Transport for NSW

Freemans Drive, Freemans Waterhole, Slope Remediation

Minor works review of environmental factors

February 2024

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which Main Road (MR) 220 Freemans Drive, Slope Remediation is proposed.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.

MW REF approval and authorisation

Approved by	Michael Coyte, Project / Contract Manager
Signed	
Date	01.02.2024

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1. Introduction

The purpose of the Minor Works review of environmental factors (REF) is to describe the proposal, to document the likely impacts of the proposal on the environment, to detail mitigation measures to be implemented and to determine whether or not the proposal can proceed. For the purposes of this work Transport for NSW (Transport) is the proponent and determining authority under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The description of the proposed works and assessment of associated environmental impacts has been undertaken in the context of section 171 of the *Environmental Planning and Assessment Regulation 2021,* Guidelines for Division 5.1 Assessments (DPE, 2022), the *Biodiversity Conservation Act 2016 (NSW)* (BC Act), the *Fisheries Management Act 1994* (FM Act) and the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)* (EPBC Act).

In doing so the REF helps to fulfil the requirements of section 5.5 of the EP&A Act including that Transport examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The potential for the proposal to significantly impact a matter of national environmental significance, including nationally listed threatened biodiversity matters, or the environment of Commonwealth land. Where a significant impact is considered likely on nationally listed biodiversity matters, either the proposal must be reconsidered or a Project REF must be prepared.

2. The proposal

2.1 Description

2.1.1 Proposal location details

Table 2-1: Proposal location details

Location details	
Title	MR220 Freemans Drive, Freemans Waterhole, Slope Remediation Minor Works Review of Environmental Factors
File number	A50209994
Road name and number	MR220 Freemans Drive, MR220
Closest crossroad(s)	Palmers Road (1.9km south of proposal)
Chainage of works	Segment 7610, MR220 Freemans Drive
Local government area	Lake Macquarie City Council
Transport for NSW region	North Region

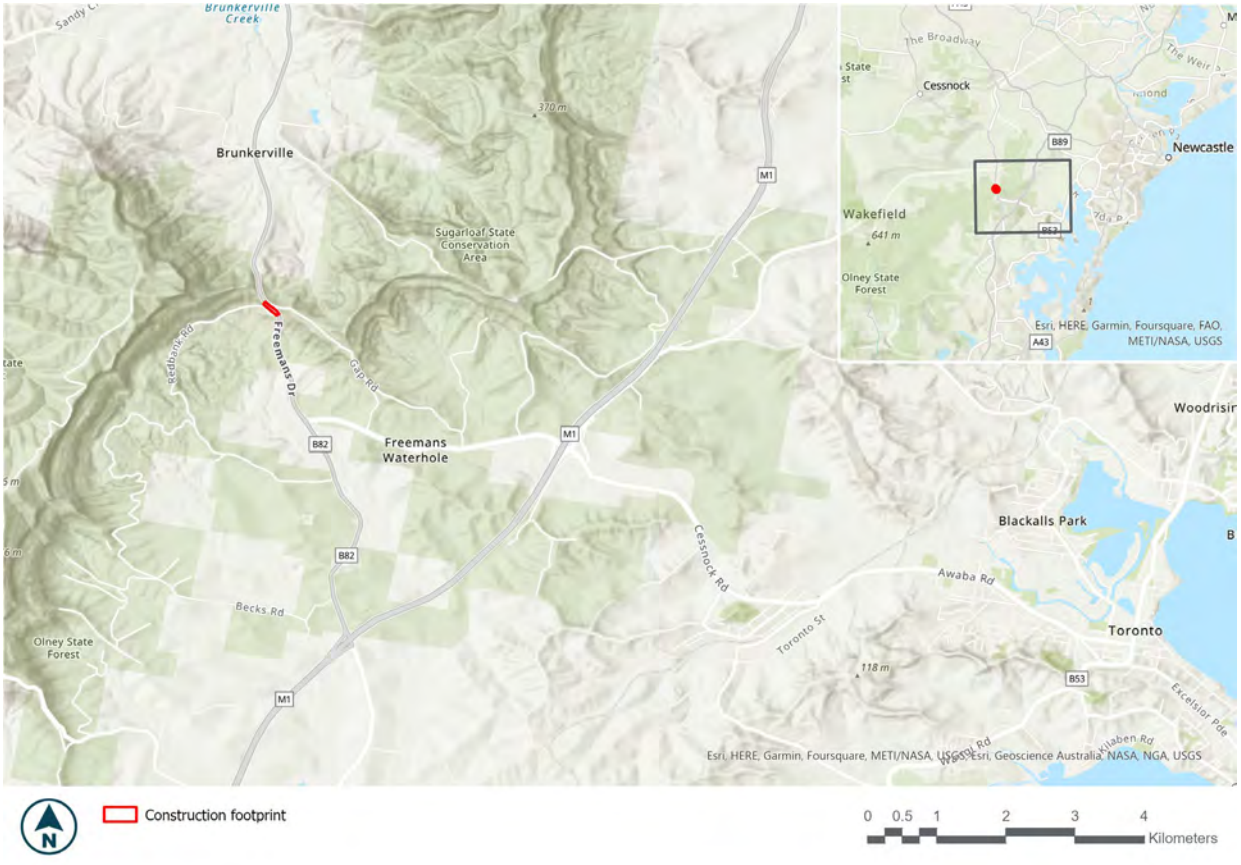

Figure 2-1: Location of proposal

2.1.2 Proposal description

Transport proposes to remediate Slope 15094 on MR220 Freemans Drive about 1.9 kilometres north of Freemans Waterhole in the Lake Macquarie local government area (the proposal). The location of the proposal is shown in Figure 2-1. The initial slope failure encompasses a 50 metre long stretch of the downslope embankment, adjacent to the northbound lane. The failure was caused by water infiltrating through cracked road pavement and dislodged drainage lines, creating instability and causing the toe of the embankment to fail. If left as is, water infiltration will likely result in further slope failure. The proposal includes the direct impact area of the construction footprint located at the slope failure site and ancillary area including the locations of two site compounds and a stockpile site (referred to collectively as the proposal site).

The proposed construction footprint has been extended on either side of the failure to include further areas that are at risk of slope failure. The construction footprint is 150 -200 metres long and extends from the eastern side of MR220 Freemans Drive to the end of the existing northbound guardrail. The construction footprint comprising of an area of about 14,800 square metres. A temporary access track is proposed within the construction footprint from MR220 Freemans Drive to the base of the slope, to provide access for construction plant and equipment if required. The design for the proposal is shown in Figure 2-2, Figure 2-4 and Figure 2-5, while and the construction footprint is shown in Figure 2-3.

Key features of the proposal include:

- Tree and vegetation removal that would include night works with a full road closure / detour over a period of up to two weeks. Tree roots would be left in the ground and poisoned to reduce regrowth.
- The establishment of a temporary access track including placement of rock to form a ramp from MR220 Freemans Drive and along the toe of the slope. Access track rock would be reused onsite for scour protection following the proposal's completion
- Installation of a threaded rod anchor nail
- Installation of small diameter micropiles a max 2000mm spacing, pouring of no fines concrete blinding layer and pouring a capping beam above the binding layer to support guardrailing with no fines backfill
- Embankment treatment using grouted soil nails to reinforce the slope, accompanied by a flexible reinforced geo-mat laid over the slope face
- Drilling of sub-horizontal drains into the embankment
- Shotcrete treatment where drainage lines traverse down the embankment
- Establishment of a new kerb and barrier
- Upgrade of two existing subsurface drainage lines including repair of existing pipes, replacement of headwalls, placement of shotcrete below outlet and and placement of rock filled matresses at the toe of the batter
- Shotcrete treatment at the southern end of the works where the kerb tails out
- Road pavement repairs on northbound lane
- The use of ancillary areas for a site compound and stockpiling activities

