impacts on nesting behaviour may occur if works are undertaken during the breeding season and where the owls choose to occupy any trees identified on **Figure 3.** Powerful Owl are sensitive to nest disturbance during the egg and chick stages and will readily abandon the nest if disturbed (DEC (NSW) 2006). This has been previously recorded by the local pair. If works are undertaken through the breeding season, excessive noise and activity may discourage the owls from establishing a breeding site close to the works area. An established nest site may also become abandoned.

Bain et al. (2014) developed a set of guidelines specifically aimed at avoiding and mitigating development impacts on the Powerful Owl, the most important of which is the observation of a minimum distance of 100

metres from any development footprint to a nest site and 50 metres to roosting habitat during the breeding season. The current buffer to nesting areas identified by the DPIE Threatened Biodiversity Data Collection constraints is 100m. For this FMP, a conservative buffer distance of 150 m between the potential nest trees and the Approved Works area has been applied. This is consistent with the buffers applied in the approved FMP for the Demolition DA footprint. Due to the implementation of this buffer, the works are not likely to indirectly impact nesting behaviour.

2.4.3.2. Impacts on Roosting Locations

The female Powerful Owl occupies the nesting hollow during the laying and early chick stages. The male at this time, and both sexes and fledglings at all other times of the year, occupy suitable dense foliage roost sites during the day. These are when the owls are at rest. Suitable roosting habitat areas within 150 m of the Approved Works area are mapped on **Figure 3**. Owls may occupy these potential roosting areas, as well as any other suitable habitat within the remaining connective forests and 1000 ha home range areas. Therefore, there is a large extent of available local roosting habitat. The roosting areas occupied by the male proximate to the nest trees from 2020 and 2021 are also shown on **Figure 3**. Some suitable roosting habitat as well as sub-optimal roosting habitat for the Powerful Owl occurs within the Approved Works area.

2.4.3.3. Impacts on Foraging

The Powerful Owl is a specialist predator of arboreal marsupials, particularly the Common Ringtail Possum. Other preferred prey species occurring in the local region include the Sugar Glider, Common Brushtail Possum, Grey-headed Flying-fox and to a lesser extent large birds.

Due to the young age of mostly landscaped and planted vegetation proposed for removal within the Approved Works area area, suitably sized hollows for prey mammal species are in very low numbers, if present at all. Constructed dreys (dome nests in dense foliage) of Common Ringtail Possum have also been observed within the landscaped areas and this species is considered to be resident in the Approved Works area. The Common Brushtail Possum is also likely to occur as it is a very widespread, urban adapted species.

Prey species have potential to occur within vegetation in the Approved Works area at night, although the Grey-headed Flying-fox is only likely to occur when seasonal flowering or fruiting of trees permit. Hence it must be recognised that Powerful Owls may be actively foraging within the vegetated works areas at night and any barbed wire fencing, excessive lighting or overnight noise (such as generators) may have some impact or deterrence to this. As foraging is only likely to occur outside of the standard daylight works period, works will generally only have low potential to impact on owl foraging. Impacts may occur however, where a direct impact on individual possums of either species may occur during vegetation clearance works. This FMP therefore also gives due consideration to effective recovery of possums including the provision of supplementary habitat for these species (see ***Section 3.6***).

3. Fauna Management Measures

This FMP has been prepared to provide detailed specifications of the measures that will be implemented to avoid impacts to native fauna as a result of the project. Measures to avoid and mitigate any unnecessary impacts from the project on fauna species are detailed in this chapter and include:

- Licences
- Environmental Inductions;
- Pre-clearance surveys;
- Staged clearing process;
- Clearance supervision by ecologists;
- Relocation of captured fauna;
- Salvage of habitat materials;
- Nest box installation;
- Preventing Brush Turkeys breeding in the Approved Works area; and
- Monitoring for the Powerful Owl.

The methods to minimise impacts are described in detail below. All fauna handling is only to be undertaken by appropriately trained and qualified ecologists. All diurnal and nocturnal pre-clearance surveys must be conducted by trained and qualified ecologists under the direction of the Project Ecologist. Trained and qualified ecologists, as directed by the Project Ecologist, must also be present onsite during all vegetation clearing works, including clearing of areas not identified as habitat features during pre-clearing surveys.

3.1. Licences

It is noted that Condition 44 l) of the Consent states that Details of relevant qualifications and appropriate licences for personnel involved in wildlife rescue and relocation is to be provided. Cumberland Ecology is an ecological consultancy that holds a Scientific Licence (REF: SL100103) under Section 132c of the *National Parks & Wildlife Act 1974* for survey purposes. Cumberland Ecology also holds an Animal Research Authority licence (ACEC ARA No: 17/1197) under the *Animal Research Act 1985* for fauna surveying and monitoring. These licences are held by the company director and cover all Cumberland Ecology staff.

However, the activities being implemented under this FMP are for the purpose of protecting fauna and minimising impact on fauna as a result of clearing works – termed 'Spotter/Catcher' works. It should be noted that NSW does not issue licences for Spotter/Catcher works and approvals for Spotter/Catcher works are dictated by issued conditions of consent and management plans, as approved by relevant consent authorities.

Therefore, while the Spotter/Catcher works required under the FMP are not considered to constitute 'animal research' or a 'recognised research purpose' under the *Animal Research Act 1985*, as NSW does not issue licences for Spotter/Catcher works, Cumberland Ecology has listed our Scientific Licence (REF: SL100103) and

associated Animal Ethics licence (REF: 17/1197) as evidence of Cumberland Ecology staff being appropriately trained/licenced for handling fauna.

Furthermore, a Cumberland Ecology staff member is a subject matter expert and trainer for a nationally accredited Fauna Spotter Catcher course that provides AHCFAU301A - Respond to Wildlife Emergencies' competency. All Cumberland Ecology staff undergo the Spotter-Catcher training, either as formally attending the course or as internal company training by the subject matter expert/trainer.

3.2. Environmental Inductions

Environmental inductions will be undertaken for all personnel who will work within the Property prior to the commencement of any works to communicate environmental features to be protected and measures to be implemented. Fauna management and procedures will form part of the site induction and all persons working on the vegetation clearing or other feature removal will be briefed about the possible fauna present at the time of construction, and what procedures must be undertaken in the event of an animal being injured or disturbed. The Project Ecologist will provide information for induction slides and the supervising ecologist on the day will provide a prestart briefing prior to works. The inductions or daily pre-starts will specify in detail which areas of vegetation are approved to be removed and the importance of not damaging retained vegetation. The induction will specify that unauthorised personnel are not permitted to enter retained vegetation areas, and that no machinery or stockpiling of materials is permitted outside the approved works areas. Other environmental matters to be included within inductions include details of what fauna species to look out for, triggers for stop works, what to do when fauna are encountered, who to contact and what do if someone is bitten or scratched, and the contact phone number/radio frequency for the supervising ecologist. In order to ensure the requisite information is passed on to all contractors, a Fauna Management Induction Fact Sheet and Checklist has been developed (Appendix A) and will be given to all contractors entering the Property. Note the provided fact sheet in Appendix A may be further updated/refined with further details (e.g colour of markings for habitat features) once available.

3.3. Boundary Demarcation

As the Approved Works area will be subject to a range of different management activities depending on the objectives for each area, boundaries of each management area will be demarcated as described below depending on the required works to identify management zones and restrict works to appropriate areas.

3.3.1. Marking Limits of Approved Works

Prior to any clearing works being undertaken, the boundary of the limit of works for the Approved Works is to be clearly delineated and fenced with temporary mesh fencing that will exclude fauna from entering the works area, particularly terrestrial species captured from within the development area. The fencing will be fauna friendly (see **Section 3.3.3**) and will include shading comprised of 70% shade cloth, a minimum of 1.8 m tall, that will be affixed to the temporary fencing panels using cable ties or similar. Staging of the fencing is to follow the sequencing of approved works and the Contractor is to ensure shading is installed at each relevant area in line with this sequencing. The fencing is most important close to adjacent or nearby vegetated habitats. The base of this fencing is to support silt fencing which is to be dug into the soil or otherwise pinned to the surface to prevent small fauna (e.g. skinks and frogs) passing through or burrowing below the fencing. This silt

fencing will also act as a drift fence for funnel traps placed along the base of the fencing to recover small frogs and reptiles frog the site.

Marking of clearing limits will also be supplemented with high visibility tape or other appropriate boundary markers. To avoid unnecessary damage to adjacent vegetation or inadvertent habitat removal, disturbance is to be restricted within the delineated area.

No stockpiling of equipment, soils, or machinery will occur beyond the delineated works zones or within the Tree Protection Zones (TPZs) of trees to be retained within the delineated works area. The clearing contractor is responsible for the installation of the boundary markers to delineate each staged worksite. The boundary markers are to be inspected by the appropriately trained and qualified ecologist responsible for the clearance activities to ensure that the boundary markers are suitable to enable the environmental and technical inspections of the proposed disturbance to be undertaken.

3.3.2. Fencing to Delineate Management Zones

Some areas within the north-eastern parts of the Approved Works area will be partially cleared for Asset Protection Zones (APZs). In order to clearly identify the APZ areas and their different management requirements (e.g Inner Protection areas (IPA) vs Outer Protection areas (OPA)), the boundary between APZs and areas to be fully cleared will be clearly demarcated prior to the commencement of works. Webbing, bunting, or similar material may be utilised to demarcate the APZ areas from those to be fully cleared provided the material is highly visible and does not contain any sharp tops or edges. Appropriate signage or other distinct markers will also be required to distinguish IPA and OPA areas as clearing limits differ between these zones.

3.3.3. Fauna Friendly Fencing

Fauna friendly fencing will be installed between areas of retained native vegetation and the Approved Works area in order to prevent native fauna species accessing the Approved Works area and to avoid impacts to these species during the construction stage.

Fauna friendly fencing comprises fencing that avoids the use of barbed wire or other sharp materials and is highly visible. Current fencing installed around the Property as part of the Demolition DA works meets the requirements for fauna friendly fencing as it does not contain any sharp tops or materials that could potentially injure or entangle wildlife and is highly visible due to application of shade cloth. Any fencing installed for the Approved Works will utilise the same format as that for the Demolition DA. Fauna friendly fencing will be installed along the Approved Works boundary to demarcate the limit of works.

3.4. Preclearance Surveys

This section provides details of the pre-clearance surveys that will be undertaken prior to the commencement of works. This includes general preclearance surveys as well as more detailed specifications for particular fauna groups of relevance to the project including the Powerful Owl and the Dural Land Snail.

As the approved works will be conducted across several stages, all requisite pre-clearing works will also be staged accordingly. As required by the Conditions of Consent, reports of pre-clearance fauna surveys and relocation will be provided on a weekly basis to be provided for the records of The Hills Shire Council.