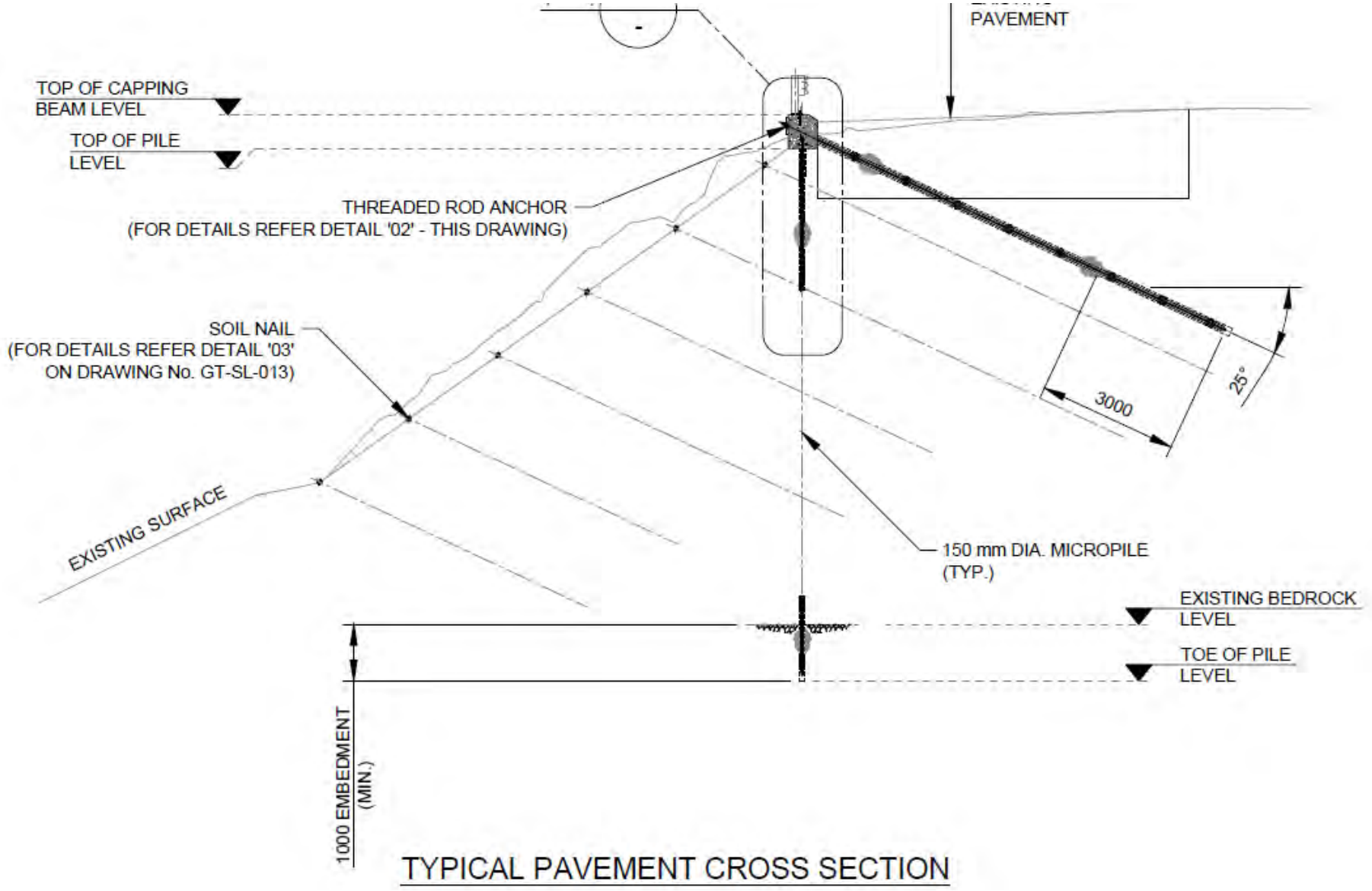

Figure 2-2: Proposal typical cross section

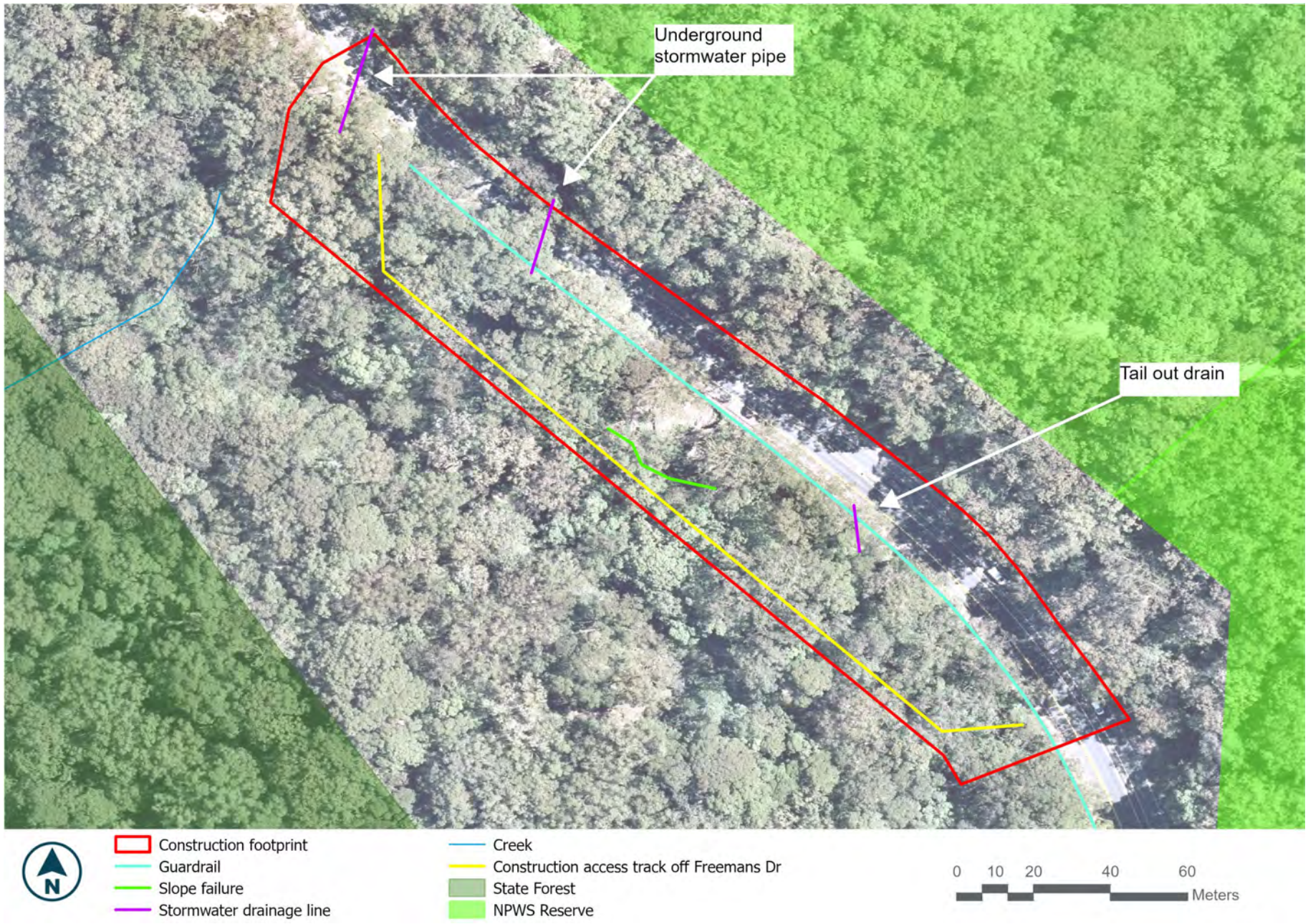

Figure 2-3: Proposal site

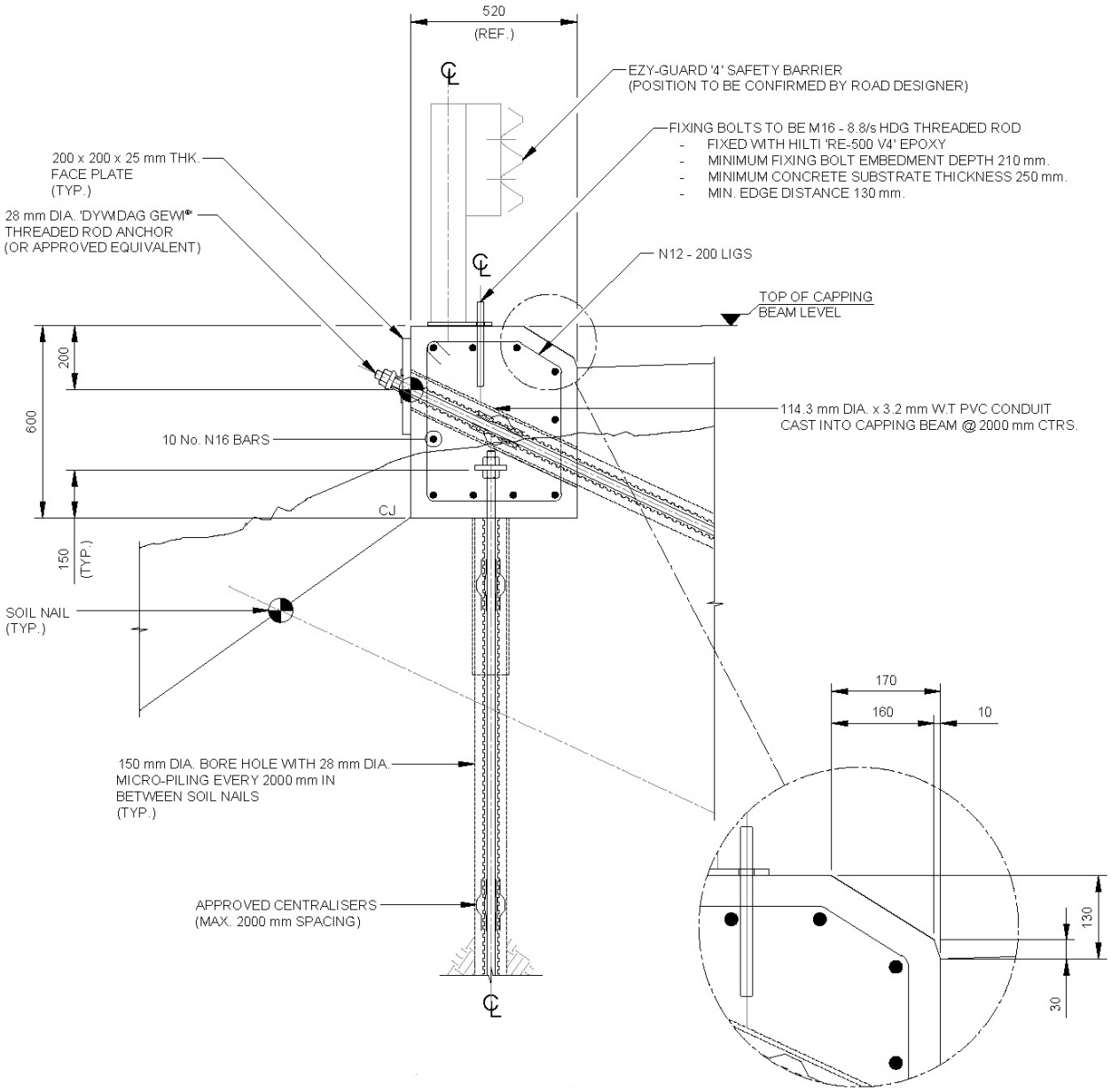

Figure 2-4: Micro pile details

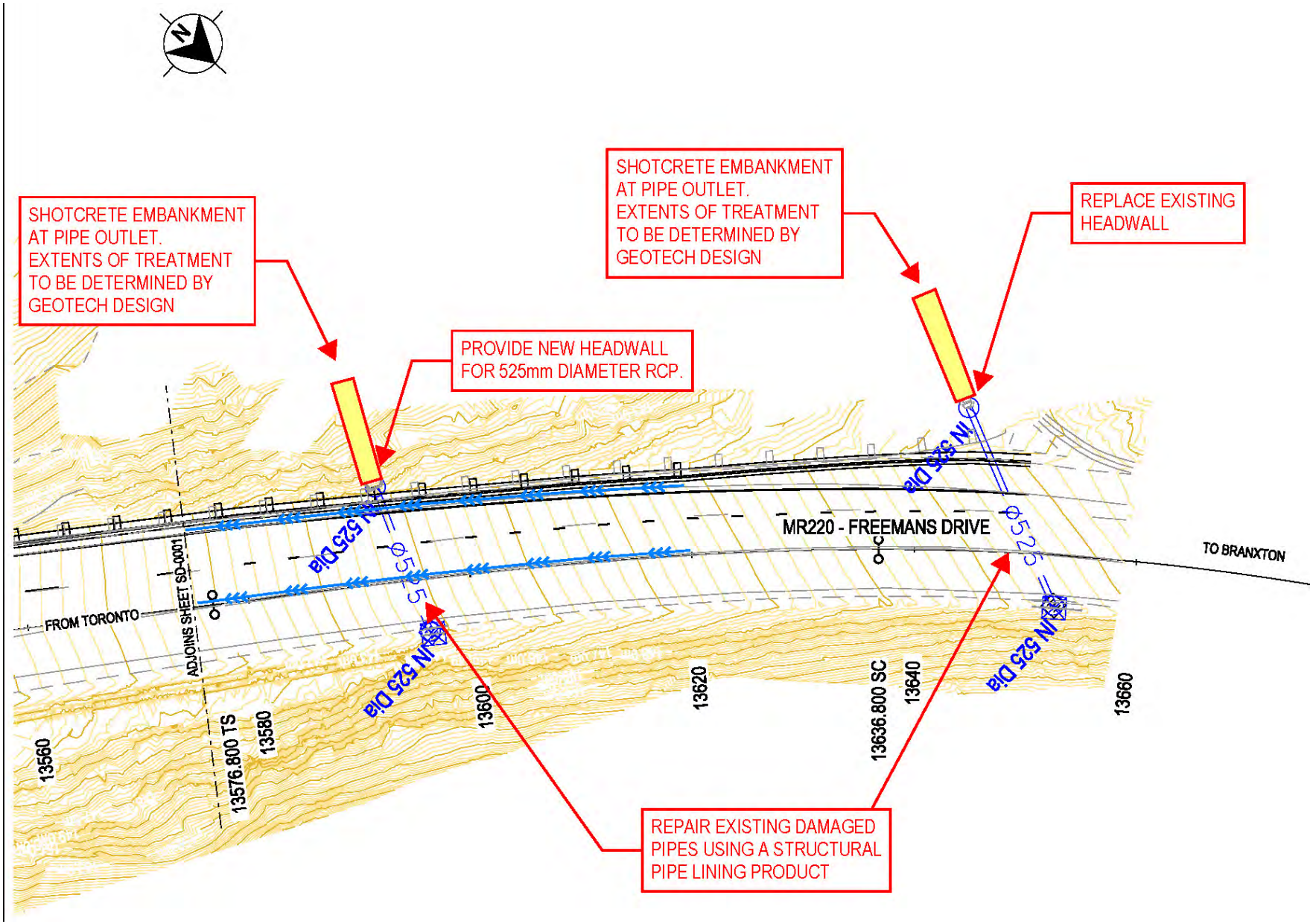

Figure 2-5: Existing cross drainage – to be upgraded

Work methodology

The proposal is anticipated to involve the following work methodology:

- Implement traffic and environmental control measures
- Clear vegetation and remove loose materials along the embankment
    - Trim vegetation to ground level and remove trimmed vegetation, existing accumulated leaf litter and any small and fallen trees from the slope treatment area
    - Remove large canopy trees which occur in the area of proposed soil nails (poison root structure left in ground)
    - Remove loose soil and surface rock from slope to expose embankment. Larger rocks embedded in the embankment would be retained with geo-mat to be shaped around or over these larger rocks. Soil nail layout would be adjusted so that soil nails are drilled through larger embedded rock
- Install road drainage pipe extensions, fibreglass sleeving and headwalls.This would be carried out from the road and involve a partial road closure, with the existing pipes being retained within the ground
- If required, from Freemans Drive establish a temporary access track down the embankment to the bottom of the slope with gabion rock
- Spread and place loose soil to reshape embankment and compact with excavator bucket
- Drill micropiles into embankment and install micropiles, install anchor nail, place no-fines concrete blinding layer, install the capping beam and connect anchor nail to the capping beam with plates
- Place spoil from micropiles onto embankment and spread and compact with excavator bucket
- Progressively fill or trim embankment
- Lay reinforced geo-mat down embankment and pin at the top
- Drill and install soil / rock nails, (refer to Figure 2-2)
- Place minimial spoil from drilling works onto embankment and compact with excavator bucket
- Install horizontal drains into embankment with locations to be confirmed by site geologist / geotechnical engineer
- Clean the drill holes free of loose material by flushing with air, install soil nail material and grout fill. Place and tension fixtures including base plates to reinforced geo-mat
- Spray embakment drainage with shotcrete and install rock at the toe of drainage lines
- Hydroseed the embankment for face vegetation Install guardrail (fastening to capping beam)
- Road pavement repairs on northbound lane
- Site de-establishment and rehabilitation of disturbed areas

Spoil and asphalt quantities

Spoil from the proposed micro piling and capping beam is indicatively expected to produce about 200 cubic metres (370-400 tonnes of spoil) while soil nailing is expected to produce about 450 cubic metres (800-900 tonnes) of spoil. Where possible, beneficial re-use of this material from the proposal will be investigated.

An estimated 500-750 cubic metres (1800-2000 tonnes) of asphalt millings is expected to be required.

Plant and equipment

The equipment and machinery to be used includes:

- Small and medium size excavators with buckets and drilling equipment
- Soil/rock nail drilling rig which is a small rig on rubber tracks

- Knuckle boom sled nailing platform
- Six wheel dump trucks
- Concrete delivery trucks and concrete pumps
- Elevated work platforms and booms
- Chainsaws, vegetation mulchers
- Tip trucks
- Light vehicles
- Mobile crane
- Traffic control equipment
- Telehandler and franna cranes may be required.

Working hours

Work would be carried out during the following working hours:

- 7am to 6pm Monday to Friday
- 8am to 4pm Saturdays
- 6pm to 7am night works, Monday to Friday
- No works on Sundays and Public Holidays.

Night works are required for tree removal where a large crane will need to occupy both lanes necessitating a full road closure and detour. This is expected to take two weeks. Implementing the full road closure at night would avoid periods where traffic volumes are highest and therefore impact fewer road users. Extended works on Saturday have been proposed should site conditions change (e.g. further deterioration in the slope) requiring works to be expediated. It is anticipated that the majority of construction works would be undertaken during standard working hours.