3.4.1. General Preclearance Surveys

General fauna pre-clearance surveys will be conducted within a one-two week period prior to activities for each relevant stage of vegetation clearing works commencing. This will comprise a single primary preclearance survey of the Approved Works area for certification by Project Ecologist and issue to Council to satisfy Condition 44 of the Consent followed by subsequent pre-clearance surveys of each phase of development to ensure data is within acceptable timeframes for the relevant stage of works. The purpose of the pre-clearance survey is to identify and mark habitat features that will need to be removed under ecologist supervision and will also identify habitat features suitable for later salvage and re-instatement in areas of retained vegetation outside the Approved Works area. Specific pre-clearing procedures that will be implemented for specific fauna species including the Dural Land Snail and the Powerful Owl are presented in later sections of this chapter (**Section 3.4.3** and **Section 3.4.4**).

Fauna pre-clearance surveys will consist of identifying, marking and documenting suitable fauna habitat features. These features include potential owl roosting areas, significant rock outcrops and crevices, large boulders, nests, decorticating bark, stags, and hollow-bearing trees. These fauna habitat features have the potential to support species such as bats, gliders, possums, reptiles and birds. Artificial structures that may be utilised as habitat by fauna, such as poles, junction boxes and other elevated structures will also be checked for indications of fauna use.

Features identified as likely to support resident fauna will be marked with a large "H" using fluorescent spray paint as well as with flagging tape. Habitat feature details will be recorded including:

- Type of habitat feature (tree, hollow, nest, log, log pile or rock pile);
- Location using a handheld GPS; and
- Record of a unique identifying code.

If a hollow bearing tree is recorded, the following data will be collected:

- Species;
- Number of hollows; and
- Average hollow size class (small, medium or large);

During the pre-clearance surveys, habitat items suitable for salvage will be identified, recorded, flagged with fluorescent marking tape, and marked with a large (>1 m) "S" using spray paint on two sides of the tree and given a unique identifying code.

The requisite survey effort for the general pre-clearance survey is outlined in **Table 4** below. The requisite survey effort for subsequent pre-clearance surveys for each stage of works will be dependent on the findings

of the general pre-clearance survey and will be stratified based on the extent of habitat present within each stage and weather conditions during and preceding the commencement of the relevant stage with due consideration to species specific survey periods as outlined in ***Sections 3.4.3*** – ***3.4.4*** below.

Table 4 Requisite survey effort for pre-clearance surveys

Survey Type	Survey Method	Survey Effort
Primary Pre-clearance	Identification and mark up to habitat features, including natural features and artificial features	Until entire Approved Works area is traversed to identify habitat features present, likely one week of survey
Staged pre-clearance	Rechecks of vegetation within relevant stages to determine any changes in condition since primary pre-clearance and determined any potential additional features not identified during primary preclearance surveys	Until entire relevant stage of works is traversed. Survey effort variable depending on the size of the relevant stage of works
Pre-clearance for Dural Land Snail	Searches including turning natural and non-natural debris such as logs and fence palings, raking the leaf litter and searching amongst clumping plants such as Lomandra.	5 days/5 nights with requirement for surveys from day four onwards dependent on weather conditions and extent of detection of specimens in on previous days. Searches are to comprise a minimum of one hour searching at each area of suitable habitat during the day or two laps of the site whichever takes longer.
Pre-clearance for Powerful Owl	Inspection to look for any roosting owls or signs of roosting such as pellets or white-wash on the ground within or close to the works area	Searches are to be conducted until entire works area is traversed

No works are to commence until the primary pre-clearance survey is completed, the accompanying report has been issued to the satisfaction of Council in accordance with ***Section 1.3*** above, and Project Ecologist direction has been given to the contractor. Subsequent phases of vegetation clearing works are not to commence until the subsequent pre-clearance surveys are conducted in line with the preceding protocols to the satisfaction of the Project Ecologist with accompanying report issued to the contractor in accordance with ***Section 5*** of this FMP.

3.4.2. Trapping and Direct Recovery of Fauna

Recovery of fauna is to be undertaken from within the Approved Works area following the installation of perimeter fencing. This is to include trapping effort for capture, but also include use of baited surveillance camera stations to identify fauna species occurring within the Approved Works area.

The recent demolition phase to the south recovered several fauna species from within the Demolition Footprint via baited cage traps (possums), arboreal Elliott traps (gliders) terrestrial Elliott traps (rats), pitfall traps and funnel traps (frogs and lizards). A similar assortment of traps will be installed across the Approved Works area with the number and location of different trap types to be based on the findings of the primary pre-clearing surveys.

Funnel traps should be placed at the base of the perimeter fencing, but may also be using in conjunction with installed drift fences and pitfall buckets.

Several previous captures of Sugar Gliders, Common Brushtail Possums and Ringtail Possum within the Demolition Footprint were individuals re-entering the site for an easy feed from within traps, particularly over the winter period when other glider feed resources are restricted. Trees located within the perimeter fence that provide canopy connectivity between the site and vegetation outside are to be trimmed to reduce the potential for re-entry to the site by possums.

Once fencing is installed then surveillance cameras should be placed at strategic locations within the Approved Works area to give an indication of the presence and activity by more cryptic species know to be locally present such as Short-beaked Echidna and European Red Fox. The presence of these species will then prompt further target recovery methods. Any evidence of echidnas will prompt late afternoon, dusk and night surveys (particularly during warmer months) to visually find active individuals. This is because they may dig themselves into the upper soil profile to avoid heat (and detection) during the day. If this proves ineffective then camera surveys must continue until all individuals are accounted for, and active searches through the upper soil surface in suitable locations close to the recorded camera sightings is to continue with dusk efforts.

If the European Red Fox is detected, this will then require cage trapping to be undertaken. In common with the survey effort required for echidnas, camera trapping efforts should continue until all individuals are recovered and humanely removed.

Once perimeter fencing is installed night surveys are to be ideally undertaken following local rainfall. This will aid in the detection of any calling frogs, for direct capture.

3.4.3. Preclearance Surveys for the Dural Land Snail

Pre-clearance surveys for the Dural Land Snail will be conducted in the Approved Works area prior to works to capture and relocate any snails that may be present. Surveys will be conducted by an expert ecologist in this field, Dr Stephanie Clark over a minimum period of 3 days/3 nights. Searches will include turning natural and non-natural debris such as logs and fence palings, raking leaf litter beneath trees and searching amongst clumping plants such as *Lomandra*.

As required by the Condition 44 of Consent, the surveys will be conducted during the day and at night, particularly during or after rain. Optimal conditions would be warm nights (e.g. 18°C), high humidity (e.g. > 80%) and the ground layer very moist to wet. However, as temperatures and humidity decrease and the ground layer gets drier, snail activity correspondingly decreases as well with almost no activity once nightly temperature drops to about 11°C or less.

As recommended by Dr Clark, searches are to comprise a minimum of one hour searching at each area of suitable habitat during the day or two laps of the site whichever takes longer. The length of time spent searching during each particular survey period will be highly dependent on the environmental conditions occurring at the time of the survey and will continue until no (further) snails are observed in the area being searched.

For the purposes of this FMP, the initial pre-clearance survey will involve a minimum of three days of day and night searches initially with additional surveys potentially required during clearing of areas within or adjacent to identified Dural Land Snail habitat. If the prevailing conditions are hot and dry in the days leading up to the vegetation clearance works, then it is very likely that any individuals that might be present within the potential impact area may not be detected. In such instances, further advice from the Snail specialist Dr Clark will be sought to determine options to maximise detection of any potentially occurring individuals.

3.4.4. Preclearance Surveys for the Powerful Owl

Between March and October (the breeding period for the Powerful Owl) a site inspection by a fauna ecologist experienced in Powerful Owl ecology will be conducted on the morning prior to the following works:

- Removal of any vegetation;
- Operating of any machinery or other requirement for loud noises, or
- Presence of more than one person working within the vegetated areas identified on **Figure 3** as potential roosting habitat.

The above inspection is to look for any roosting owls or signs of roosting such as pellets or owl-wash on the ground within or close to the works area. If a nest site has been confirmed elsewhere (outside of the buffer area) at this time of year, then the inspection is not warranted, and the above works may proceed. Where roosting is identified, the works are to assume nesting until the actual nest site is located, or established breeding roosts have otherwise been confirmed elsewhere.

Any vegetation clearing works outside of the March-October period will require a pre-clearance inspection which is to include a search of owl activity by a fauna ecologist. Where roosting activity is recorded, no works may proceed within 50 m until roosting has moved on. This may be the following day.

3.5. Clearing Supervision

Following completion of primary and relevant staged preclearance surveys and establishment of requisite exclusion zones for the relevant stage of works, the clearing of vegetation or other features (such as sandstone blocks or artificial structures) will be conducted using a two-stage clearing process as outlined below under

strict qualified ecologist supervision to rescue and re-locate any displaced fauna that may be disturbed during this activity. This may be commenced after a minimum of 1 week of trapping efforts as outlined in **Section 3.4.2**. A minimum of two ecologists will be on-site during clearing of significant areas of trees/vegetation/other habitat to provide appropriate supervision and rescue fauna as required.

Stage 1: Firstly, vegetation or other features not identified during pre-clearance surveys as potential fauna habitat is cleared under ecological supervision. All vegetation around the habitat item is cleared so that the potential fauna habitat is isolated.

Stage 2: Secondly, potential habitat trees are left to stand overnight to allow resident fauna to voluntarily move from the area before being cleared under ecological supervision.

An appropriately qualified Ecologist, or fauna handler under Project Ecologist supervision, will then manually recover any fauna still present where it is safe and possible to do so. For fauna species that are high in trees and are unable to be recovered from the ground, an accredited tree-climber will check the trees for fauna under ecological supervision and remove the complete nest, hollow drey or habitat in sections if safe to do so for relocation on site.

The following protocols are to be implemented under strict Project Ecologist supervision for all identified habitat trees:

- Trees will be gently shaken by machinery prior to clearing to awaken sleeping fauna and encourage any resident fauna to self-relocate;
- All potential habitat trees are to be lowered to the ground slowly by an excavator with a grab mechanism, thus minimising the risk of injury or mortality to fauna;
- The supervising ecologist will inspect all visible hollows for the presence of fauna following felling of the tree; and
- If salvageable, branches with hollows and sections of trunk will be marked and set aside for transfer to a storage area for eventual placement within areas to be revegetated under the VMP.

The two-stage clearing process is designed to enable fauna to feel secure whilst clearing occurs around their tree, and to allow them a chance to self-relocate at night to coincide with typical foraging behaviours of arboreal animals. The supervising ecologist has discretion to request the Stage 2 tree removal protocol should additional fauna or habitat be identified during the clearing process. In the event that additional habitat is identified during the clearing process, details, as per the pre-clearance requirements listed in ***Section 3.4***, of the newly identified habitat is to be recorded by the supervision ecologist.

Ecologists are to be present while clearing to rescue animals identified during the clearance operation. Any fauna found will be captured and relocated to nearby remnant vegetation and released as identified in the release location map (**Figure 4**).

Where bat species are found following felling of the tree but not able to be accessed, the section of the tree will be removed using a chainsaw (or a suitable alternative low-impact method) to extract the bats. The ends

of the extracted tree section and cavity openings will be temporarily blocked with a piece of cloth during transportation to the fauna release location. It is a requirement to release microchiropteran bats after nightfall to minimise the risk of predation by diurnal predators and harassment by birds.

3.5.1. Veterinary Hospitals and Wildlife Rescue Organisations

All measures will be taken to ensure the safe and secure relocation of located fauna residing within the Approved Works area. However, in the unlikely event that any animals are inadvertently injured, they will be taken to the nearest veterinary clinic for treatment. All fauna deaths or injuries must be reported to The Hills Shire Council within 24 hours of the incident occurring.

The contact details for veterinary hospitals that have been contacted and agreed to receive fauna are listed in order of preference below. The relevant experience of the veterinarian will need to be confirmed against the fauna proposed to be brought to the hospital prior to attendance:

- Small Animal Specialist Hospital (SASH), 1 Richardson Pl, North Ryde NSW (15km from Site - 15min drive) Telephone: (02) 9889 0289. Hours: 24/7 emergency department available, native, exotic, and avian wildlife capabilities (no venomous snakes). Lyssavirus vaccination status: vaccinated, wildlife specialist avian and exotics team available Mon - Fri 8am - 6pm;
- North Shore Veterinary Hospital (NSVH), 63 Herbert St, Artarmon NSW (20km from Site – 25 min drive) Telephone: (02) 9436 1213 (open 24 hours)
- Castle Hill Veterinary Hospital, 1 Francis Street, Castle Hill NSW 2154 (5km from Site - 9min drive). Telephone: (02) 9634 2712. Hours: Mon - Fri 7am - 7pm Sat - Sun 8am - 4pm. Lyssavirus vaccination status: not vaccinated;
- Beecroft Vet, Shop 2 & 3/5 Wongala Crescent, Beecroft NSW 2119 (5km from Site - 9min drive). Telephone: (02) 8914 0828. Hours: Mon - Fri 7:30am - 8pm Sat - Sun 9am - 6pm. Lyssavirus vaccination status: not vaccinated;
- Baulkham Hills Veterinary Hospital, 332 Windsor Road, Baulkham Hills NSW 2153 (10km from Site - 12min drive). Telephone (02) 9639 6399. Hours: Mon - Fri 8am - 7pm Sat - Sun 9am - 5pm. Lyssavirus vaccination status: not vaccinated;

Prior to taking the animal to a veterinary clinic, a registered wildlife carer organisation is to be contacted and a call sheet/reference number obtained for the animal. The wildlife carer contact is to be either Sydney Wildlife Rescue 9413 4300 (24/7 emergency service available) or WIRES (1300 094 737; 24 hours). The veterinary clinic is to then be phoned to advise that the animal is being brought in and the reference number provided to the vet to ensure the animal can be appropriately cared for and tracked after its release from the veterinary clinic.

3.6. Habitat Supplementation Strategy

In accordance with the Conditions of Consent, a nest box/habitat supplementation strategy is required for the salvage and relocation of tree hollows/habitat features present in the Approved Works area or substitution with artificial nest boxes/habitat features where this cannot be achieved.

3.6.1. Salvage of Habitat Features

Habitat features such as hollow-bearing trees, hollow-bearing logs and rocks removed from the Approved Works area are to be salvaged for reuse in the VMP areas and/or selected recipient areas within nearby retained vegetation in the Site (refer **Figure 4**). Where feasible, whole trees will be transported into the area of retained vegetation in the Site using existing roads for transport as much as possible. Vegetation to be retained must not be damaged during transport and placement of habitat features. This will ensure that key habitat resources are retained and utilised in rehabilitation and offset areas (where appropriate).

Hollow trees will be considered for salvage based on structural integrity, number and size of hollows. Hollows to be salvaged will include a range of diameter sizes. Trees will be favoured if single stemmed to ensure that they remain intact during felling. Stags (dead trees) can be selected if they appear solid and have good hollows in the trunk.

Trees and fallen logs without hollows can be collected for retention in addition to those marked by ecologists during pre-clearing. Large, flat or creviced rocks (>500 mm width) that appear solid enough to survive translocation will also be considered for translocation.

3.6.2. Installation of Habitat Features/Nestboxes

In accordance with the Conditions of consent, nest boxes/habitat features area to be installed at the ratio of 2:1 for every hollow/habitat feature removed. This is to provide displaced fauna a greater variety of options when seeking new habitat. As the habitat features salvaged and installed in areas of retained native vegetation will only provide a 1:1 replacement ratio for their removal, an additional nest box will be installed for every habitat feature that is removed and relocated in order to achieve the 2:1 replacement ratio.

The Conditions of Consent state that nest boxes/habitat features are to be installed prior to vegetation removal following the preclearance survey. However, this is only possible for features such as hollows and/or dreys, as other habitat features such as logs, bush rock etc will be physically relocated if feasible during the clearing operation. If additional hollows or nests are identified during tree removal, an appropriate number of additional nest boxes/habitat features will be installed.

The number of requisite nest boxes will be determined during the pre-clearance surveys for each respective stage of works. Any hollows encountered will be either prepared for relocation into a recipient tree within the conserved habitat areas or otherwise replaced with nest boxes at a minimum final ratio of 2:1. If additional boxes are required to meet this figure, additional boxes will be installed post habitat removal.

A total of 33 nest boxes have already been installed prior to the demolition of the seven office buildings, to provide habitat for displaced fauna during the demolition process. Additional nest boxes will need to be installed for the Concept Masterplan works, to provide additional habitat for fauna displaced during the Approved Works. The final number of nest-boxes will be dependent on the findings of the primary preclearance surveys as well as staged pre-clearing surveys. Based on the findings of the primary preclearance surveys, a specific number of nest boxes/other habitat features will be installed prior to commencement of works to provide habitat for displaced fauna.

The nest boxes will be of varying size and design to cater for a range of species including microbats, gliders and possums and hollow-dependent birds such as parrots and cockatoos. The Powerful Owl requires very large tree hollows and as the Approved Works area does not contain any suitable nest trees for this species and the species does not readily take to boxes, no Powerful Owl nest boxes are proposed to be installed. The installation of the arboreal mammal nest boxes will encourage the breeding of preferred prey species for the Powerful Owl, including the Ring-tailed Possum and Sugar Glider.

While the type of the nest boxes to be installed will be dependent on the findings of primary preclearing surveys, indicative types of nest boxes that are likely to be installed include:

- Microbat boxes (variable between 450-600 mm x 230-400mm x 75mm) with a slit as entrance;
- Large arboreal mammal (possum) nest boxes) (250 mm × 250 mm × 500 mm) with 120 mm entrance;
- Small arboreal mammal (gliders and small possums) nest boxes (250 mm × 250 mm × 300 mm) with 50-70 mm entrance;
- Additional arboreal mammal nest boxes must also be installed with dimensions to be drey dependant and determined by the Project Ecologist onsite.
- Medium bird nest boxes (parrots) (400 mm x 170 mm x 170 mm) with 65 mm entrance;
- Large bird nest boxes (cockatoos) (600 mm x 250 mm X 250 mm) with 120mm entrance.

Nest boxes and habitat features shall be installed by qualified tree climber using climbing ropes. Installation will be supervised by a qualified ecologist who will ensure appropriate location, orientation and stability of recipient tree. The details of all next boxes installed prior to clearing will be included in the primary pre-clearing report submitted to Council.

Locations for installation of nest boxes/habitat features will be dependent on the number and type of nest boxes required. Indicative locations for nest boxes will be determined during primary preclearing surveys and will be shown in a figure in the primary preclearance survey report.

Consideration should also be given to the opportunity to identify suitable augered hollow locations within trees as an alternative to nest boxes. Augered hollows have been found to provide more stable temperatures than nest boxes (Briscoe and Griffiths 2020). This method has been trialled by Transport for NSW under a pilot habitat replacement project whereby more than 800 hollows have been installed to replace habitat lost in bushfire affected areas using the Hollowhog technology (HollowHog).

3.6.3. Nest Box Monitoring and Maintenance Program

In order to determine if the nest boxes are being utilised and by what species, and to ensure that the nest boxes continue to provide habitat in the long term, a nest box monitoring and maintenance program will be implemented.

This will comprise an annual monitoring and maintenance inspection and brief report for submission to Council. During the annual monitoring and maintenance inspection, each nest box will be inspected for occupancy

using a long handled camera and any species utilising the nest box will be recorded as well as the number of individuals.

The condition of the nest box will also be examined during the inspection. Damaged nest boxes are to be taken down and repaired on site where possible or an alternative one of similar type added. If the nest box needs to be removed, then a replacement nest box is to be installed until repairs are completed.

If nest boxes show evidence of being occupied by feral animals (e.g. European Honeybees) they will be removed or modified to prevent occupation by such species. If removal/modification is deemed unsafe, then the nest box will be replaced with the same size nest box in a nearby relocation. Specific details of appropriate measures to be implemented relating to feral animals will be provided within the recommendations of each monitoring report.

3.7. Dural Land Snail Management Strategies

In addition to the pre-clearance surveys specified in **Section 3.4**, the following specific measures will be implemented to minimise impacts to the Dural Land Snail during clearance and construction:

- Installation of additional temporary protective fencing, if required beyond that already established for the Demolition DA, between the Approved Works area and known locations of Dural Land Snail;
- Prior to scheduled works, intensive pre-clearing survey for Dural Land Snails by a snail specialist (or under guidance by a snail specialist) in suitable snail habitat in the Approved Works area; and
- Relocation of all Dural Land Snails found in the Approved Works area in accordance with a relocation protocol, as recommended by a snail expert.

It is very likely that any materials, equipment etc that are left/stored along the edges of the construction areas for short or extended periods, particularly those close to native vegetation may provide shelter for the snails. Therefore, these must be checked before or during their removal for the presence of any snails. No materials, equipment etc shall be left/stored within the Tree Protection Zones (TPZs) of vegetation to be retained.

3.8. Powerful Owl Management Strategies

The proposed works are not likely to cause direct harm to the breeding pair that have previously been known to occur in Cumberland State Forest, and therefore the vicinity of the Approved Works area, or their young as no large hollows will be removed. However, disturbances close to their breeding habitat in the breeding season can interfere with the breeding success of that pair. To identify if any impacts are occurring to the Powerful Owl as a result of the project and to determine appropriate mitigation measures, monitoring of the Powerful Owl is therefore proposed as outlined in subsequent sections. All monitoring is to be undertaken by a fauna ecologist with demonstrated experience in owl ecology. Previous informal communications with owl expert Dr Rod Kavanagh have been conducted in relation to his studies of the breeding pair and further consultation with Dr Kavanagh or other relevant stakeholders will be conducted, as required throughout the breeding period.