2.1.3 Proposal objectives

The objectives of the proposal are to:

- Stabilise the slopes of the road embankments along MR220, Freemans Drive
- Improve safety for motorists using the MR220, Freemans Drive
- Minimise long-term environmental and social impacts
- Minimise disruptions to road users and the community

2.1.4 Ancillary facilities

Table 2-2: Ancillary facilities

Ancillary facilities		
Will the proposal require the use or installation of a compound site? Up to two compound facilities would be required for the proposal. Site compound No.1 is an existing hardstand area located about two kilometres south of the proposal on the western shoulder of MR220 Freemans Drive. It has an area of about 800 square metres and would be used for worker amenities and some storage. No tree removal is proposed. Site compound No.1 is shown in Figure 2-6. Site compound No. 2 is an existing hardstand area located approximately 200 metres north of the proposal on the western shoulder of Freemans Drive. It has an area of about 200 square metres and would be used for a worker amenities and some storage. No tree removal is proposed. Site compound No. 2 is shown in Figure 2-7.	Yes ☒	No ☐
Will the proposal require the use or installation of a stockpile site? One stockpile site facility would be required for the proposal and would be used in accordance with the Stockpile Site Management Guideline (EMS-TG-10). The proposed stockpile site is an existing Transport for NSW stockpile site located about two kilometres south of the proposal adjacent to the southern side of Palmers Road. It has an area of approximately 500 square metres and would be used, if required, to temporarily stockpile any additional soil not utilised in the proposal. Shown in Figure 2-6.	Yes ☒	No ☐
Are any other ancillary facilities required (e.g., temporary plants, parking areas, access tracks)? A temporary access track is required within the construction footprint off Freemans Drive, along the base of the slope, to provide access for construction vehicles, plant and equipment. The indicative location of this access track is shown above in Figure 2-3.	Yes ☒	No ☐

Figure 2-6: Compound Site No.1 and Stockpile Site (locations are indicative only)

Figure 2-7: Compound Site No.2 (location is indicative only)

2.1.5 Proposed date of commencement

The indicative date for the commencement of the proposal 3rd / 4th quarter 2024.

2.1.6 Estimated length of construction period

Weather permitting, the anticipated duration for the proposal would be approximately five to eight months.

2.2 Need and options

2.2.1 Options considered

The options considered for the proposal included:

- Option 1: Do nothing
- Option 2: Stabilise slopes with soil and rock nails, flexible reinforced geo-mat and shotcrete drainage batter chutes
- Option 3: Support of the embankment by an anchored contigious pile wall and steel sheet pile.
- Option 4 – Fill the embankment with rock and resurface road pavement
- Option 5 - Stabilise slopes with soil and rock nails, and apply shotcrete over the entire embankment

Option 1 would not impose any environmental impacts from construction activities; however, it would not address the objectives of the proposal and the current safety risks to the road corridor, traffic impacts and the existing condition of the slope would continue to worsen.

Option 2 would involve further disturbance of the subject slope, including tree removal and establishment of a temporary access track to the toe of the slope. This option would address the safety risk to the road corridor and can be delivered within a relatively short timeframe minimising s road closures and detours.

Option 3 would have a smaller footprint compared to Option 2 and would require fewer trees to be removed. It would provide a rigid barrier against further slope movement and would have lower ongoing maintenance and inspection requirements. This option would have a substantially longer construction program and greater traffic impacts with longer duration road closures. Construction of this option would be more complex with greater construction risk due to the need place heavier construction plant on the unstable slope for longer periods.

Option 4 would not address the geotechnical challenges the site has slide plane analysis and drainage issues. This option would not achieve the long-term factor of safety requirements and would likely result in future maintenance causing more road corridor safety risk and traffic impacts.

Option 5 is considered the most expensive and time consuming with little engineering benefit. Installing a full shotcrete finish would increase traffic impacts during construction as the construction program would double increasing cost. This option offers nil visual amenity with the completed works.

The preferred option is Option 2 as it is less complex and has fewer constructability risks when compared to Option 3, 4 & 5. Drilling the soil nails can be carried out from the top of the embankment within the current closed northbound lane or at the toe minimising disruption to traffic on MR220 Freemans Drive during construction and reducing the need to operate heavy pilling equipment from the top of the unstable slope. The geo-mat to be used as part of Option 2 would also allow vegetation to grow on the slope over time and this would reduce runoff velocities, increase visual amenity, water infiltration and reduce discharge. While Option 2 has a larger construction footprint and affects more trees, management measures are proposed to address identified impacts and native vegetation removal would be offset to ensure no net loss of biodiversity values consistent with the No net loss guidelines (Transport for NSW, 2022) and Tree and hollow replacement guidelines (Transport for NSW, 2022).

2.2.2 Justification for the proposal

The subject slope has failed due to a combination of wear and tear and the damage that occurred during the June 2022 severe weather event and subsequent weather events. The slope requires a permanent remediation solution to address the failure and restore usual traffic operations on MR220 Freemans Drive (the northbound climbing lane currently being closed to traffic).

Although the immediate slope failure is about 50 metres in length, the overall embankment for Slope 15094 is showing signs of movement which has contributed to the slope remediation works increasing to 200 m.

The proposal would improve safety conditions for motorists using MR220 Freemans Drive and address delays associated with the current closure of the northbound climbing lane. While the proposal would involve impacts to the surrounding environment, including vegetation clearing and soil disturbance, the potential environmental impacts of the proposal have been identified as relatively minor and can be addressed by safeguards and offsets. On balance, the benefits derived from proceeding with the proposal outweigh the potential impacts.

2.3 Statutory and planning framework

2.3.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (Transport and Infrastructure)) aims to facilitate the effective delivery of infrastructure across the state, including for roads and road infrastructure facilities. Section 2.109 of the SEPP (Transport and Infrastructure) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is appropriately characterised as development for the purposes of a road or road infrastructure facilities and is to be carried out by or on behalf of Transport, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Resilience and Hazards) 2021, State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021, State Environmental Planning Policy (Precincts – Central River City) 2021, State Environmental Planning Policy (Precincts – Western Parkland City) 2021, State Environmental Planning Policy (Precincts – Regional) 2021 or State Environmental Planning Policy (Planning Systems) 2021.

2.3.2 Other relevant legislation and environmental planning instruments

State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity SEPP) includes the koala habitat protection provisions of the now repealed State Environmental Planning Policy (Koala Habitat Protection) 2021. These provisions aim to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. The Biodiversity SEPP applies to a range of local government areas, including Lake Macquarie. The koala habitat protection provisions of the Biodiversity SEPP apply more directly to development applications under Part 4 of the EP&A Act; however Transport's practice is to consider these provisions for Part 5 assessments.

Within the construction footprint, the following koala habitat use trees are present: Sydney Blue Gum, Rough-barked Apple, Smooth- barked Apple, White Mahogany, Grey Gum, Turpentine and Forest Oak. No Koala Plan of Management exists for the locality and no evidence (i.e., sightings, calls, scats etc.) suggests the construction footprint supports a resident Koala population. The construction footprint is not considered to constitute Core Koala habitat within the meaning of the Biodiversity SEPP.

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is directed at maintaining a healthy, productive and resilient environment consistent with the principles of ecologically sustainable development (ESD). The BC Act sets out the assessment framework for threatened species and ecological communities. Certain species of animals or plants are identified as endangered species, populations or communities or vulnerable species under the Act. Areas of land comprising the habitats of listed endangered species may also be declared critical habitat under the Act.

Activities that are likely to have a significant impact on listed threatened species, populations, endangered ecological communities or their habitats must be the subject of a species impact statement and require the concurrence of the Secretary of the Department of Planning and Environment. This is unless the activity is a project to which Division 5.2 of the EP&A Act applies.

Potential impacts on flora and fauna and threatened communities as a result of the proposal are discussed in Section 3.7 of this Minor Works REF.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the NSW Environment Protection Authority (EPA). It provides an integrated system of licences to set out protection of the environment policies and to adopt more innovative approaches to reduce pollution in the environment, having regard to the need to maintain ecologically sustainable development (ESD). Measures to address potential pollution as a result of the proposal have been prescribed in this Minor Works REF and are included in Sections 3.1 and 3.2.

The POEO Act requires an Environmental Protection Licence (EPL) for scheduled development work and the carrying out of scheduled activities. The proposal does not involve undertaking a scheduled activity and therefore an EPL would not be required.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

Section 199 of the *Fisheries Management Act 1994* provides that:

(1) A public authority (other than a local government authority) must, before it carries out or authorises the carrying out of dredging or reclamation work:

(a) give the Minister written notice of the proposed work, and

(b) consider any matters concerning the proposed work that are raised by the Minister within 21 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority).

Section 219 of the *Fisheries Management Act 1994* includes a prohibition on the blocking of fish passage. A permit is required from Department of Primary Industries (DPI) if a proposal would permanently or temporarily block fish passage.

Notice under Section 199 and a permit under section 219 is typically only required in relation to mapped Key Fish Habitat. The proposal does not encroach Key Fish Habitat, the nearest being Lords Creek (about 650 metres to the south-west), and therefore notification to DPI is not required.

Heritage Act 1977

The *Heritage Act 1977* provides for the conservation of buildings, work, relics and places that are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the State.

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. Section 139(4) of the *Heritage Act 1977* makes provision for the issuing of an exception in certain prescribed circumstances. An excavation permit would not be required for the proposal.

National Parks and Wildlife Act 1974

The proposal is not located within land reserved under the *National Parks and Wildlife Act 1979*; however, it is located adjacent to the Sugarloaf State Conservation Area which is managed by National Parks and Wildlife Service. The Sugarloaf State Conservation Area is to the immediate east of the proposal footprint, as can be seen in Figure 2-3. The proposal is located downslope from the Sugarloaf State Conservation Area and indirect impacts on the area are not anticipated.

The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the *National Parks and Wildlife Act 1979*. Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

The potential impacts and relevant safeguards are discussed further in Section 3.5. No permits under the *National Parks and Wildlife Act 1979* are required for the proposal.

Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Section 4.2.

A referral is not required for proposed road activities that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

The assessment of the proposal's impact, on matters of national environmental significance and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water under the EPBC Act.

2.4 Community and agency consultation

2.4.1 SEPP (Transport and Infrastructure) consultation

Part 2.2 of the SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This is detailed below:

Table 2-3: Consultation required with Council

Is consultation with Council required under sections 2.10 - 2.12 and 2.14 of the SEPP (Transport and Infrastructure)?		
Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	Yes ☐	No ☒
Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	Yes ☐	No ☒
Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	Yes ☐	No ☒
Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	Yes ☐	No ☒
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	Yes ☐	No ☒
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes ☐	No ☒
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works?	Yes ☐	No ☒
Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land? Note: See interactive map at Coastal management - (nsw.gov.au). Note the coastal vulnerability area has not yet been mapped. Note: a certified coastal zone management plan is taken to be a certified coastal management program.	Yes ☐	No ☒

Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent? Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the Floodplain Development Manual: the management of flood liable land (nsw.gov.au).	Yes ☐	No ☒

Table 2-4: Consultation with other public authorities

Is consultation with a public authority (other than Council) required under sections 2.13, 2.15 and 2.16 of the SEPP (Transport and Infrastructure)?		
Are the works located on flood liable land? (to any extent) (SEPP (Transport and Infrastructure) s2.13) If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the Floodplain Development Manual: the management of flood liable land (nsw.gov.au).	Yes ☐	No ☒
Are the works adjacent to a national park, nature reserve or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act? The proposal is adjacent to the Sugarloaf State Conservation Area. Consultation with the National Parks and Wildlife Service has occurred in relation to the proposal (refer to Section 2.4 and the correspondence in Appendix C). The recommendations in Developments adjacent to NPWS lands: Guidelines for consent and planning authorities (as relevant to the proposal) are considered in Appendix E.	Yes ☒	No ☐
Are the works on land in Zone C1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	Yes ☐	No ☒
Do the works include a fixed or floating structure in or over navigable waters?	Yes ☐	No ☒
Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?	Yes ☐	No ☒
Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	Yes ☐	No ☒
Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	Yes ☐	No ☒
Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	Yes ☐	No ☒

Table 2-5: Notification of council and occupiers of adjoining land

Do Council and occupiers of adjoining land need to be notified under section 2.110 of the SEPP (Transport and Infrastructure)?		
Does the proposal include a car park intended for the use by commuters using regular bus services?	Yes ☐	No ☒
Does the proposal include a bus depot?	Yes ☐	No ☒

Does the proposal include a permanent road maintenance depot or associated infrastructure, such as garages, sheds, tool houses, storage yards, training facilities and workers amenities?	Yes ☐	No ☒

2.4.2 Other agency and community consultation

Stakeholder consultation will be carried out prior to construction works to ensure key stakeholders are informed of the work schedule, changed traffic conditions and road closures. Community notifications would be distributed to residents and businesses who may be impacted by noise, changed traffic conditions and road closures. These notifications would also provide details about the detour arrangements during the road closures. Noting that night works road closures and a detour is proposed over a period of up to two weeks, pre-work letterbox drops at Brunkerville and at the Freemans Springs Caravan Park are proposed. Nearby businesses (including the nearby service stations) and emergency services will also be notified.

Notice will also be provided to road users via advance Variable Message Sign notifications on MR220 Freemans Drive in approach to the proposal site. Preconstruction Notification will also be provided to Lake Macquarie Council by Transport.

Bus operators and the freight network would be consulted about changed traffic conditions and detour arrangements.

3. Environmental assessment

This section provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021.

The matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) are also considered in section 4. Site-specific safeguards are provided to ameliorate the identified potential impacts.