3.8.1. Monitoring

3.8.1.1. Hollow-bearing Trees

Formal monitoring of all SHTs and MPs identified within 150m of the Approved Works area (**Figure 3**) is to be undertaken if any site works are proposed during the March – October period. Four previously known nesting trees with large hollows are known within or in close proximity to the 150 m buffer and these have been identified for formal monitoring as a precautionary conservative measure. Monitoring is to include:

- Full covert infra-red cellular surveillance cameras placed on all potential SHTs/MPs located within 100 m of the Approved Works area area leading into the nesting period. This includes SHT1, MP2, MP3, SHT4 and MP5. These cameras are to provide ongoing real-time monitoring of all hollows most at risk of indirect impacts. This procedure was undertaken on each of these trees during the recent 2022 breeding period, with recorded visits by Powerful Owl to SHT1, MP2, and both hollows in SHT4. SHT4 & SHT7 (being the closest 2 potential nest trees) were also monitored in the year prior by TreeHouse Ecology (2021) during sewer upgrade works in the early 2021 breeding period.

- Full covert cameras do not emit any white or red flash. A 'low-glo' red flash has been documented to deter Powerful Owls from a nest hollow (recorded by Treehouse Ecology at Wadalba NSW at a 9T relocated trunk section monitored for Central Coast Council). Any movement combined with a variation of heat from the ambient surrounds will trigger an image to be taken by wildlife surveillance cameras.

- Cellular cameras have the added function that images can be sent to a network device in real time. The benefit of this is that any pre-nesting visit to the hollows by the owls will be captured and known prior to the next day of works commencing. Cellular cameras contain their own sim card and operate off a local phone network.

- The cameras are to be installed at a distance greater than 2m and less than 4m from the hollow by a tree climber. Cameras are to be programmed to record only during the nocturnal period and batteries must be specifically Lithium (and preferably 12V) to attain longevity to the nest period. The camera images and settings are to be monitored by an experienced fauna ecologist experienced in Powerful Owl ecology. Rapid fire is to be avoided, with a 5 second delay set between images and a maximum of 3 images per trigger.

The remaining three large hollow-bearing trees (MP6, SHT7 and & SHT8) within or in close proximity to the 150m buffer are to be regularly monitored for breeding activity by on-ground surveys on no less than a monthly basis during the breeding period. Survey of the remaining three large hollow-bearing trees within 150m will also incorporate the use of song-meters placed at strategic locations, which will assist in identifying breeding areas in the time leading up to laying. This proved very effective in determining the 2022 selected hollow. Owls tend to quieten down after laying with most vocalisations then being direct calls between the breeding pair (rather than louder territory calls). Where a nest site is identified, a song-meter can then be used to document calling behaviour close to the nest for future reference. The breeding recordings by TreeHouse Ecology over the 2022 survey period also assisted in determining exactly when the female nested, when the pair abandoned the dead chicks and also all of the anthropogenic noise during this period, from both the

demolition process and otherwise. Low flights from Sydney airport and traffic leaving the Cumberland State Forest at the time the pair were making dusk associations were most notable.

Specific procedures for any nesting recorded within the 10 trees located within 150m of the works areas are provided in ***Section 3.8.2*** below.

3.8.1.2. Targeted Surveys

In addition to the monitoring of hollow-bearing trees identified above, in accordance with Condition 44 of Consent, targeted surveys for the Powerful Owl roosting and/or nesting within the surrounding forest (including Cumberland State Forest) will be undertaken by an expert owl ecologist (to be approved by Council). Surveys must be completed monthly during the nest selection period and throughout the breeding season (April to September) for the duration of clearing and construction phases in order to identify whether a pair has established a breeding territory and success of the breeding attempt. Monitoring reports are to be submitted to Council monthly following each survey and a map showing the location of roosting/nesting owls in relation to clearing/demolition works is to be included. The targeted Powerful Owl reporting requirements are further detailed in **Section 5.3**.

3.8.2. Requirements if the Powerful Owl is Recorded

If nesting is recorded within close proximity to the works areas, the following requirements apply:

- Within 50m (SHT1, MP2, MP3 and SHT4):
    - Work is discouraged within this distance.
    - Where nesting (or suggested nesting activity) is recorded at any of these trees then no works within 50m may commence until a works plan is prepared demonstrating all possible measures to prevent indirect impacts on the specific tree. This is to include considerations to placement of screens and noise controls and are to involve the fauna ecologist. Council will be made aware of nesting owls and provided a copy of the works plan.
    - Any works required within this distance is to be supervised by a fauna ecologist following a pre-work inspection to establish roost locations(s).
    - Daily monitoring of the surveillance cameras by an ecologist with Powerful Owl ecology experience is required with detailed notes on owl behaviour and times for a week prior to and up to a week following these works. In the event of any altered behaviour, then works are to cease immediately.
- Within 100m (SHT1, MP2, MP3, SHT4, & MP5):
    - Work is not to start until 1 hour after sunrise and must finish by 4 pm.
- Within/In proximity to 150m buffer (SHT1, MP2, MP3, SHT4, MP5, MP6, SHT7, SHT8):
    - The fauna ecologist is to be notified prior to each day's work on the proposed works involved. The fauna ecologist will then determine needed presence.

- Any unsuccessful nesting within this area is to be documented with a detailed report from the fauna ecologist outlining timing for failure, associated works and likely reasons.

Where owl roosting activity is recorded within the Approved Works area, no works may proceed within 50m until roosting has moved on. This may be the following day.

3.8.3. Other Requirements

The following measures are required at all times during the construction period in order to avoid impacts to the Powerful Owl:

- There is to be no lighting spill-over into the retained natural forest area habitats. This includes the canopy area. All lights and light fittings for the work sites are to be located, directed or shielded to avoid lighting anything but the target object or area. Lighting intensity is to be appropriate for the activity and only the minimum number and intensity of lights needed to provide safe and secure illumination for the area at the time required must be utilised. Any existing lights can be modified by installing a shield.
- There is to be no machinery, motors, generators or periodic noise emitted from the Approved Works area during the complete nocturnal period between sunset and sunrise in order to avoid impacts to this nocturnal species. If machinery is required to be operated at night, it will need inspection and appropriate measures advised by the Project Ecologist in order to minimise impacts to the Powerful Owl. Noisy works must not begin until after 7am and be completed before 4pm with respite periods as outlined by the Consent.
- There is to be no barbed wire used anywhere or fine mesh fencing placed in any potential flyways to avoid potential entanglement of the Powerful Owl. Chain mesh barrier fencing is suitable and covered in shade cloth or equivalent.

3.9. Australian Brush Turkey Management Strategies

The Australian Brush Turkey has been recorded within the Site and multiple mounds are known to occur to date, though currently outside the Approved Works area. Male brush turkeys build large mulch nests between August to February each year, and females usually lay one egg every 2 to 5 days until around 20 eggs are laid. The females do not stay around the mound once they have laid the eggs and it is the male that then incubates the eggs for 50 days. Chicks take up to 48 hours to dig themselves out to an independent life and they receive no further parental care.

Communication with the NSW National Parks and Wildlife Service (NPWS) has recommended that vegetation clearance works be scheduled for after the brush turkey chicks have hatched and left the mounds. Relocation of brush turkeys can prove to be difficult, as they tend to fly back and therefore subsequent management activities will need to prevent them from laying more eggs or re-building mounds in unsuitable locations. This will involve using methods such as:

- The supervising ecologist may spray the brush turkey early in the morning with a hose or water pistol when it first shows signs in entering an area or nesting at a site. A water pistol is good for this, but do not aim for the head, only the body, to give it a fright. This allows accuracy without using too much water. The

person carrying out the procedure must try to hide from view, so it is the location the bird is wary of. Do not continually squirt or chase the bird with the water device as this is harassment and not permitted.

- Make it harder to access the mulch or compost they use to build their mounds by:
    - Pegging a tarpaulin over the mulch
    - Putting eucalyptus sticks or other obstacles such as rocks in the ground around plants
    - Removing overhanging branches so the area gets more sunlight. Brush Turkeys don't want to build mounds in areas that aren't shady.
- Try to attract the birds to nest in a more suitable location by putting mulch or a compost heap next to at least one large tree providing 80 to 95 per cent shade. The brush turkey may see this as a better nesting option than battling the above deterrents.

In the event of the requirement to dismantle of any mounds in the Approved Works area, an application to NSW NPWS for a *Licence to Harm Native Animals* under the BC Act is required. This licence allows authorised person(s) to control protected native animals if shown to be causing a serious threat to safety, property damage or economic hardship on a property. Although, as the title of the licence alludes to, a licence to harm may include to trap and euthanise, catch and release, or kill, the licence to harm for these project works would be to catch and release any Australian Brush Turkeys within zoned C2 areas of the Property outside of the Approved Works boundary.

4. Fauna Handling Protocols

Ecologists are responsible for capturing vertebrate fauna during the habitat clearing process, as this maximises the number of vertebrate fauna able to be rescued Although every precaution will be taken to avoid injuring fauna during the course of the scope of this FMP or the project works, in the unlikely event an injured animal is encountered, the onsite presence of an ecologist will allow injured animals to be assessed quickly and efficiently as required. An appropriately qualified ecologist must be present onsite during all vegetation and habitat clearing works.

The following protocols for fauna handling and care have been based on the fauna handling procedures of the nationally accredited Fauna Spotter Catcher course that provides AHCFAU301A - Respond to Wildlife Emergencies' competency. All Cumberland Ecology staff undergo the Spotter-Catcher training, either as formally attending the course or as internal company training by a subject matter expert/trainer for the course.

4.1. Fauna Care

Any fauna handling is only to be conducted by the supervising ecologist. Animals caught are to be placed in appropriate calico bags, cardboard boxes or capture cages whether alive or dead. A judgement is required on animals with superficial injuries (e.g non-bleeding scratches) as to whether they are suitable for release or if transport to a vet is required. A precautionary approach should be taken for superficial injuries and the individual should be transported to a vet in the event of any doubt on extent of injuries.

Any fauna assessed as requiring treatment by a qualified vet are to be taken to one of the veterinary clinics listed in ***Section 3.5.1.*** The supervising ecologist is to ensure the veterinary hospital nominated is available, sufficiently equipped and experienced to handle the fauna prior to transportation. All injured native fauna are to be taken to a veterinary clinic within the shortest possible time frame. Any injured fauna are to be monitored by the supervising ecologist prior to transport and no obviously injured animal shall be left longer than 15 minutes before being taken to a vet.

The general protocol for release or veterinary treatment of injured fauna comprise:

1. If a captured animal is critically injured and transport is feasible, it is to be transported to the nearest available vet emergency service in the shortest feasible timeframe;
2. If the animal is seriously injured, it is to be taken to one of the nominated veterinary clinics capable of dealing with the fauna under care within required timeframes;
3. If the animal is not seriously injured, it is to be taken to one of the nominated veterinary clinics capable of dealing with the fauna under care within the shortest possible time frame; or
4. If a captured animal shows no obvious signs of injury but is not locomotive, it is to be held in an area designated for animal care (which is to be quiet and maintained at a mild temperature) and contained within an appropriate capture enclosure and checked at an interval of 1 and 2 hours:
    a. After 2 hours if the animal is locomotive and still shows no obvious signs of injury, it is to be released.
    b. If the animal is not locomotive after 2 hours, it is to be taken immediately to one of the nominated veterinary clinics capable of dealing with the fauna under care.

c. In the event of injured fauna being located during any night surveys conducted, the injured fauna is to be taken to one of the nominated veterinary clinics with a 24/7 emergency service.

4.2. Stop Works Procedures

The following stop work protocols must be followed when animals are encountered by clearing contractors, or spotted by the ecologist:

- Where an animal is encountered by a contractor:
  - If not in the vicinity of machinery the ecologist/handler is to be notified but work not stopped.
  - if in the vicinity of a piece of machinery the ecologist/handler is to be notified, work stopped, bucket lowered, and the animal captured and removed or until it has self-relocated.
- If the animal is spotted by ecologist:
  - the ecologist has the authority to advise machinery operating in close proximity to the animal to stop work and lower bucket until the animal is captured and removed or has self-relocated.
  - The ecologist is the only person authorised to advise that work can recommence by that piece of machinery. All personnel must be well clear of the machinery prior to work recommencing and Safe Work practices strictly adhered to.

4.3. Fauna Handling Protocols

4.3.1. Birds

Birds are likely to be encountered during clearing operations. Birds commonly occur throughout the site, including some threatened species. Birds utilise tree hollows, trees and shrubs and groundcover as suitable nesting locations. Small bird nests are to be detected during the pre-clearing phase, with all hollows and other habitat features being checked for faunal activity prior to clearing.

If a small bird is injured, or struck but with no clear injuries during clearing, it must be handled carefully and inspected. If the animal has obvious significant injuries, it must be taken to a vet immediately for assessment. If the individual has no obvious injuries, it is to be captured using a towel and contained within a cardboard box with a lid and towels placed on the bottom for grip. The bird is to be taken to the designated fauna care area (maintained at a mild temperature) and left to destress and reassessed after 1 hour and again at 2 hours. If normal locomotion is observed, the animal will be released. If normal locomotion is not observed, the animal must be taken to the vet.

If young birds are detected during clearing and parents are detected nearby, an attempt should be made by the supervising ecologist to relocate the nest or hollow to a nearby tree and monitored to ensure parents recommence care. Adequate PPE (eye protection, head protection and gloves) should be worn by all personnel during relocation in the event of swooping attacks by parents. If parents are not detected, do not resume care on relocation or in some instances the habitat cannot be relocated, the chicks are to be removed from the nest or hollow and contained in the designated fauna care area with a suitable substrate such as a calico bag or

kitchen towel and handed over to a wildlife carer as soon as is practical and a report made immediately to either WIRES or Sydney Wildlife Rescue. If a wildlife carer is unavailable for handover, the chicks must be taken to the vet.

Handling of birds of prey such as the Powerful Owl requires full PPE as there are risks of significant injury to humans from being gripped by strong talons, or from the beak. To this end, all raptors and other large birds must be handled wearing thick gloves and must be captured by two supervising ecologists using a calico bag or towel to cover the animal, and one hand to grasp the bird around the base of wings when folded down and talons and place in a suitably sized container that allows sufficient airflow. All raptors captured and/or injured are to be reported to WIRES or Sydney Wildlife Rescue immediately. If identified as injured the raptor will be immediately taken to an approved vet. Raptors are to be released following assessment by experienced wildlife carer (WIRES or Sydney Wildlife) or other experienced handlers and must be released by an experienced handler as soon as possible but only at the optimum time of day for the species in consultation with wildlife carers.

If nests with eggs are detected, the relevant species should be identified (if nest is not abandoned) and a wildlife rescue service should be contacted to confirm that eggs can be collected for incubation. If collection of eggs is deemed not viable by the wildlife rescue service or identity of species remains unknown, guidance for appropriate disposal of eggs should be sought from the wildlife rescue service.

4.3.2. Reptiles

For clearing works that occur during winter months, consideration should be given to the fact that reptiles may be in torpor. Any reptiles captured during winter months should be released during the warmest part of the day.

4.3.2.1. Small Lizards

Small lizards are the most commonly captured fauna within clearing operations. Types of lizard detected typically include skinks, geckoes and legless lizards. These fauna are fast moving and small and can be easily injured with incorrect handling techniques. For the purposes of clearing operations, small lizards are classified as arboreal or terrestrial. Protocols for the capture of both are provided below:

Terrestrial small lizards are typically detected during machinery movements and when clearing log piles. When one is detected, radio your machinery operator, instruct them to lower their blade or bucket, and after positive communications have been established, enter the machinery exclusion zone. Following this, track the animal and cup it with an open hand on the surface. Move your other hand under the first hand, and feel for the animal's head, and place light pressure on the neck, pinning the animal to the ground, then use the thumb and forefinger to gain control of the base of the animal's head, ensuring support is provided along the body. Alternately, if the animal is in litter, it is appropriate to grasp a handful of litter then place the litter inside a container with air flow.

Identification of legless lizards must take place before handling, as some species of lizards mimic the juvenile colouration of juvenile venomous snakes. Identifying features of lizards include visible ear holes, small vestigial limbs and the lack of a forked tongue. A legless lizard must not be captured until these features have been identified;

Arboreal small lizards are to be captured in much the same way, noting that large sheets of decorticating bark are to be pulled back and checked under for presence of lizards.

Following capture, the supervising ecologist will inspect the animal for obvious external injuries or lack of locomotion. If injuries are detected, the injured fauna must be taken to the vet for further assessment. If uninjured, place the animal inside a vertically held plastic container, with the lid opened at one corner and release as soon as practicable. The container is to have adequate airflow, some shelter such as bark within it and placed in the designated fauna care area prior to release.

4.3.2.2. Large Lizards

Large lizards on site include monitors (varanids), Eastern Water dragons and large skinks such as Blue tongue Lizards. Varanids often flee up trees when disturbed, which is highly likely during clearing operations. They are fast-moving over short distances, but tire over longer distances, thus can be effectively chased down if not captured immediately on detection. Varanids have large claws and have high densities of mouth bacteria, which can cause infection if bitten. Therefore, there is a high risk of personal injury when capturing this group. Only suitably qualified and trained ecologists are to attempt to capture.

When large lizards are detected, the situation must be assessed for personal safety and self-relocation by the species should be the priority, provided there is a suitable nearby area that will not be cleared and is not near hazards such as roads. If the individual is spotted during felling, positive communications must be established with the machinery operator by the supervising ecologist/handler and works stopped before attempting capture. Once the area is safe to enter, the animal is to be approached from the side, and not cornered if possible. Due to the sharp claws typically encountered, welding gloves are to be utilised to capture the animal. For varanids, the animal should be first captured approximately half way up the tail, while allowing the body to remain along the ground. If there is a suitable area for release nearby, the animal can be 'walked off' site while holding the tail to reduce the stress of using a full restraint. This method is not suitable for skink species that drop their tails. If further restraint is required, the animal is to be pinned by the catcher, with a "V" grip using the hand around the back of the animal's skull, and the second hand should either around the base of the tail for varanids or supporting the body of skinks. Once captured, the animal is to be faced with claws away from the catcher at all times.

The animal is to be assessed for health following capture by supervising ecologists. If healthy, the animal is to be placed into a secure catch cage, and the animal is to be held in the designated fauna care area and kept calm until released. The transfer into the capture cage will occur by the ecologist/handler placing the cage on the ground and opening the door, while the other releases the front part of the animal first, ensuring it is well inside the cage before releasing the rear. If the animal is too large for the catch cage, it will be placed in a modified nally bin with sufficient air flow. Care must be taken that the animal does not overheat in the container.

Uninjured large lizards will be relocated by ecologists immediately, following positive identification to species level. If injuries are detected, the injured fauna **must be** taken to the vet for assessment.

4.3.2.3. Snakes

A variety of snakes are known to occur within the project area, ranging from relatively harmless snakes to those with potential to cause life-threatening envenomation. Within the project, all snakes are to be treated as venomous.

Snakes are not to be handled by ecologists unless experienced, trained and competent to do so. The Project Ecologist is to be notified whenever a snake is detected and will determine the most appropriate and safest course of action. **If a snake is detected, stop work and notify your supervisor.**

Self-relocation should be the priority for snake species. Snake handling is to be minimised and only a suitably qualified, licenced and experienced snake handler is permitted to handle snakes. If required, a snake bag and hook is to be used by the snake handler. The open bag is to be placed in front of the snake, allowing it a dark spot to self-relocate to. It can be encouraged into the bag with the use of the hook or hooked into the bag with the bag being held upright and the hook placed approximately one third of the way along the body of the snake. Suitably sprung grab sticks may be used if a snake is located in an inaccessible location, such as in a tree hollow. Snakes are to be deposited in a bag, and the bag given a strong downward shake to ensure that the snake is at the bottom of the bag. Once in the bag, the bag is to be twisted and tied off, and the tabs on the exterior of the bag used to place the snake into the flat area created by the hoop.

Uninjured snakes are to be immediately released at a suitable location by the supervising ecologist. If a snake is injured during clearing, the supervising ecologist must be notified and will take the injured fauna to the vet clinic that is able to accept snakes for assessment. When taking a venomous snake to a vet, it must be securely bagged and boxed, and the box clearly labelled as containing a Dangerous Animal.

Snake Bite Kits are kept on site in easily accessible locations and all contractors are to be informed of First Aid procedures for snake bites during site induction.

4.3.2.4. Turtles

Suitable habitat for turtles exists within the Site in the form of dams and areas of wet mud and soaks (refer Figure 4). This FMP includes a section on handling Turtles in the event one is encountered during the pre-clearance survey of the Approved Works area given that turtles have been recorded in the wider Site. Turtles are relatively harmless and are to be captured by gripping them from the side, with a firm grip on both their shell (carapace) and belly (plastron). It should be noted that they will often excrete a strong-smelling liquid, with which contact must be avoided due to its overpowering smell.

Uninjured animals are to be kept in a nally bin with a damp towel on the bottom or if suitable some mud and water from the point of capture. These are to be moved to suitable cool areas in the designated fauna care area until release in a suitable similar habitat outside the Approved Works area nominated on **Figure 4**.

If a turtle is injured during clearing, the supervising ecologist will take the injured fauna to the vet for assessment. The animal is to be kept moist with a damp towel during transport.

4.3.2.5. Eggs

If nests with eggs are detected, the relevant species should be identified (if nest is not abandoned) and a wildlife rescue service should be contacted to confirm that eggs can be collected for incubation. If collection of eggs is deemed not viable by the wildlife rescue service or identity of species remains unknown, guidance for appropriate disposal of eggs should be sought from the wildlife rescue service.

4.3.3. Amphibians

Frogs that may be encountered within the Site include those which utilise trees (arboreal), those that utilise ground habitat (terrestrial) and those that burrow (fossorial).