3.1 Soil

Table 3-1: Soil

Description of existing environmental and potential impacts		
Are there any known occurrences of salinity or acid sulfate soils in the area? Department of Planning and Environment acid sulfate soil risk mapping does not identify any of the proposal footprint as having a risk of acid sulfate soil occurrence. Reference to SEED data (NSW State-wide Hydrogeological Landscapes 2020 (First Edition)) indicates the proposal footprint has a very low overall salinity hazard.	Yes ☐	No ☒
Does the proposal involve the disturbance of large areas (e.g., >2ha) for earthworks? The proposal would require the disturbance of existing roadside slopes. The area of potential disturbance (and the basis for the assessment in this REF) at the site is about 1.5 hectares. Areas of the proposal would be progressively rehabilitated throughout construction to minimise the amount of soil exposed at any one time.	Yes ☐	No ☒
Does the site have constraints for erosion and sedimentation controls such as steep gradients or narrow corridors? The proposal site is constrained by steep slopes and the proximity of the MR220 Freemans Drive travel lanes. Effective erosion and sediment controls can still be implemented across the gradient and at the base of the slope, and in any other areas as required, to avoid or minimise any potential impacts to soils. Controls will also be installed at the compound and stockpile sites to reduce the risk of sediment transport off site. There are no identified constraints to the implementation of controls at these locations.	Yes ☒	No ☐
Are there any sensitive receiving environments that are located in or nearby the likely proposal area or that would likely receive stormwater discharge from the proposal? Sensitive receiving environments include (but are not limited to) wetlands, state forests, national parks, nature reserves, rainforests, drinking water catchments). There are no wetlands, national parks, rainforests or drinking water catchments within or adjacent to the proposal footprints. However, the proposal is located adjacent to the Sugarloaf State Conservation Area and the Heaton State Forest. Sugarloaf State Conservation Area is located upslope and on the opposite side of MR220 Freemans Drive from the proposal site. Heaton State Forest is located approximately 60-100 metres downslope from the proposal site to the west of the MR220 Freemans Drive road reserve. In the absence of appropriate controls, polluted stormwater could be released from the site into downstream waterways. The proposed safeguards in this section and Section 3.2 would address water quality risks during construction.	Yes ☒	No ☐
Is there any evidence within or nearby the likely footprint of potential contamination?	Yes ☐	No ☒

A search (16 June 2023) of the NSW Environment Protection Authority (EPA) contaminated land record of notices for the Lake Macquarie City and Cessnock local government areas returned no records near the proposal site. A search of the list of NSW contaminated sites notified to EPA (16 June 2023) also returned no records near the proposal site. Current and former land use (road reserve, bushland) at the proposal locations does not indicate the potential for land contamination.		
Is the likely proposal footprint in or nearby highly sloping landform? The construction footprint is a steep roadside slope that require stabilisation. The compound and stockpile sites are relatively flat.	Yes ☒	No ☐
Is the proposal likely to result in more than 2.5ha (area) of exposed soil? The total area for disturbance across the sites is less than 1.5 hectares.	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

ES1	Erosion and sediment control measures are to be implemented and maintained to: • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site (In accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)).
ES2	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.
ES3	Erosion and sediment control measures are not to be removed until the work is complete, and areas stabilised.
ES4	A progressive erosion and sediment control plan is to be prepared for the works by the Contractor or Contractors engaged for the works. The erosion and sediment control plan is to be developed in accordance with Bluebook principles.
ES5	Parking of vehicles and storage of plant/equipment is to occur only within the designated proposal footprints or at nominated ancillary sites.
ES6	Existing ground cover vegetation will be retained to the greatest extent possible to minimise the area of exposed soils.
ES7	The use of established stockpile sites is to be in accordance with the Roads and Maritime Services Stockpile Site Management Guideline (EMS-TG-10).
ES8	Upslope diversions will be used to direct runoff away from the proposal site to minimise the potential for surface flow to mobilise sediment or other pollutants.
ES9	If suspected contamination is identified all work would cease and the Transport for NSW Project Manager contacted immediately.

3.2 Waterways and water quality

Table 3-2: Waterways and water quality

Description of existing environmental and potential impacts		
Is the proposal located within, adjacent to or near a waterway? The proposal is located about 15 metres upslope of a nearby unnamed tributary of Lords Creek (a non-perennial watercourse), which flows into Lake Macquarie via Dora Creek (refer to Figure 2-3). The slope remediation works is expected to stabilise and minimise further erosion of the roadside slope. This would help maintain watercourse structure and would minimise impact on water quality associated with the failure and erosion of the slope. The proposal involves repair and outlet treatments at two existing cross drainage lines. These works would be planned for forecast periods of dry weather but in the event of rainfall, suitable diversions would be implemented. During construction, the slope would be protected from rainfall ingress by adequate surface water diversion and by the placement of geofabric or plastic sheeting over the exposed soils surfaces. The proposed compound is about 50 metres from a non-perennial tributary of Lords Creek, while the proposed stockpile is immediately adjacent to another tributary. In the absence of appropriate controls, works near the identified downslope watercourse and the compound / stockpile sites have the potential to affect water quality. This includes risks from alkaline concrete wash water (pH of around 12) that can impact aquatic habitats by raising the pH, but also contains high levels of chromium that can pollute land and leach into the ground and contaminate groundwater. The proposed safeguards in this section and Section 3.1 would address water quality risks during construction. This includes a requirement that concrete washout occurs in a bunded area within the nominated compound.	Yes ☒	No ☐
Is the location known to flood or be prone to water logging? The proposal sites are not identified as flood prone (either within a flood planning area or within the extent of historic floods) by Lake Macquarie City flood mapping.	Yes ☐	No ☒
Is the proposal located within or immediately adjacent to the area managed by Water NSW covered by Chapter 8 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (SEPP (Biodiversity and Conservation))?	Yes ☐	No ☒
Would the proposal be undertaken on a bridge or ferry?	Yes ☐	No ☒
Is the proposal likely to require the extraction of water from a local water course (not mains)?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

WQ1	There is to be no release of dirty water into drainage lines and waterways.
WQ2	Water quality control measures are to be used to prevent any materials (e.g. grout, sediment etc) entering drainage or waterways.
WQ3	Shotcreting operations would not occur during periods of rainfall or where a medium or higher chance (≥40%) of rainfall is forecast by the Bureau of Meteorology.
WQ4	Waste shotcrete would be frequently removed from the road pavement and other areas to prevent mobilisation during a rainfall event.
WQ5	Vehicle wash down would occur in a bunded area within a nominated site compound.
WQ6	Plant and equipment will be inspected regularly to ensure there are no leakages of fuel, oil and hydraulic fluid.

WQ7	All chemicals and liquids will be stored in an impervious bunded area within the compound site when not in use.
WQ8	If refuelling of plant and equipment is required on site it will take place from a small mobile tanker (or fuel pod), on flat ground and with appropriate mobile spill containment in place.
WQ9	If an incident (e.g. spill) occurs, the Environmental Incident Procedure (Transport for NSW, 2021) is to be followed and the Transport for NSW Contract Manager and Environment Manager notified immediately.
WQ10	An emergency spill kit is to be kept on site and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances. All staff are to be made aware of the location of the spill kit and trained in its use.
WQ11	Procedures will be developed by the Contractors for managing the worksite where there is a risk of high rainfall, including removal and storage of plant and equipment and securing of the site, and access arrangements.

3.3 Noise and vibration

Are there any residential properties or other noise sensitive areas near the location of the proposal that may be affected by the work (i.e., church, school, hospital)?

Table 3-3: Noise and vibration

<table>
<tr><th colspan="3">Description of existing environmental and potential impacts</th></tr>
<tr><td>During construction?
The nearest sensitive receivers to the proposal work sites, compound locations and stockpile locations are outlined in the table below:
<table>
<tr><th>Location</th><th>Distance to nearest receiver</th></tr>
<tr><td>Proposal work site</td><td>Residential: 475 m (no line of site)
Commercial: 435 m (no line of site)</td></tr>
<tr><td>Compound No. 1</td><td>Residential: 150 m (with line of site)
Commercial: 30 m (with line of site)</td></tr>
<tr><td>Compound No. 2</td><td>Residential: 310 m (no line of site)
Commercial: 200 m (with line of site)</td></tr>
<tr><td>Stockpile site</td><td>Residential: 250 m (no line of site)
Commercial: 125 m (with line of site)</td></tr>
</table></td><td>Yes ☒</td><td>No ☐</td></tr>
<tr><td>During operation?
There would be no operational noise associated with the proposal. Refer to discussion below.</td><td>Yes ☐</td><td>No ☒</td></tr>
<tr><td>Is the proposal going to be undertaken only during standard working hours?
Standard working hours
• Monday-Friday: 7:00am to 6.00pm
• Saturday: 8.00am to 1.00pm
• Sunday and Public Holidays: no work
Work would be carried out primarily during the above standard working hours. However, some work would need to be carried out outside these hours, to facilitate the fast repair of the failed slope and to accommodate full road closures during periods of lower traffic volume.
Night works are required for tree removal where a crane will need to occupy both lanes necessitating a full road closure and detour. Implementing the full road closure at night would avoid periods where traffic volumes are highest and therefore impact fewer road users. Extended works on Saturday have been proposed should site conditions change (e.g. further deterioration in the slope) requiring works to be expediated.</td><td>Yes ☐</td><td>No ☒</td></tr>
<tr><td>Is any explosive blasting required for the proposal?</td><td>Yes ☐</td><td>No ☒</td></tr>
</table>

Would construction noise or vibration from the proposal affect sensitive receivers?	Yes ☒	No ☐

Potential construction noise impacts were assessed in accordance with the Construction Noise and Vibration Guideline (Transport for NSW, 2023) and associated noise estimator tool. The 'distance-based scenario' worksheet was used with the 'corridor clearing' scenario adopted for the construction footprint, the 'compound operation' scenario adopted for the compound. For the stockpile site the distance based noisiest plant worksheet was used and 'excavator dumping rubbles' was adopted as the noisiest plant. These scenarios are considered a conservative representation of the noisiest activities that would occur at each site.

Noise management levels (NMLs) were established for the proposal using the Rating Background Level (RBL) for the R2 representative environment defined in the noise estimator. This level best reflects the traffic volumes on MR220 Freemans Drive, and the existing noise environment characterised by the commercial activity of two service stations and a roadside retail premises. The selected ground type used in the assessment was for 'undeveloped green fields, rural areas with isolated dwellings.'

For the slope stabilisation works, a substantial solid barrier between the noise source and nearest receiver was assumed given the intervening topography. For the compound and stockpile sites, a line of sight between noise source and commercial receivers was assumed. A substantial noise barrier between the noise source and the residential receivers (caravan park) was assumed due to the presence of a noise wall south of the residences, located at the Freemans Waterhole United Service Station.

Key assessment results for the slope remediation works (with corridor clearing assumed to be the loudest activity) are identified in the table below. This activity would occur at night and the results show that the nearest residential receiver (at 475 metres) would not be affected. The results also show that the nearest commercial receiver (at 430 metres) would not be affected. The night-time affected distance for corridor clearing in relation to the nearest residential receivers is shown in Figure 3-2.

Noise impact (corridor clearing - night)	**Distance (m)**	**Affected receivers**
Residential receiver		
Affected distance (>NML)	420	0
Noticeable (5-10 dBA > Background)	420	0
Clearly audible (10-20 dBA > Background)	290	0
Moderately intrusive (20-30 dBA > Background)	135	0
Highly intrusive (>30 dBA > Background)	45	0
Highly noise affected (> 75 dBA)	15	0
Commercial receiver		
Affected distance (>NML)	25	0
<5 dBA > Background	25	0
5-15 dBA > Background	15	0
15-20 dBA > Background	5	0
>25 dBA > Background	2	0

Key assessment results for Compound No.1 are summarised below (with compound operation assumed to be the loudest activity) are identified in the tables below. There are no residential or commercial receivers within the calculated affected distance for Compound No.2.

The results for Compound No.1 show that during the day residences are not likely to experience noise above NMLs. During the night period two residences could be affected by noise above NMLs, but noise would not reach the moderately intrusive level. Commercial receivers are not likely to experience noise above NMLs during compound operation. The noise affected distances for compound operation during the day and night periods are shown below.

Noise impact (compound No.1 operation - day)	**Distance (m)**	**Affected receivers**
Residential receiver		

Affected distance (>NML)	65	0
Noticeable (5-10 dBA > Background)	-	-
Clearly audible (10-20 dBA > Background)	-	-
Moderately intrusive (20-30 dBA > Background)	20	0
Highly intrusive (>30 dBA > Background)	5	0
Highly noise affected (> 75 dBA)	5	0
Commercial receiver		
Affected distance (>NML)	10	0
5-10 dBA > Background	10	0
10-20 dBA > Background	5	0
Highly noise affected (> 75 dBA)	2	0

Noise impact (compound No.1 operation night)	**Distance (m)**	**Affected receivers**
Residential receiver		
Affected distance (>NML)	250	2
Noticeable (5-10 dBA > Background)	250	2
Clearly audible (10-20 dBA > Background)	170	1
Moderately intrusive (20-30 dBA > Background)	65	0
Highly intrusive (>30 dBA > Background)	20	0
Highly noise affected (> 75 dBA)	5	0
Commercial receiver		
Affected distance (>NML)	10	0
<5 dBA > Background	10	0
5-15 dBA > Background	5	0
15-20 dBA > Background	2	0
>25 dBA > Background	1	0

Key assessment results for the stockpile site on Palmers Road are summarised below (with excavator dumping rubbles assumed to be the loudest activity) are identified in the tables below. It has been assumed that these works would only occur during the day. The results show that residential and commercial receivers are not likely to be affected by the use of the stockpile site.