Tree dwelling frogs are typically detected in tree hollows following tree felling. These are to be caught by hand by cupping them on a surface and closing the hand around them. Food preparation gloves are to be worn to avoid oils from hands touching their skin. The frogs are to be checked for health, and then placed in a plastic container with sufficient air flow and containing a substrate similar to that in which it was caught. Note that water is not to be added to containers, only moist soil. The individuals are to be placed in the designated fauna care areas until release.

Terrestrial frogs will likely be detected during the clearing of ground debris such as rocks and logs. These are to also be caught by hand wearing food handling gloves, checked for health and placed in a plastic container, with airflow, moist soil and litter provided for shelter.

Fossorial frogs will likely be detected during clearing where soil is disturbed, particularly in the vicinity of drainage lines. There is a high likelihood of these types of frogs being injured due to disturbance of soil by machinery.

When frogs are detected, they are to be checked for obvious external injuries, and an assessment made of their health. Frogs must be capable of normal locomotion, and responsive when handled. Frogs that are unresponsive or do not locomote normally must be assessed by an Ecologist and taken to the vet for assessment.

Frogs should be handled in accordance with Frog Hygiene Protocols to prevent the spread of pathogens.

4.3.4. Mammals

4.3.4.1. Macropods

For the purposes of this protocol, macropods include all wallabies and kangaroos. Although there is no record of a macropod being found on the Property or surrounds, as a precautionary measure this FMP includes a section on handling macropods in the unlikely event one is encountered during the pre-clearance survey. Many of these will flee prior to clearing; however, there is potential for vehicle strikes to occur coming into the site or while travelling on site.

If macropods are detected within the Approved Works area, they will be allowed to self-relocate to an area of adjacent vegetation by temporarily removing of one or more fencing panels and encouraging the macropods to go through the gap, before immediate replacement of fencing panels to secure the works site. If a macropod is struck during clearing, it is to be inspected for injury by the supervising ecologist. Dependant on the size of

the individual, the ecologist may relocate the animal to a vet, in which case a large bag will be placed over the animal's head, and it will be driven to the veterinary hospital identified previously. If the individual is too large to be safely transported in available vehicles, WIRES or Sydney Wildlife Rescue will be called onsite to attend to the injured fauna.

All injured macropods must be checked for pouch young. If pouch young are present, wildlife carers (Sydney Wildlife Rescue or WIRES) must be contacted immediately to obtain advice on whether pouch young are to be left in-situ or removed from the pouch. Dependant on the level of injury and wildlife carer advice, the young may be left in-situ if the animal is being taken to a vet. If the mother is too large for transport, the joey may to be removed in accordance with wildlife carer advice and wrapped in a towel and contained in a box in a warm area. There is potential that these young could be raised and released successfully by a wildlife carer.

4.3.4.2. Terrestrial Mammals

i. Echidna

Species such as the Short-beaked Echidna are known to occur within the Property and may attempt to burrow when a capture attempt is made. This can be counteracted by a quick capture, thus not allowing the animal to deeply engage with the ground. If the individual is found to have burrowed, moving of soil around the animal followed by lifting from underneath back two feet will be sufficient to extract the individual. Welding gauntlets are to be worn to avoid injury to staff. Tools, such as shovels, should never be used to dig underneath the Echidna as these risk injury to the beak. Catchers must gently work their hands down each side of the Echidna avoiding the spines and get their hands under the animals back legs where the fur is soft, then link fingers and apply firm constant pressure in an upward direction to enable the echidna to be lifted free of the ground. Special care must be taken not to injure the beak. As echidnas are more prone to heat stress than cold stress (DPIE 2021), any echidna captured must be kept in cool ventilated conditions and released at or after dusk. If injured, the echidna must be taken to an appropriately qualified veterinarian or wildlife carer immediately. Echidnas should be wrapped in a catch bag or towel and transported in a ventilated plastic container.

Echidnas encountered between July and October may have pouch young (puggles) (DPIE 2021). Puggles may also be left in burrows by parents during foraging. If any Echidna puggles, not with parents, are encountered, Sydney Wildlife rescue or WIRES are to be notified immediately and the puggles taken to a vet for examination. The surroundings of any injured adults should also be checked for presence of puggles that may have been dislodged during trauma.

ii. Small mammals

Small terrestrial mammals which have potential to occur within the Approved Works area include a range of species and groups including mice, rats, Antechinus, rabbits and hares. Each group is likely to react differently to disturbance caused by clearing, with species such as hares likely to flee prior to clearing, but groups such as rodents and dasyurids seeking shelter.

Small terrestrial mammals are to be caught whenever possible, as they are fast moving and can quickly hide in small and hard to reach spaces once they have been initially disturbed. Small terrestrial mammals will typically be detected during clearing of suitable habitat such as hollow logs, log piles and rocky debris.

Small mammals are to be captured using a small soft net or using a towel thrown over the animal, then quickly moving the animal into a container or calico bag. Animals can be secured through the net or towel by using the index and middle fingers around the back of the neck, and the remainder of the hand controlling the body. Animals will be inspected for injury, and individually placed inside a calico bag or cardboard box appropriate for their size. The animal is to then be removed from the clearing area and placed in the designated fauna care area until the appropriate release time by the supervising ecologist.

If injured animals are detected, the ecologist must be notified, and will assess the animals' condition and transport to a vet. Injured animals are to be placed in suitably sized boxes with towels/catch bags for padding and for transport to the vet.

Rabbits and hares are pest species in NSW and are to be contained and taken to the closest vet for humane euthanasia.

iii. Large Mammals

Large mammals which are known to occur within the Approved Works area to date is limited to foxes.

Feral animals such as foxes and dogs are not to be captured unless injured. All will attack violently if threatened, thus it may be safer for these individuals to be avoided. If safe to do so, these animals are to be restrained in a large hessian sack and transported securely to a vet.

4.3.4.3. Arboreal Mammals

Arboreal mammals are likely to be encountered during clearing operations. Mammals such as gliders and possums are known to occur on the Site. As a result, it is vital that all hollows/habitat features be thoroughly checked prior to felling and once felling has occurred.

Possums and gliders are relatively adept at moving on the ground, thus present a challenge for spotter catchers. Capture is best undertaken when animals are in a confined space, such as in a tree hollow. The first option should be to avoid capture of the animal and allow the individual to self-relocate. If feasible, relocate the entire log/hollow to a suitable nearby release area and allow the animal to self-relocate. If capture is required, a bag is to be placed over the tree hollow and the animal encouraged from the opposite end. Where this is not possible and the animal is moving on the ground, a team of two ecologists are to attempt the capture with approaching the animal from two different angles and guide it away from other trees that it could run and climb up before being checked for injuries. Each person will have a towel, large catch bag and/or pillowcase and wear thick gloves. The towel can be used to throw over and slow down the possum or glider while using the sides of the towel to wrap the animal up. The animal is to be then taken to the designated fauna care areas for further examination. the supervising ecologist is to hold the possum with towel covering and holding the base of the head gently with one hand and around the hips of the back two legs with the other hand while the towel is moved to inspect the different parts of the possum's body for obvious signs or injuries such as puncture wounds by the second person. The animal can then be placed inside a small carboard box or catch cage with the towel for subsequent release (if uninjured) at dusk by the supervising ecologist or transported to the vet (if injured).

Arboreal mammals are to be checked for obvious physical injury before release, and it is to be determined by the supervising ecologist whether normal locomotion and response is occurring. All injured animals must be taken to the vet immediately for assessment and possible rehabilitation. Any possums or gliders captured, once checked for injuries by an experienced carer or vet, shall only be released after dusk and prior to dawn by an experienced catcher/rescuer. Releasing into a possum or glider box is preferable, within the designated release area. Nominated release sites will be in accordance with **Figure 4**.

When disturbed, adult possums and gliders may abandon vulnerable young in order to escape danger and are unlikely to return for them. Any young juveniles must be kept warm, quiet and dark with a towel in a box and Sydney Wildlife Rescue or WIRES is to be contacted for further care of juveniles.

4.3.5. Bats

Bats include both megachiropteran and microchiropteran bats. In order to facilitate detection of microchiropteran bats, hollows are to be extensively checked and cracked open. Secondary detection such as the use of auditory cues (such as high pitched clicking and chattering) can also be used to detect this group.

If bats are detected during clearing, only appropriately vaccinated ecologists are to handle them. There is potential that bats carry the Australian bat lyssavirus, a virus similar to rabies, which is fatal if contracted. To this end, supervisors are to be notified when bats are detected. Bats are to only be handled by experienced/trained and vaccinated ecologists using gloves and are to be stored in hung calico bags in a cool dark place. Similar species are to be kept together, as mixtures of bat species can lead to predation. No more than 5 bats are to be kept in a single large calico bag. Bats should only be released at dusk when other microbat activity is observed, or a bat soft release box can be installed in the relocation area and bats placed inside, allowing them to leave on their own. These bat soft release boxes should be checked in the morning to ensure all bats have self-relocated.

Handling microbats requires a greater level of feel of the bat and so lighter and thinner gloves are required. Puncture resistant/tear resistant nitrile gloves with thin gloves must be used when handling bats. In the event of a scratch or bite, the gloves must be checked for any breach to allow the handler to know that no exposure has occurred. A pen must be used to mark the glove where bite occurred, then remove and hold up to the light to see if glove was penetrated. In the event of penetration through gloves, the relevant person must immediately seek medical attention and obtain additional vaccination booster shots as required.

Bats are to be identified to species level, following inspection for injury. If normal locomotion cannot be achieved, the animal is to be taken to a vet that accepts microbats for further treatment/assessment.

4.3.6. Invertebrates

If any individuals of the Dural Land Snail are found, they must be kept dry and cool. This is simply achieved by placing them in a small jar, box or container with a few leaves or bark to shelter underneath. If more than two or three snails are found, then the additional snails are to be put into another container. They generally can survive for several days, especially if kept cool and dry if they need to be held for longer periods then this needs to be dealt on a case-by-case basis by a suitably qualified person.

4.4. Emergency Protocols (if required)

As identified throughout this FMP every precaution will be taken to pre-clear, catch and relocate, and avoid injuring any fauna. In the event of any fauna injury, the preferred course of action is to take the injured fauna to one of the nominated veterinary hospitals listed in ***Section 3.5.1.***

However, as advised by Council, the following emergency protocol is provided in unlikely event of catastrophic injury to prevent fauna from suffering a painful death during transport to a veterinary hospital.

Any individuals assessed as catastrophically injured such that they are deemed likely to suffer a painful death enroute to the vet are to be euthanised onsite quickly and humanely to alleviate suffering by the supervising ecologist. Any onsite euthanasia is considered to be an emergency last resort procedure and will be conducted in accordance with the objectives of the *Prevention of Cruelty to Animals Act 1979* whereby euthanasia is provided to the animal in a way that causes the animal to die quickly and without unnecessary pain.

4.5. Post Clearing Fauna Encounter Protocols

As required by the consent conditions, this section provides protocols for dealing with fauna (e.g. macropods) encountered within construction zones after vegetation clearing has taken place.