Noise impact (day)	**Distance (m)**	**Affected receivers**
Residential receiver		
Affected distance (>NML)	75	0
Noticeable (5-10 dBA > Background)	-	-
Clearly audible (10-20 dBA > Background)	-	-
Moderately intrusive (20-30 dBA > Background)	25	0
Highly intrusive (>30 dBA > Background)	15	0
Highly noise affected (> 75 dBA)	15	0
Commercial receiver		
Affected distance (>NML)	20	0
5-10 dBA > Background	-	-
10-20 dBA > Background	-	-
Highly noise affected (> 75 dBA)	15	0

Tree removal within the construction footprint would occur at night and would require the temporary closure of MR220 Freemans Drive (at night) and the implementation of a detour over a

period of two weeks. The detour route is via Palmers Road, M1 Pacific Motorway, M15 Hunter Expressway, John Renshaw Drive and Leggetts Drive and is shown in Figure 3-3 (in Section 3.9). The 'road traffic noise' worksheet from the construction noise estimator was used to identify the extent of any increase in noise due to the detoured traffic. The assumptions used where as follows:

- MR220 Freemans Drive traffic – 7619 vehicles per day, 90%/10% day/night split, 10% heavy vehicles, equal traffic in each direction. The 10% night time traffic was assumed to be detoured.
- Palmers Road (existing traffic) – 7942 vehicles per day, 90%/10% day/night split, 11.5% heavy vehicles, equal traffic in each direction. Speed limit 90 km/h
- M1 Pacific Motorway (existing traffic) – 32,314 vehicles per day, 90%/10% day/night split, 11.43% heavy vehicles, equal traffic in each direction. Speed limit 110 km/h
- M15 Hunter Expressway (existing traffic) – 33,241 vehicles per day, 90%/10% day/night split, 12% heavy vehicles, equal traffic in each direction. Speed limit 110 km/h
- John Renshaw Drive (existing traffic) – 21,964 vehicles per day, 90%/10% day/night split, 6.2% heavy vehicles, equal traffic in each direction. Speed limit 90 km/h
- Leggetts Drive – 5,880 vehicles per day, 90%/10% day/night split, 8.2% heavy vehicles, equal traffic in each direction. Speed limit 90 km/h, except through Pelaw Main where 50 km/h applies.

The results of the assessment are provided in the table below. The results suggest that increases in road traffic noise by less than 2 dBA are likely for receivers near the M1 Pacific Motorway, M15 Hunter Expressway and John Renshaw Drive. These increases are not likely to be noticeable. Modest increases above 2 dBA may be noticeable for residences adjacent Palmers Road and Leggetts Drive. However, these will be temporary and limited to the detour period (up to 2 weeks).

Detour road	**Predicted change in noise level (dBA)**
Palmers Road	2.1
M1 Pacific Motorway	0.8
M15 Hunter Expressway	0.9
John Renshaw Drive	1.5
Leggetts Drive (50km/h) (Pelaw Main)	3.9
Leggetts Drive (90km/h)	3.8

Would operation of the proposal alter the noise environment for sensitive receivers? The operation of the proposal would not result in changes to the traffic mix or traffic speeds and traffic lanes would not move closer to noise sensitive receivers.	Yes ☐	No ☒
Would the proposal result in vibration being experienced by any surrounding properties or infrastructure during operation? There would be no operational vibration associated with the proposal.	Yes ☐	No ☒

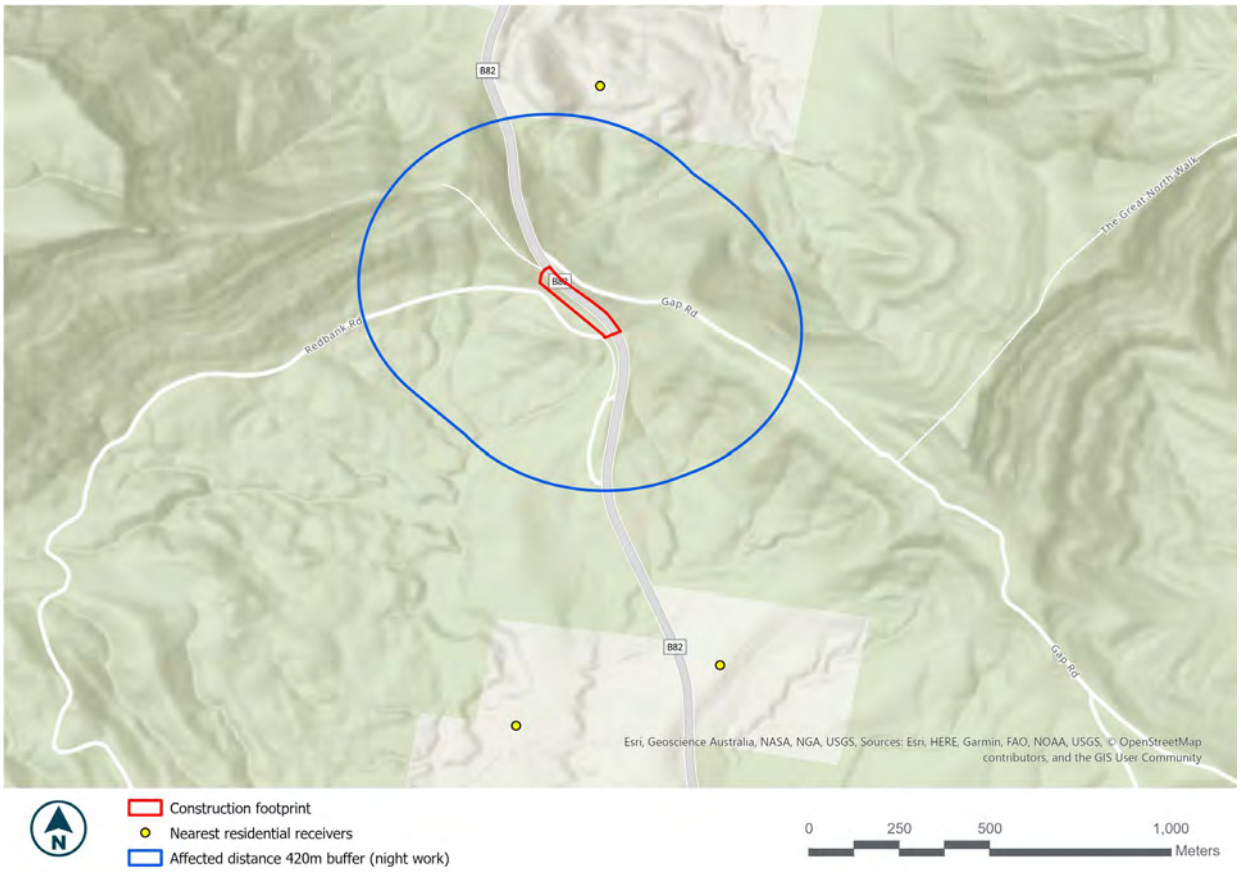

Figure 3-1: Night-time affected distance for corridor clearing (residential receivers)

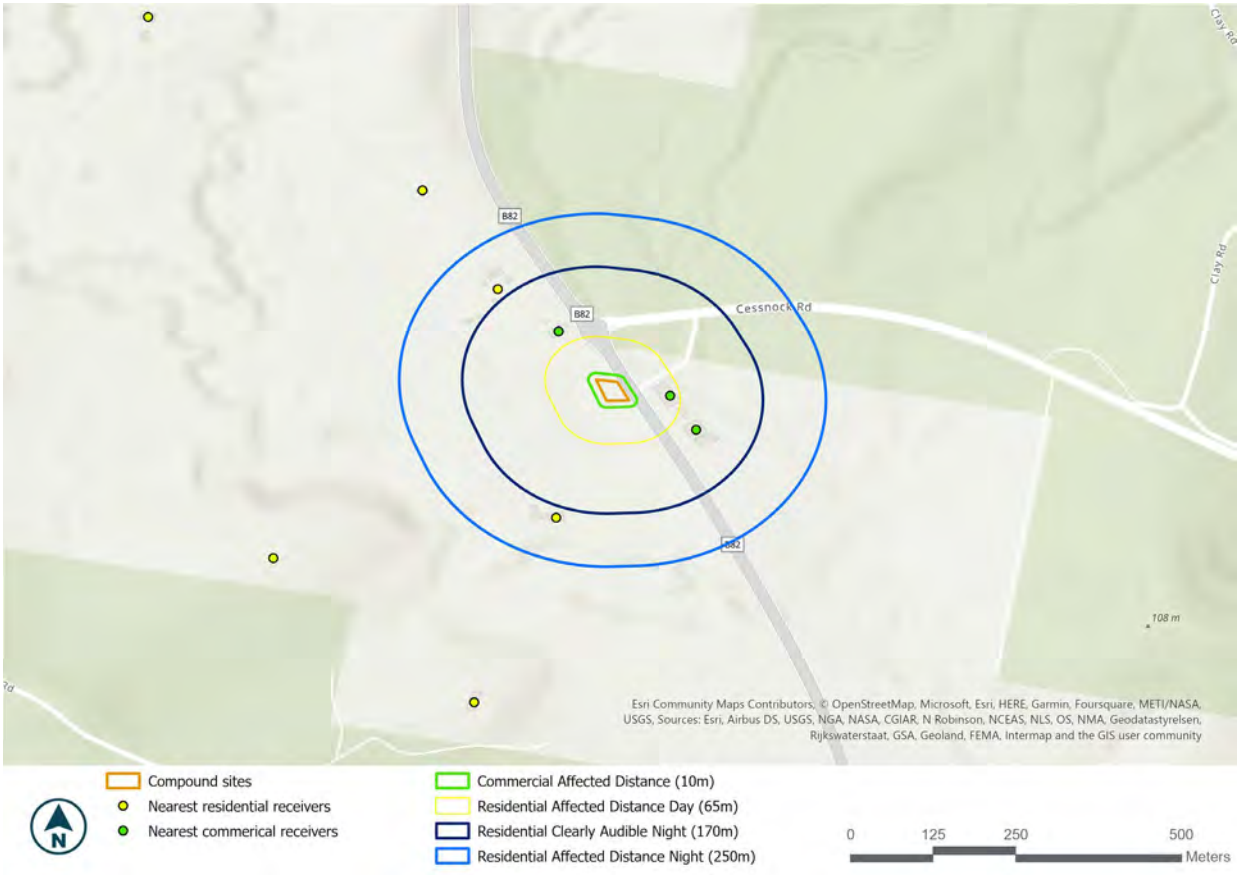

Figure 3-2: Day and night affected distance for compound No. 1 operation (residential receivers)

Safeguards

Safeguards to be implemented are:

NV1	The standard mitigation measures identified in Appendix B of the Construction Noise and Vibration Guideline (Transport for NSW, 2022) will be implemented.
NV2	A letterbox drop notification for residential receivers within 250m of the proposed compound, and receivers along the Palmers Road and Leggetts Drive sections of the detour route, will occur at least five business days prior to works starting. The notification will detail work activities, dates and hours, impacts (including any changed traffic arrangements) and mitigation measures. It will also include a contact number for enquiries and complaints.

3.4 Air quality

Table 3-4: Air quality

<table>
<tr><th colspan="3">Description of existing environmental and potential impacts</th></tr>
<tr><td>Is the proposal likely to result in large areas (>2ha) of exposed soils?
The proposal would disturb the existing roadside slope, including vegetation removal and slope remediation works (including excavation and drilling). The maximum area of potential disturbance (and the basis for the assessment in this REF) would be about 14,800 square metres, less than 1.5 hectares.
The total amount of dust generated from earthworks would depend on the silt and moisture content in the soil, prevailing weather conditions and the types of activities being carried out.
Dust from drilling activities would be minimal as embankment is fill material. Soil nail drilling would occur after the reinforced geo-mat is placed on the embankment which will help to suppress any dust
The area to be disturbed is not near sensitive receivers and dust impacts are expected to be minor. Therefore, any dust impacts would be highly localised and can be managed with the proposed safeguards.</td><td>Yes ☐</td><td>No ☒</td></tr>
<tr><td>Are there any dust-sensitive receivers located within the vicinity of the proposal during the construction period?
The nearest sensitive receivers to the proposal work sites, compound locations and stockpile locations are outlined in the table below:
<table>
<tr><td>Location</td><td>Distance to nearest receiver</td></tr>
<tr><td>Proposal work site</td><td>Residential: 475 m
Commercial: 435 m</td></tr>
<tr><td>Compound No. 1</td><td>Residential: 150 m
Commercial: 30 m</td></tr>
<tr><td>Compound No. 2</td><td>Residential: 310 m
Commercial: 200 m</td></tr>
<tr><td>Stockpile site</td><td>Residential: 250 m
Commercial: 125 m</td></tr>
</table>
In the absence of appropriate controls, works have the potential to mobilise dust into the surrounding area and impact on the air quality at nearby sensitive receivers. The proposed safeguards in this section would address air quality risks during construction.</td><td>Yes ☒</td><td>No ☐</td></tr>
<tr><td>Is there likely to be an emission to air during construction?
The proposal would not result in a material increase in air pollution. The proposal would result in minor exhaust emissions from equipment and vehicles. Given the scale of the proposal and implementation of appropriate controls, the potential for adverse air quality impacts on receivers and the general environment is considered minor.</td><td>Yes ☐</td><td>No ☒</td></tr>
</table>

Safeguards

Safeguards to be implemented are:

AQ1	Work will not be carried out during strong winds or in weather conditions where elevated levels of dust or airborne particulates are likely.
AQ2	Vehicles transporting waste or other materials that may produce odours or dust are to be covered during transportation.
AQ3	Stockpiles or areas that may generate dust are to be managed to suppress dust emissions in accordance with the Roads and Maritime Services Stockpile Site Management Guideline (EMS-TG-10).
AD4	Spoil from drilling and micro pile works will be placed directly onto the embankment reducing loading and hauling of spoil to the nominated stockpile locations.