Although it is unlikely that fauna will be encountered in the construction zones after vegetation clearance has taken place, there is the potential for large, mobile species such as macropods (kangaroos and wallabies) to occur, most likely in transit between areas of habitat outside the clearing area.

If fauna are encountered, works should stop until the animal has left the construction zone. In the first instance, they should be encouraged to leave of their own accord by slowly approaching them. This should be undertaken very slowly, ensuring that the animal does not feel trapped by being pushed into an area from which there is no escape and that there is a large open area that the animal can retreat to. The animal should not be approached closer than 5 m in the first instance to avoid stressing the animal or incurring injuries if the animal becomes aggressive. No attempt should be made to capture the animal under any circumstances and they are not to be handled by any person other than the supervising ecologist or an appropriately trained and qualified ecologist. If the animal does not relocate voluntarily, or appears to be injured or sick, the supervising ecologist must be called to advise on further procedures. These will be as outlined in previous sections during clearing.

5. Reporting Requirements

The Project Ecologist or relevant fauna specialist is to provide the following reports to Council's Manager - Environment & Health and the clearing contractor prior to the commencement of the relevant activity:

- A pre-clearance letter itemising habitat features before works commence; and
- A clearance supervision report itemising the extent of habitat cleared as well as a full list of species encountered/relocated.

In addition, a Certification Report will be prepared for submission to Council two weeks prior to the commencement of works to certify that the primary pre-clearance surveys have been undertaken in accordance with requirements of this FMP. Further details of the reporting requirements are presented below.

5.1. Pre-clearing Survey Report

Weekly pre-clearing survey reports will be provided to Council following commencement of the project. These will identify and itemise the habitat features recorded from the Approved Works area as well as the type and number of species recorded and relocated.

It will be provided to Council's Manager - Environment & Health and the clearing contractor prior to clearing to ensure that the habitat features are known and to prevent any inadvertent impacts to these features during clearing. Each pre-clearing survey report will provide the following information as a minimum:

- Types of habitat features present (tree hollows, nest/drey, logs, roosting cavity etc);
- Location of habitat features;
- Number of potential salvage features;
- Any fauna encountered/observed; and
- Recommendations of additional mitigation measures (if required).

5.2. Clearing Supervision Report

As outlined previously, all vegetation clearing will be supervised by an ecologist in order to minimise impacts to native fauna species. Following the clearing and attendant supervision, a clearance supervision report will be prepared itemising the extent of habitat cleared as well as a full list of species encountered/relocated. Each clearing supervision report will provide the following information as a minimum:

- Name of species captured and relocated;
- Health of species captured;
- Location of release point within the fauna release area;
- Locations of any relocated habitat features;
- Total number of individuals relocated; and

- Details of any fauna were injured and required further care including reference/call sheet number for licenced wildlife carer organisation.

5.3. Powerful Owl Survey Reports

As required by the Conditions of Consent, monitoring reports are to be submitted to Council monthly following each targeted Powerful Owl survey and a map showing the location of roosting/nesting owls in relation to clearing/demolition works is to be included.

5.4. Certification Reports

As required by Condition 44 of Consent, certification by the Project Ecologist that all the works required to be undertaken prior to clearing have been undertaken in accordance with the measures specified in this FMP shall be submitted to Council's Manager – Environment & Health for endorsement two weeks prior to any works commencing. This report will certify that the pre-clearance survey, fauna relocation and installation of nest boxes have been undertaken strictly in accordance with this FMP and implemented in accordance with the approved timelines.

As required by Condition 100 of Consent and prior to issue of an occupation and/or subdivision certificate, a certification report will be submitted to Council's Manager – Environment & Health. This report will certify that the following measures have been undertaken in accordance with this FMP:

- Fauna Nest Boxes – Location plan and photographs of installed nest boxes; and
- Tree Removal & Fauna Protection – Details prepared by the Project Ecologist demonstrating compliance with Conditions 44 and 81 of Consent.

A copy of all preclearance reports issued to Council will also be issued to contractors.

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APPENDIX A :

Fauna Induction Fact Sheet

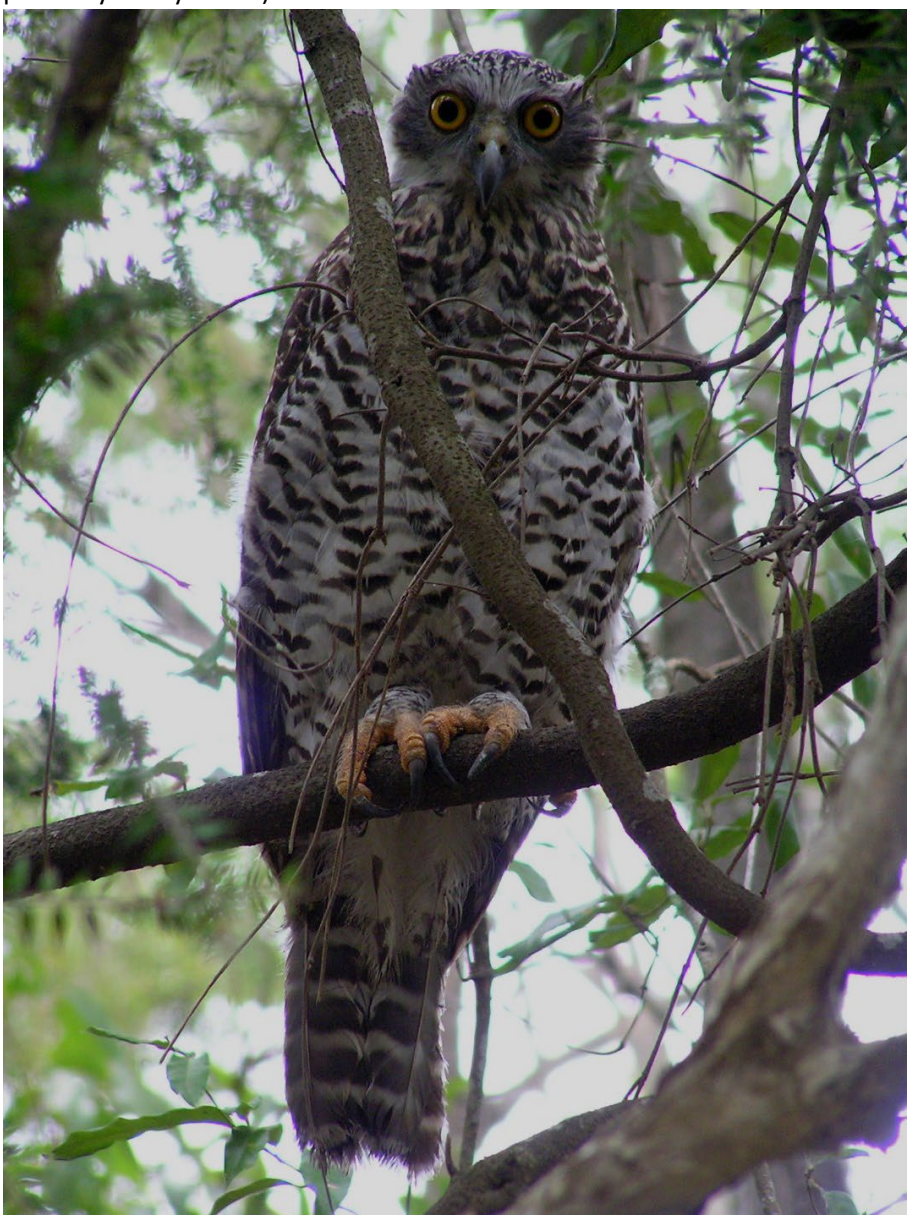
55 Coonara Avenue, West Pennant Hills (the Property): Induction Fact Sheet – Ecology

Environmental Values

The Property contains significant areas of high biodiversity values within and adjacent to the Demolition Footprint including, but not limited to the following:

- Threatened Ecological Communities: Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest (STIF).
- A known population of the endangered Dural Land Snail (Photo by Stephanie Clark)

- Roosting/Breeding habitat for an established breeding pair of Powerful Owls (Powerful Owl photo by Corey Mead)



- Roosting/Sheltering/Foraging habitat for a variety of native fauna, including (but not limited to) frogs, lizards, snakes, cockatoos, brush turkeys, possums, echidnas and microbats
- Habitat within the approved works area is a mix of natural (trees, groundcover vegetation, bush rock) and artificial (landscaped car parks)
- Exotic/Pest species such as Foxes and Black rats are also present within the Property and may occur within the approved works area.
- The property potentially supports various snake species, including venomous snakes such as the Red-bellied Black Snake or the Eastern Brown Snake
- Other species found on the site that may be problematic to contractors include, ticks, bull-ants, bees, wasps and spiders.

General Environmental Requirements

- All works are to be fully contained within demarcated/delineated work zones/work sites.
- The site is a smoke free environment. There is no smoking within the approved works areas.
- All rubbish to be placed in bins onsite.
- All machinery and equipment entering the site is to be clean of dirt and foreign material.
- Wash down areas should be set up to clean footwear prior to entering/leaving site
- Tree Protection Fencing requirements are to be strictly adhered to. Tree Protection Fencing must be installed and maintained in accordance with approved plans at all times
- Work zones can only be accessed once approval and a clearance report is received from Project Ecologist and/or Project Arborist.
- Any excavation within a tree protection zone for trees that are to be retained is to be completed under the supervision of the project Arborist.
- Only areas within the approved works area are to be accessed by personnel and equipment. Unauthorised personnel and equipment are not permitted to enter retained vegetation areas outside the approved works area;
- Machinery, tools & equipment that generate sparks or flames should not be used within 20m of barrier fencing to minimise the risk of bush fire ignition within the adjacent vegetation areas being retained.
- Any damage to barrier fencing is to be immediately reported and steps actioned to repair barrier fencing.
- All important fauna habitat within the works area will be identified during pre-clearing surveys and will be marked with flagging tape and/or spray paint of a specified colour. These features are not to be disturbed/removed without supervision by the ecologist.
- Fauna survey equipment (traps and surveillance cameras) will be deployed across the approved works areas. These are not to be disturbed/removed without supervision by fauna ecologist. If captures are incidentally observed within traps, the supervising ecologist is to be notified.
- Fauna are not to be disturbed and their occurrence is to reported to the supervising ecologist
- Only authorised/trained ecologists are to handle fauna. In the event of any unexpected fauna encounters, the supervising ecologist is to be notified immediately. All other personnel are to maintain a safe distance from fauna and allow it a clear path to self-relocate if it is attempting to do so.
- All personnel should be aware of locations of first aid kits/first aid stations. All first aid kits/stations should contain snake bandages in the event of a snake encounters.

Stop Work Procedures

The following stop work procedures must be followed when animals are encountered by clearing or demolition contractors, or spotted by the ecologist:

- Where an animal is encountered by a contractor:
    - If not in the vicinity of machinery or in close proximity to other works (e.g repair of fences) the supervising ecologist and Mirvac representative are to be notified but work not stopped. This is particularly relevant for sightings of bats, owls, frogs, echidnas, possums, snakes and larger lizards such as goannas;
    - If in the vicinity of a piece of machinery the supervising ecologist and Mirvac representative are to be notified, work stopped and bucket/other equipment lowered. Works are to cease until the fauna is captured by the supervising ecologist or ecologist gives the all clear in the event of fauna self-relocation;
    - If a snake is detected, stop works, notify the supervising ecologist and maintain safe distance (at least 7-10m);
- Where a contractor is bitten or scratched by an animal
    - Work in the vicinity is to be stopped;
    - Animal should be identified as accurately as possible in order to inform treatment;
    - Medical attention must be sought immediately. Some microbats carry Australian Bat Lyssavirus (ABLV) which is a virus similar to rabies that can be transmitted from bats to humans, causing serious illness;
- If the animal is spotted by ecologist:
    - The ecologist has the authority to advise machinery operating in close proximity to the animal to stop work and lower bucket. The contractor is to follow the direction of the supervising ecologist until the animal is captured and removed or has self-relocated.
    - Once captured, removed or has self relocated the supervising ecologist is the only person authorised to advise that work can recommence by that piece of machinery. All personnel must be well clear of the machinery prior to work recommencing and the contractor must always follow their safety management plan and Safe Work practices.

FIGURES

Legend

- The Property
- Concept Masterplan – Approved Works
- Demolition DA footprint – subject to separate FMP
- Asset Protection Zone
- Areas to be managed under a VMP (to be approved by Council)

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2023)
Dated: 18/01/2023

Data Source:
Sixmaps Clip and Ship (2022)
Spatial Services
NSW Department of
Finance and Services

cumberland ecology

I:\...\21108\Figures\RP7\20230209\Figure 1. Location

Figure 1. Location of the Property and Concept Masterplan DA areas

0 50 100 150 m

Legend

- The Property
- Concept Masterplan – Approved Works
- Demolition DA footprint – subject to separate FMP
- Areas to be managed under a VMP (to be approved by Council)
- Dural Land Snail Locations

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2023)
Dated: 18/01/2023

Data Source:
Sixmaps Clip and Ship (2022)
Spatial Services
NSW Department of
Finance and Services

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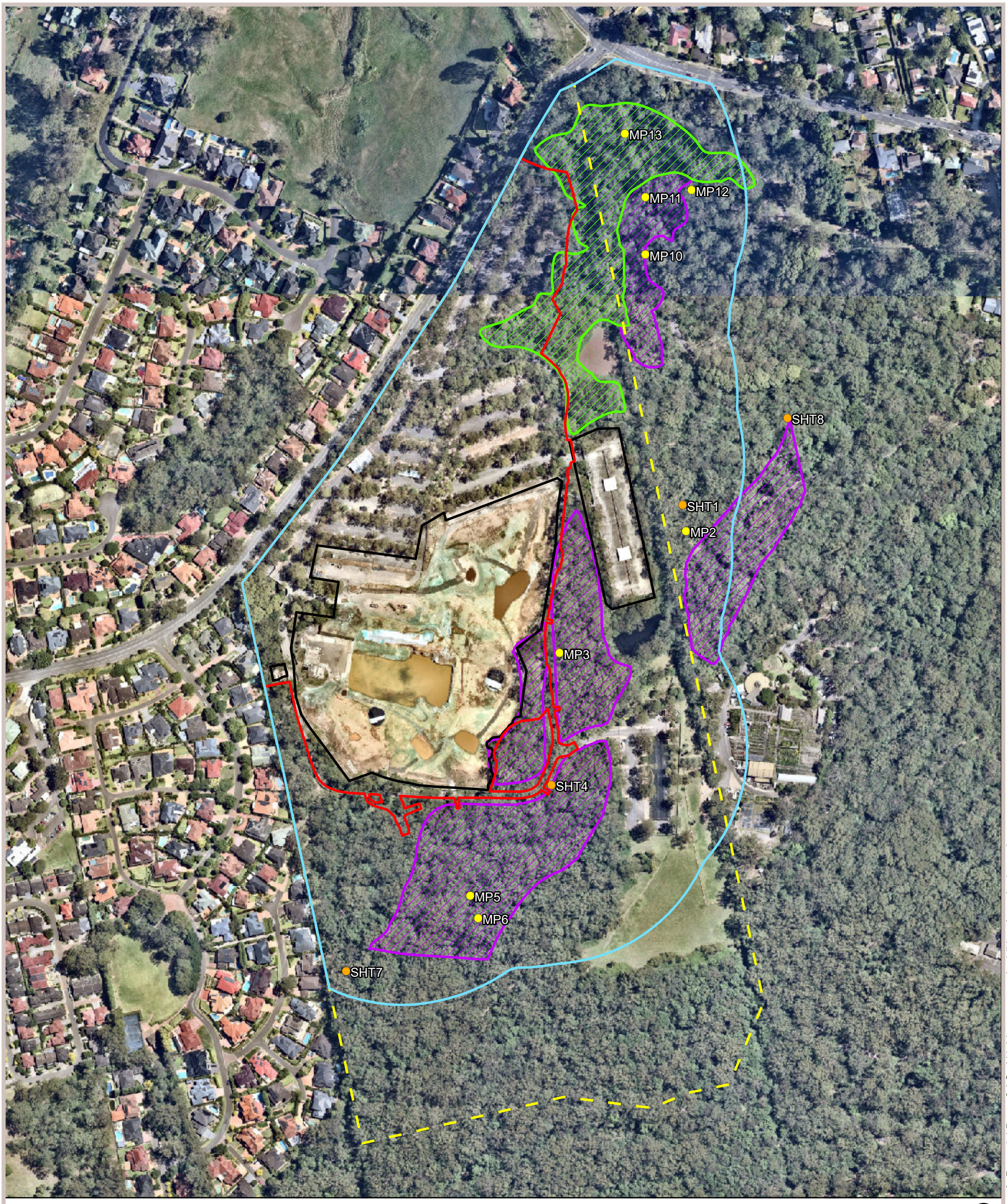
0 50 100 m

I:\...\21108\Figures\RP7\20230209\Figure 2. Location of Dural Land Snail recordings

Figure 2. Location of Dural Land Snail recordings within the Property and adjacent Cumberland State Forest



Legend

- The Property
- Concept Masterplan – Approved Works
- Demolition DA footprint – subject to separate FMP
- Concept Masterplan 150 m Buffer
- Suitable Roosting Habitat Areas
- Lantana/Privet understorey – sub-optimal roosting habitat
- Monitoring Point (MP)
- Significant Habitat Tree (SHT)

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2023)
Dated: 18/01/2023

Data Source:
Sixmaps Clip and Ship (2022)
Spatial Services
NSW Department of
Finance and Services

cumberland ecology

0 50 100 m

I:\...\21108\Figures\RP7\20230209\Figure 3. Potential Powerful Owl Habitat trees and additional monitoring points

Figure 3. Potential Powerful Owl Habitat trees and additional monitoring points out to 150m from the Concept Masterplan DA Footprint

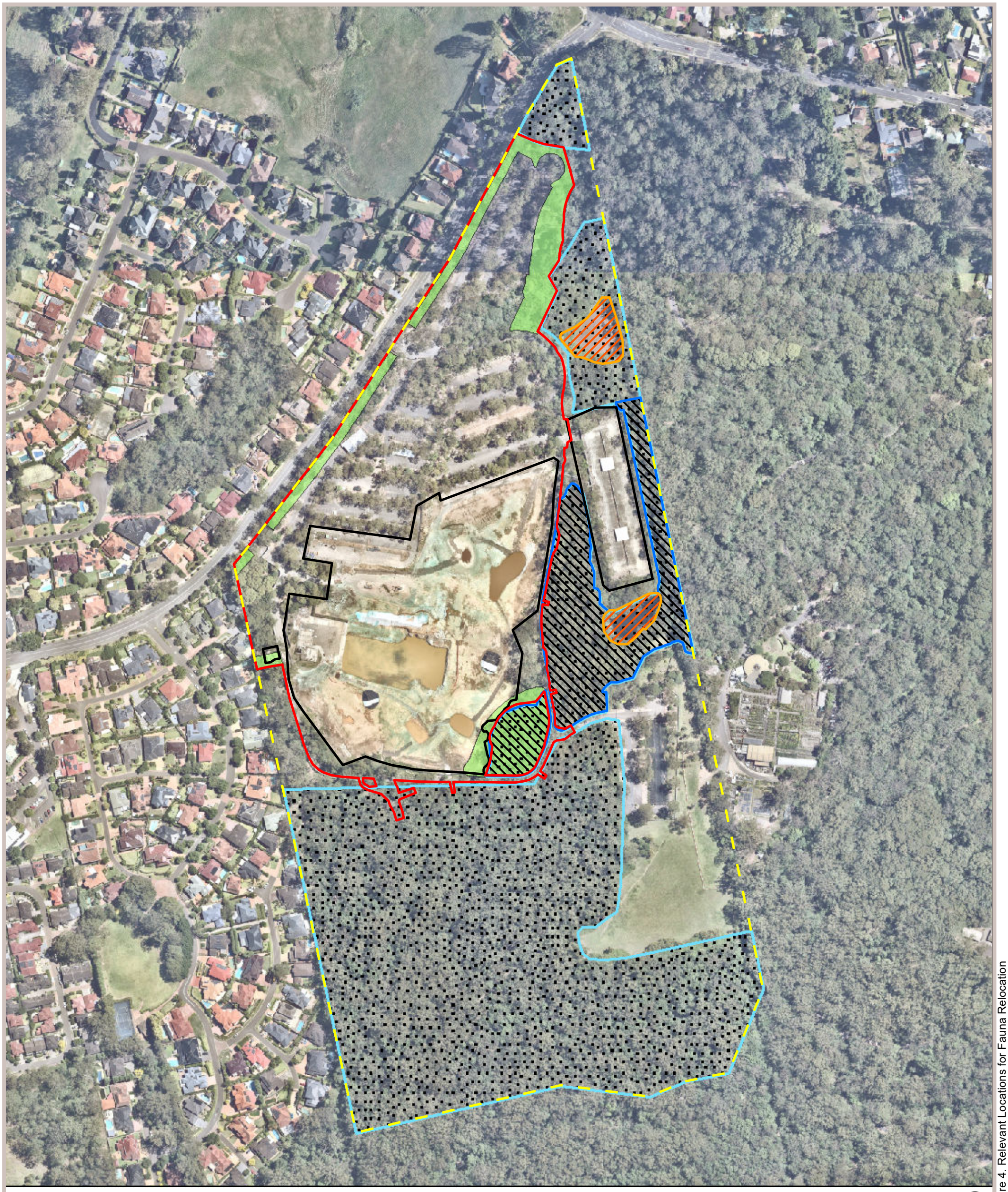


Figure 4. Relevant Locations for Fauna Relocation