3.5 Aboriginal heritage

Table 3-5: Aboriginal heritage

Description of existing environmental and potential impacts		
Would the proposal involve disturbance in any area that has not been subject to previous ground disturbances? All of the proposal sites have been previously disturbed by prior road construction and maintenance works.	Yes ☐	No ☒
Has an online Aboriginal Heritage Information Management System (AHIMS) search been completed? An AHIMS search was originally conducted by Transport on 18/10/2022 and informed assessment under the PACHCI. The search identified six sites within the broader locality, none of which would be affected by the proposal. Some of these sites are upslope of the construction footprint along Gap Road at a distance of about 130 metres. One site is located about 350 metres to the north. An updated search (same coordinates) was conducted 25/10/2023 and returned the same results. An additional search on 25/10/2023 covering the compound and stockpile location returned no records.	Yes ☒	No ☐
Is there potential for the proposal to impact on any items of Aboriginal heritage? The proposal would not affect known Aboriginal sites. The risk of encountering unregistered sites is considered low given the extent of previous disturbance at the site.	Yes ☐	No ☒
Would the proposal involve the removal of mature native trees? The AHIMS search did not identify any previously recorded culturally modified trees within or adjacent to the proposal site.	Yes ☒	No ☐
Is the proposal consistent with the requirements of the legacy *Roads and Maritime Procedure for Aboriginal cultural heritage consultation and investigation* (PACHCI)? Advice from the Transport's Aboriginal Community and Heritage Partner (Appendix D) noted that the AHIMS search did not indicate moderate to high concentrations of Aboriginal objects, that the proposal footprint does not contain landscape features that indicate the presence of Aboriginal objects, and that cultural heritage potential of the site appears to be reduced due to past disturbance. The advice indicates the proposal may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.	Yes ☒	No ☐

Safeguards

Safeguards to be implemented are:

AH1	If Aboriginal heritage items are uncovered during the works, all works must cease in the vicinity of the find and the Transport for NSW Aboriginal Community and Heritage Partner and the Environment Manager contacted immediately. The steps in the unexpected heritage items procedure (Transport for NSW, 2022) must be followed.
AH2	Site inductions will cover the location of nearby Aboriginal sites and the requirement to avoid impacts. Inductions will be informed by a map showing the location of Aboriginal archaeological sites.
AH3	If the scope of the proposal changes or the extent of the disturbance area changes then the Transport for NSW Aboriginal cultural heritage officer and regional environment manager should be contacted immediately.

3.6 Non-Aboriginal heritage

Table 3-6: Non-Aboriginal heritage

Description of existing environmental and potential impacts		
The following online heritage database searches were completed on the 16/06/23: • Transport (including legacy Roads and Maritime) section 170 register. • NSW Heritage database. • Commonwealth Heritage List, established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). • Australian Heritage Places Inventory. • Local Environmental Plan(s) heritage items.	Yes ☒	No ☐
Are there any items of non-Aboriginal heritage or heritage conservation areas listed on relevant heritage databases/registers that are located within the vicinity of the proposal? The search of the online heritage databases revealed no non-Aboriginal heritage items or heritage conservation areas located near the proposal. The closest listed heritage item is a local heritage item, Brunkerville Uniting Church Cemetery (Item No: I44), located 1.4 kilometres north of the proposal.	Yes ☐	No ☒
Is the proposal likely to occur in or near features that indicate potential archaeological remains?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

H1	If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the unexpected heritage items procedure (Transport for NSW, 2022) must be followed. The Transport for NSW Environment Manager must be contacted immediately.

3.7 Biodiversity

Table 3-7: Biodiversity

Description of existing environmental and potential impacts		
Have relevant database searches been carried out? Database searches were carried out as part of the Biodiversity Assessment (included in Appendix A) and included: • Commonwealth EPBC Act Protected Matters Search Tool (PMST) (May 2023) • Register of critical habitat (May 2023) • BioNet threatened species records within the locality (10km radius) (May 2023) • State Vegetation Type Map (May 2023) • BioNet Vegetation Classificiation database (May 2023)	Yes ☒	No ☐

• Biodiversity Values Map and Threshold Tool (May 2023) • NSW WeedWise (DPI) website (May 2023) • National Flying-fox monitoring viewer (May 2023) • Groundwater Dependent Ecosystems Atlas (May 2023) • Department of Primary Industries (Fisheries) NSW Spatial Data Portal (May 2023) • Areas of Outstanding Biodiversity Value register (May 2023). • PlantNet (May 2023) • SEED map viewer (May 2023) Field surveys were conducted on 22 February and 10 May 2023.		
Did the database searches identify any endangered ecological communities, threatened flora and/or threatened or protected fauna, or migratory species in or within the vicinity of the proposed works? Both Commonwealth and State listed matters must be considered. Database searches identified the following within a 10-kilometre buffer centred on the proposal: • 10-20 kilometres upstream of the Hunter Estuary Wetlands (Wetlands of International Importance (Ramsar Wetlands)) • 5 threatened ecological communities • 62 Threatened Species • 19 Migratory Species The full list of threatened flora and fauna species identified in the database searches and their likeliness to occur in the proposal site is provided in Appendix B of the Biodiversity Assessment Report (BAR). <u>Vegetation communities</u> Vegetation at the proposal site conforms to PCT 3150 (Hunter Coast Ranges Turpentine Wet Forest) and is characterised by a uniform canopy of trees 30 metres high, a midstory of isolated eucalypt saplings, and isolated small trees to eight metres high, an understorey of natives and weeds to one metre high, and groundcovers. Groundcover consists of grasses, weeds and vines. The PCT at the slope is in a low/disturbed condition with exposed earth with vegetation disturbed by weeds. A map showing the distribution of PCT 3150 is shown in Figure 3-3 below. PCT 3150 does not conform to any threatened ecological community listed by the BC Act or EPBC Act. The proposed compound and stockpile sites are cleared and there are no PCTs present. <u>Threatened flora</u> 28 threatened flora species listed under the EPBC Act and/or BC Act that have been previously recorded or are considered to have habitat within the area investigated. Prior to the field survey, three threatened flora species were considered to have a moderate likelihood of occurring based on local records and their association with the mapped PCTs. Most of the other threatened species were assessed to have only a 'low' likelihood of occurrence. Targeted surveys were conducted to investigate the presence of the three threatened species with a moderate likelihood within the proposal site. None of the three threatened were identified within the proposal site during the field surveys. The following is noted: • Scrub Turpentine (Rhodamnia rubescens) (Critically Endangered BC Act and EPBC Act) – Not recorded. The survey timing and conditions were suitable for this species, which is obvious when present. • Native Guana (*Rhodomyrtus psidioides*) – Not recorded. The survey timing and conditions were suitable for this species, which is obvious when present. • Red Helmet Orchid (*Corybas dowlingii*) – The timing of the survey was early for this species, which flowers during June and July. However, the timing of the surveys would have coincided with the presence of leaves, as they are not present all year. No *Corybas* or *Acianthus* species with which it could be confused with when not flowering, were recorded. Furthermore, habitat is substantially degraded at the site. Therefore, although associated with PCT 3150, it is considered this species has a low likelihood of occurring. <u>Threatened fauna</u> 68 threatened fauna species, listed under the EPBC and/or BC Acts that have been previously recorded or are considered to have habitat within the area investigated. None of the species recorded during the field surveys are listed, or currently being considered for listing, under the EPBC Act or BC Act. No indirect evidence to suggest the presence of a locally	Yes ☒	No ☐

viable population of threatened fauna occurring within, or close to, the slope remediation site was identified.		
Is the proposal likely to impact nationally listed threatened species, ecological communities or migratory species? None of the threatened species or ecological communities predicted to occur near the proposal site would be reliant upon the fauna habitat or vegetation communities present, and none would be affected by the conducting of the slope remediation activities proposed. Impacts on migratory species are not expected.	Yes ☐	No ☒
Does the proposal involve pruning, trimming or removal of any tree/s? The field investigation reccorded 224 trees within the proposal site, three of which are hollow-bearing trees (HBT) (refer to Figure 5-1 in the Biodiversity Assessment at Appendix A). Each of the 224 trees recorded are within the proposed impact footprint of the slope remediation work. This represents a worst-case estimate of impacts on trees, and it is expected that a smaller number of trees will be identified for removal during pre-work planning. The table below provides a preliminary estimate of tree removal and offset requirements. The following Key Threatening Process (KTP) are relevant to the proposal's impact on vegetation: • Clearing of native vegetation – Schedule 4, BC Act • Removal of dead wood and dead trees – Schedule 4, BC Act. Given the extent of similar resources within the locality, and provided recommended mitigation measures are adopted, the loss of 0.8 ha of native and exotic vegetation, and removal of dead wood and dead trees, is not considered to significantly contribute to, or increase the impact of, these KTP.	Yes ☒	No ☐
Would the proposal require the removal of any other vegetation? The extent of affected vegetation is discussed above. The proposal would require the removal of up to about 0.8 hectares of PCT 3150.	Yes ☒	No ☐
Would the proposal affect any tree hollows or hollow logs? The proposal would impact up to three hollow bearing trees. The impact of the slope remediation works on hollow-dependent species assessed in the BAR using the criteria provided under Section 7.3 of the BC Act (refer to BAR Appendix F). The slope stabilisation works would not have a significant effect on hollow-dependent threatened fauna or their habitat. As such, preparation of further studies such as a Species Impact Statement or BDAR is not required.	Yes ☒	No ☐
Are there any known areas of outstanding biodiversity value or areas mapped as 'littoral rainforest' or 'coastal wetland' under chapter 2 of SEPP (Resilience and Hazards) in or within the vicinity of the proposed work? The Register of Critical Habitat (DCCEEW 2023e) and Area of Outstanding Biodiversity Value (AOBV) register (DPE 2023b) (in conjunction with Part 3 of the Biodiversity Conservation Regulation 2017) per listings provided under the EPBC and/or BC Acts, did not identify any gazetted areas of critical habitat or AOBV for any flora or fauna species or communities occurring within or near the proposal footprint.	Yes ☐	No ☒

Tree size	Estimated native tree removal (worst-case scenario)	Required number of replacement trees	Required cost transfer into Conservation Fund
Small	42	84	$5,250
Medium	97	388	$48,500
Large	76	608	$76,000
Extra large	9	144	$22,500
Hollows	3	9 hollows	$1,500
Total	224 & 3 HBT	1224	$153,750

Would the proposal provide any additional barriers to the movement of wildlife? Several barriers to ground traversing fauna are currently present within the area investigated including the MR220 Freemans Drive road formation and steep upslopes and downslopes. In this context the proposal would not substantially alter fauna connectivity. Despite the proposal involving the removal of some trees and vegetation, due to the presence of similar plants beyond the limits of the slope arboreal species that rely on gliding to move between the tree canopy would still be able to do so post-stabilisation. The works within the surrounding corridor would not significantly increase any canopy widths. During construction, some native fauna may be discouraged from traversing the site due to noise and lighting (for night works). Areas of native vegetation south and north of the site provide similar movement opportunities. During operation, the proposal would not affect any fauna movements, nor would it have an adverse cumulative impact when associated with the existing situation. The proposal would not further fragment or isolate any habitat area, nor present a barrier to fauna dispersal patterns.	Yes ☐	No ☒
Would the proposal disturb any natural waterways or aquatic habitat? During construction there would be no direct impacts on natural waterways or aquatic habitat. Potential indirect impacts, such as the discharge of sediment laden water from the proposal site, has been addressed by the safeguards and management measures identified in Sections 3.1 and 3.2. During operation, the proposal would not result in any direct or indirect adverse impact on surface hydrology within the proposal site and is not expected to impact any of those drainage lines that occur beyond the limits of the work. There would be a small increase in impermeable road surface, however substantial changes to runoff volumes and velocities are not expected. The geo-mat to be used as part of proposal would allow vegetation to grow on the slope over time and this would reduce runoff velocities, increase water infiltration and reduce discharge.	Yes ☐	No ☒
Would the proposal disturb any crevices or other locations (such as on bridges and culverts) for potential bat habitat? The culverts present were inspected during the field investigations and not found to be suitable for occupation by cave-dependent microbats. They were also noted to support occurrences of spider webs, the presence of these indicating that no animals are entering or exiting the culverts present.	Yes ☐	No ☒

<u>Groundwater dependant ecosystems</u>

A low - moderate potential terrestrial GDE has been identified within the proposal site. The proposal would not have any direct or indirect impact on a water source or aquifer structure, it would not involve groundwater extraction.

With the adoption of the proposed mitigation measures, the proposal would not contribute to the off-site movement of sediment. The remediation of the failed slope and improvement to site drainage would improve otherwise adverse effects if left untreated.

<u>Weeds and pests</u>

Of the introduced plant species recorded during the field surveys, Lantana is listed:

- under Schedule 3 of the NSW Biosecurity Regulation 2017
- as a Priority Weed in the Hunter region (which includes Lake Macquarie LGA)
- a Weed of National Significance.

Beyond the existing diversity of exotic species and pests recorded and predicted to occur, the stabilisation of the slope would not have an adverse cumulative impact. The works will not benefit any exotic pests at the expense of native species. Exotic plants and animals currently occupy, and occur in proximity to, the proposed works area.

The safeguards identified in this section have been proposed to address the potential for the spread of weeds.

<u>Invasion and spread of pathogens and disease</u>

There is a risk that the proposal would introduce, spread and/or exacerbate the plant diseases caused by *Phytophthora cinnamomi* and Myrtle Rust (*Puccinia psidii*). These diseases are most likely introduced or spread through the importation or movement of soil, water and landscaping materials, either directly or through incidental attachment to machinery. Although there was no obvious evidence for the presence of *Phytophthora cinnamomi* or Myrtle Rust in the vegetation of the proposal site, the safeguards listed in this section have been proposed to address the risk of pathogen spread.

Fauna injury and mortality

Vegetation clearing is required for the proposal. Given the proposal would be conducted within a modified environment (due to the existing landslips), there is minimal expectation that sheltering animals would be injured during the course of the proposed work.

During the construction phase of the proposal some ground-traversing fauna species (i.e. frogs and ground-traversing mammals) could be present and be subject to injury. Mitigation measures to minimise the impact of the proposed work on animals if present (such as checking beneath vehicles/machinery prior to their use) have been provided to address this matter.

Beyond current levels of impact due to the existing presence of MR220 Freemans Drive and the volume of traffic that typically uses this road, the operation phase of the proposal is not expected to notably increase the risk of fauna injury or mortality. The proposal would be unlikely to alter the rate of vehicle strikes on those fauna species recorded or potentially occurring within the locality.

Noise, light and vibration

The proposal has been affected by noise, light and vibration from the adjoining trafficable surfaces. As the proposal is for repairs to scour and drainage upgrades, the impacts of noise, light and vibration from passing vehicles during the operation phase are unlikely to be significantly greater than existing impacts.

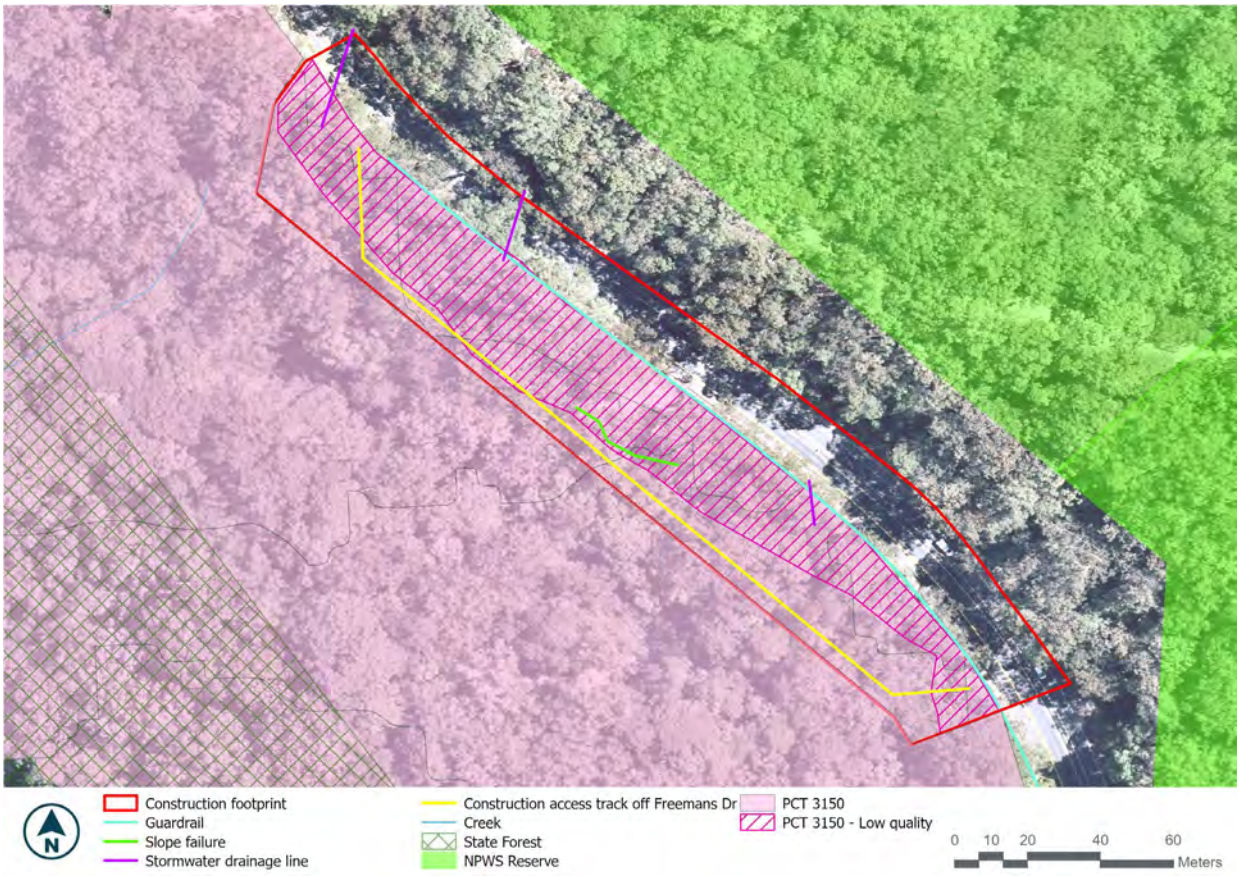

Figure 3-3: PTCs within the construction footprint

Safeguards

Safeguards to be implemented are:

BD1	Pre-clearing surveys will be carried out in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
BD2	Native vegetation removal will be minimised through pre-construction planning.
BD3	Vegetation clearance limits will be identified on site maps/plans and on-site exclusion zones will be established as per Guide 2: Biodiversity Guidelines Protecting and managing biodiversity on RTA projects (RTA, 2011).

BD4	Retained trees would be clearly identified on-site prior to the commencement of work to ensure they are not indirectly impacted or cleared.
BD5	Vegetation removal would be carried out in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011). An ecologist (or similar qualified person) is to be present on-site during the removal of the three hollow-bearing trees.
BD6	The three hollow-bearing trees should be 'soft- felled' in sections, with hollow-limbs lowered to the ground. These should be collected and used locally as habitat as part of the off-setting requirements. Where possible, relocate locally the felled trees as opposed to the mulching of these plants. Relocation of the felled trees would aim at providing habitat for native species and their prey (as per DEC 2004 Threatened Species Survey and Assessment: Guidelines for developments and activities and Transport's Biodiversity guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)).
BD7	The three hollow-bearing trees are to be marked during pre-clearing surveys and retained for Stage 2 of clearing (i.e., left for at least 24 hours following Stage 1 clearing). All vegetation around the hollow-bearing trees to be removed would be cleared 24 to 48 hours prior to the removal of the hollow-bearing trees. This approach isolates the hollow-bearing trees and reduces their habitat value (particularly for ground-traversing fauna that are exposed to predation).
BD8	Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
BD9	Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock.
BD10	The felled trees will be cut at ground level, retaining the stump/root system in the ground, maintaining soil stabilisation. The root structure of removed trees must be left undisturbed.
BD11	Removed native vegetation would be mulched or re-used on-site (e.g., to stabilise disturbed areas).
BD12	Fauna that may be present on-site during works will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011). Prior to the start of works suitable wildlife rescuers will be identified and contact details provided to site staff.
BD13	Inspections for the presence of any sheltering native species would be carried out within the affected culverts, as well as under vehicles and machinery prior to their use.
BD14	Weed species would be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011) and the Biosecurity Act 2015 (general duty to prevent, eliminate or minimise any biosecurity risk). This would include disposing of weeds and weed contaminated soil at an appropriate waste management facility.
BD15	If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Unexpected Threatened Species Find Procedure in Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
BD16	To prevent the spread of pathogens, the Best Practice Hygiene Protocols in Guide 7: Pathogen management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011) will be implemented.
BD17	The removal of trees will be offset in accordance with the Transport Tree and hollow replacement guidelines. If tree planning is proposed, a Tree Replacement Plan is to be prepared.
BD18	If any hollow bearing trees are identified as requiring either partial or full removal, preference will be given to only partial removal leaving the hollow in situ where possible. If partial removal is not possible, trees with hollows that are to be completely felled will be left onsite nearby for potential re-occupation rather than being removed from site. Trees identified with habitat features would be soft fallen in the presence of an onsite arborists.
BD19	Vegetation and tree removal will be undertaken with an agreed staged approach.

3.8 Trees

Table 3-8: Trees

Description of existing environmental and potential impacts		
Does the proposal involve pruning, trimming or removal of any tree/s? Refer to Section 3.7. By the completion of the field investigations, 224 trees had been recorded, three of which are hollow-bearing. Each of the 224 trees recorded (these comprised of 42 small, 97 medium sized, 76 large sized, and 9 extra large sized) are within the proposed impact footprint of the slope remediation work. This represents a worst-case estimate of impacts on trees, and it is expected that a smaller number of trees will be identified for removal during pre-work planning and detailed design.	Yes ☒	No ☐
Do the trees form part of a streetscape, an avenue or roadside planting?	Yes ☐	No ☒
Have the trees been planted by a community group, Landcare group or by council or is the tree a memorial or part of a memorial group e.g., has a plaque?	Yes ☐	No ☒
Do the trees form part of a heritage listing or have other heritage value?	Yes ☐	No ☒

Safeguards

Refer to safeguards proposed in section 3.7.

3.9 Traffic and transport

Table 3-9: Traffic and transport

Description of existing environmental and potential impacts		
Is the proposal likely to result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during construction? Tree removal within the construction footprint would occur at night and would require a temporary closure of MR220 Freemans Drive (at night only, reopening for daytime operations) and the implementation of a detour over a period of two weeks. The detour route is via Palmers Road, M1 Pacific Motorway, M15 Hunter Expressway, John Renshaw Drive and Leggetts Drive and is shown in Figure 3-3. The detour would add a maximum additional travel distance of about 53 kilometres, although for many road users the increased distance would be less (as it depends on their specific origin and destination). Considering posted speed limits for each leg of the detour, additional travel time could be up to about 34 minutes for the night-time closure. There would be no detour for daytime operations. Emergency services will be contacted advising of night-time road closure / detour and Variable Message Signs will be in place on Freemans Drive, Palmers Road, Hunter Expressway and M1 Motorway. During daytime construction the proposal would involve continued lane closures (and associated stop/slow measures) and a reduced speed limit, resulting in some disruptions and delays to traffic flow. It is noted that the proposal sites are currently under traffic control. During the day, traffic impacts are not expected to be substantially different to the existing situation (with one lane currently closed).	Yes ☒	No ☐
Is the proposal likely to result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during operation?	Yes ☐	No ☒
Is the proposal likely to affect any other transport nodes or transport infrastructure (e.g., bus stops, bus routes) in the surrounding area? Or result in detours or disruptions to traffic flow (vehicular, cycle and pedestrian) or access during operation?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

TT1	During construction, traffic and/or pedestrian movements would be managed in accordance with *Traffic control at work sites – Technical manual* (version 6.1, 2022) as necessary.
TT2	A traffic control plan will be prepared in accordance with the *Traffic control at work sites – Technical manual* (version 6.1, 2022) and Australian Standard 1742.3 Manual of uniform control devices
TT3	Notice will be provided to road users via advance Variable Message Sign notifications on MR220 Freemans Drive on approach to the proposal site. Preconstruction Notification will also be provided to Lake Macquarie Council by Transport.
TT4	Project team to consult with 'Customer and Network Operations Coordinators' to ensure Variable Message Signs are in place and emergency services have been contacted.

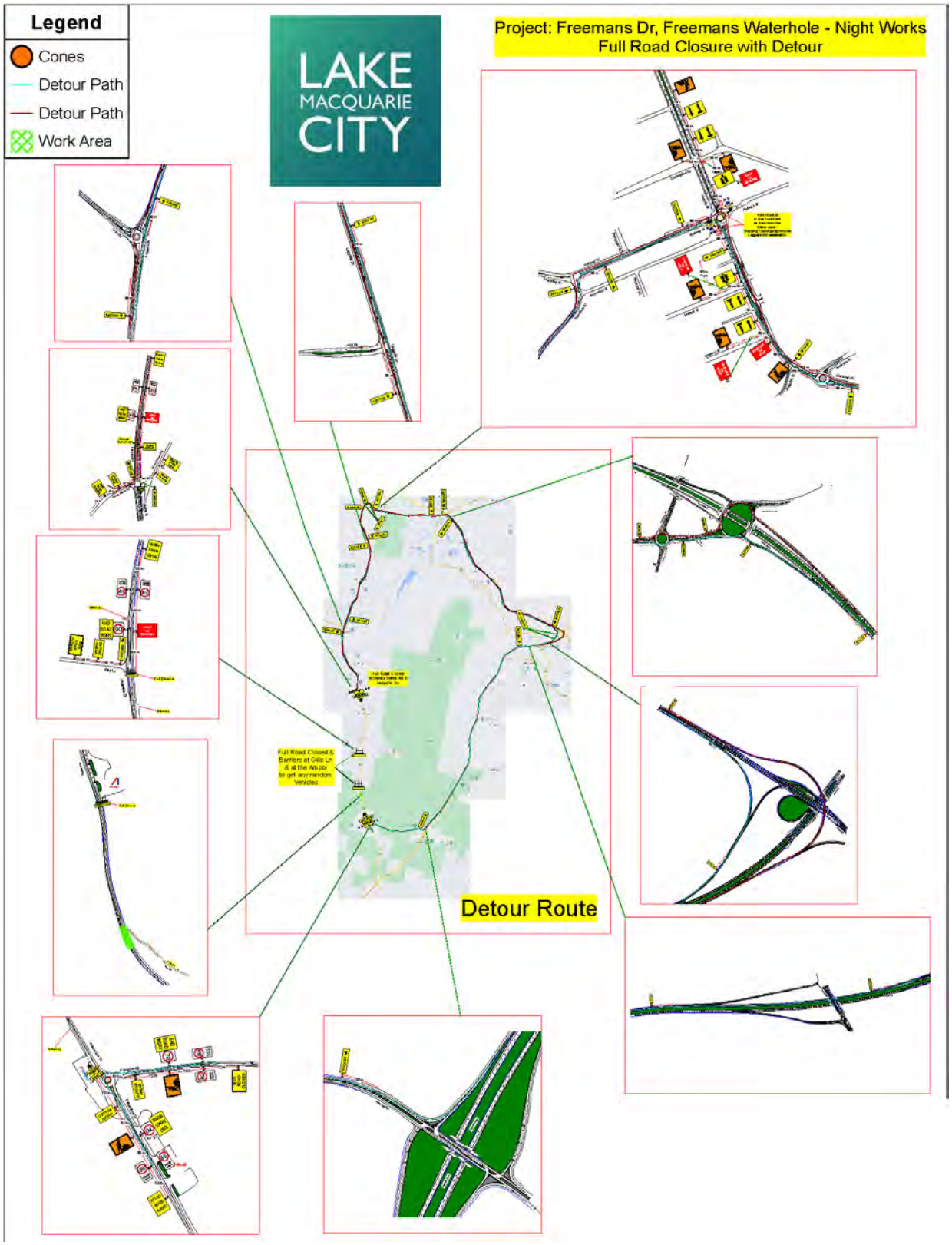

Figure 3-4: Proposed detour route

3.10 Socio-economic

Table 3-10: Socio-economic

Description of existing environmental and potential impacts		
Is the proposal likely to impact on local business? Compound No. 1 is located about 30 metres away from two businesses on the opposite side of MR220 Freemans Drive and about 50 metres away from a third business on the same side of MR220 Freemans Drive. These businesses consist of two service stations and a café. Potential noise, vibration and air quality impacts associated with the proposal have been discussed above in Section 3.3 and Section 3.4. Impacts on local business due to the night-time detour would be limited. The detour would be limited to two weeks and there would be minimal overlap with trading hours (with businesses understood to close at midnight).	Yes ☐	No ☒
Is the proposal likely to require any property acquisition?	Yes ☐	No ☒
Is the proposal likely to alter any access for properties (either temporarily or permanently)?	Yes ☐	No ☒
Is the proposal likely to alter any on-street parking arrangements (either temporarily or permanently)? While designated on-street parking would not be affected, areas nominated for compounds/stockpiling (refer to Section 2.1.4) would be unavailable for other vehicles to use as pull over areas for the duration of construction.	Yes ☐	No ☒
Is the proposal likely to change pedestrian movements or pedestrian access (either temporarily or permanently)?	Yes ☐	No ☒
Is the proposal likely to impact on any items or places of social value to the community (either temporarily or permanently)?	Yes ☐	No ☒
Is the proposal likely to reduce or change visibility of any businesses, farms, tourist attractions or the like (either temporarily or permanently)?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

S1	All complaints received during the work are to be recorded on a complaints register and dealt with promptly.
S2	Nearby businesses (including the nearby service stations) and emergency services will be notified prior to the start of works.

3.11 Landscape character and visual amenity

Table 3-11: Landscape character and visual amenity

Description of existing environmental and potential impacts		
Is the proposed work over or near an important physical or cultural element or landscape? (For example, heritage items and areas, distinctive or historic built form, National Parks, conservation areas, scenic highways etc.)? The MR220 Freemans Drive route is frequently used by local traffic and by tourists and recreational drivers. It traverses scenic bushland and rural landscapes. The proposal is located adjacent to the Sugarloaf State Conservation Area which is reserved land under the *National Parks and Wildlife Act 1974*. The proposal involves slope stabilisation for an existing rural road. Maintenance works on roadside slopes are an expected element of rural road corridor and the works would therefore not represent a departure from the existing landscape character. The affected areas are relatively small in the context of the MR220 Freemans Drive route, although the loss of up to 224 trees would be noticeable to passing road users. Most of the affected areas are located on slopes which face away from the MR220 Freemans Drive and are not visible from the perspectives of road users. The works would have a moderate impact on the driver experience over a short distance.	Yes ☒	No ☐
Would the proposal obstruct or intrude upon the character or views of a valued landscape or urban area? For example, locally significant topography, a rural landscape or a park, a river, lake or the ocean or a historic or distinctive townscape or landmark? The proposal footprint includes views of a rural/bushland landscape. The proposal does not include any high or bulky elements that would obscure these views. The use of shotcrete has some potential to alter the character of the road corridor, however the areas of proposed shotcrete are small, and would not be visible to passing motorists. The geo-mat to be used as part of proposal would allow vegetation to grow on the slope over time, which would reduce the visual contrast with the adjacent areas.	Yes ☐	No ☒
Would the proposal require the removal of mature trees or stands of vegetation, either native or introduced? The proposal involves removal of native vegetation (up to 224 trees)which would be visible to road users during and following construction (refer to Section 3.7). Viewers are not considered particularly sensitive as they would experience the change at speed and the area of impact is small relative to the wider bushland landscape. The geo-mat to be used as part of proposal would allow vegetation to grow on the slope over time, which would reduce the visual contrast with the adjacent areas.	Yes ☒	No ☐
Would the proposal result in large areas of shotcrete visible from the road or adjacent properties? While the proposal involves use of shotcrete at two drainage outlets, the kerb tail out at the southern area of the construction footprint, and potentially at the main failure location. These areas are downslope and would not be visible from the road. The monochrome appearance of the shotcrete will change over time (with tannins from leaf litter etc) resulting in less of a contrast with the adjacent slope. Shotcrete use would be managed in accordance with Transport R64 design guidelines.	Yes ☐	No ☒
Would the proposal involve new noise walls or visible changes to existing noise walls?	Yes ☐	No ☒
Would the proposal involve the removal or reuse of large areas of road corridor, landscape, either verges or medians?	Yes ☐	No ☒
Would the proposal involve substantial changes to the appearance of a bridge (including piers, girders, abutments and parapets) that are visible from the road or residential areas?	Yes ☐	No ☒
If involving lighting, would the proposal create unwanted light spillage on residential properties at night (in construction or operation)?	Yes ☐	No ☒

Would any new structures or features to be constructed, result in over shadowing to adjoining properties or areas?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

V1	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
V2	All construction related material and equipment will be removed from the proposal footprint at the completion of work and disturbed areas restored.
V3	Construction site lighting will be oriented to minimise the risk of light spill impacts on adjacent bushland.
V4	Opportunities to further minimise the visual contrast of the shotcrete with existing landscape character will be investigated and shotcrete would be managed in accordance with Roads and Maritime Shotcrete Design Guidelines 2016.

3.12 Waste

Table 3-12: Waste

Description of existing environmental and potential impacts		
Is the proposal likely to generate >200 tonnes of waste material (contaminated and /or non-contaminated material)? The proposal would generate over 200 tonnes of waste in the worse-case scenario (primarily green waste). The proposal would result in the generation of the following waste streams: • General waste • Mulched vegetation • Concrete waste • Material removed from the rock face, from soil nailing and micropiling. Spoil from the proposed micro piling is indicatively expected to produce about 96 cubic metres (153 tonnes of spoil) while soil nailing is expected to produce about 450 cubic metres (720 tonnes) of spoil. Waste would be classified and either reused (where permitted) or disposed of by Transport (or appointed contractor) at an appropriately licenced facility. The proposal would seek to use the spoil from the proposal for reshaping the embankments to support final profile requirements.	Yes ☒	No ☐
Is the proposal likely to require a licence from EPA?	Yes ☐	No ☒
Is the proposal likely to require the removal of asbestos?	Yes ☐	No ☒

Safeguards

Safeguards to be implemented are:

WM1	Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • Disposal is undertaken as a last resort (in accordance with the *Waste Avoidance & Resource Recovery Act 2001*).
WM2	Waste material is to be reused in accordance with any waste exemptions or disposed of legally in accordance with its waste classification.
WM3	Bulk project waste (e.g. fill) to be reused on site where suitable or sent to a site not owned by the Roads and Maritime Services (excluding EPA licenced landfills and resource recovery facilities) is to have prior formal written approval from the landowner, in accordance with Environmental Direction No. 20 – Legal Off-

	site Disposal of Roads and Maritime Services Waste. This includes waste transported for reuse, recycling, disposal or stockpiling.
WM4	All construction related material and equipment will be removed from the proposal footprint at the completion of work and disturbed areas restored.
WM5	If vegetation is to be mulched and transported off site for beneficial reuse, it is to be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the Roads and Maritime Technical Procedure: Mulch Management

4. Consideration of State and Commonwealth environmental factors

4.1 Environmental Planning and Assessment Regulation 2021 factors

The following factors, listed in section 171(2) of the Environmental Planning and Assessment Regulation 2021, have been considered to assess the likely impacts of the proposal on the natural and built environment. This consideration is required to comply with sections 5.5 and 5.7 of the EP&A Act.

Table 4-1: Consideration of section 171 of the EP&A Regulation factors

Environmental factor	Impact
a) Any environmental impact on a community? The proposal would have a minor and short-term impact on the community, which is attributable to construction noise, lane closures, delays and construction related visual impacts. Safeguards have been proposed to address identified potential impacts. Over the long-term, the community would benefit from improved safety.	Negative (minor and short-term) Positive (long-term)
b) Any transformation of a locality? The proposal would result in some transformation of the locality in the short-term due to visual impacts associated with construction works. Over the longer term the proposal is unlikely to be noticeable in the broader bushland and rural landscape.	Negative (minor and short-term)
c) Any environmental impact on the ecosystems of a locality? The proposal would have limited impact on ecosystems. Impacts on threatened species, communities and/or their habitats are discussed in Section 3.7. The impacts would be minimised with the implementation of the safeguards as detailed in this REF.	Negative (minor and short-term)
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposal would result in a minor reduction in the aesthetic value of the locality as a result of construction related activities and the removal of trees/vegetation. Works would be contained to the minimum area required to achieve the proposed objectives. The impacts would be minimised with the implementation of the safeguards as detailed in this REF.	Negative (minor short-term and long-term)
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would not affect any known Aboriginal sites. There are also no expected indirect impacts on nearby listed non-Aboriginal heritage items. The proposal footprint is disturbed and is likely to have low or nil archaeological potential. The proposal would have minimal impact on on-going ecological and biological processes and would not impact threatened species or threatened ecological communities.	Nil
f) Any impact on habitat of any protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)? The proposal may result in the removal of some sheltering and foraging resources for small mammals, reptiles, birds and insects. The proposed safeguards are considered adequate to minimise impacts on protected animals.	Negative (minor and short-term)
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life.	Nil
h) Any long-term effects on the environment?	Positive (long-term)

Environmental factor	Impact
Over the longer term the proposal would improve safety for road users and the surrounding environment by preventing future degradation of the slope and significantly reducing the risk of slips occurring.	
i) Any degradation of the quality of the environment? There would be potential for minor, short-term impacts on the quality of the environment including amenity (air quality and noise), visual and potential water quality impacts. Safeguards have been proposed to address the potential impacts.	Negative (minor short-term)
j) Any risk to the safety of the environment? The proposal would not result in a risk to the safety of the environment. Over the longer term the proposal would improve safety for road users and the surrounding environment.	Nil (short-term) Positive (long-term)
k) Any reduction in the range of beneficial uses of the environment? The proposal would not reduce the range of beneficial uses of the environment.	Nil
l) Any pollution of the environment? Minor, short-term risks to water quality would be present in the event of a spill or release of material from the work site during construction. Safeguards have been proposed to address the risk of water pollution. Any dust impacts would be highly localised and can be managed with the proposed safeguards.	Negative (minor short-term and long-term)
m) Any environmental problems associated with the disposal of waste? The proposal would result in some waste as noted in Section 3.12. Waste generated would be transported from the proposal footprint, tracked and disposed of at a licenced waste facility.	Nil
n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply? The proposal would not increase demand for resources which are likely to become in short supply.	Nil
o) Any cumulative environmental effect with other existing or likely future activities? Noting the relatively limited scale of the proposal no cumulative environmental effects as a result of existing or likely future activities have been identified. Coordination with other slope remediation projects on MR220 Freemans Drive will allow any cumulative impacts (primarily construction traffic) to be minimised.	Nil
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not influence coastal processes and/or coastal hazards.	Nil
q) Any impact on applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1? The nominated regional strategic plan is the Hunter Regional Plan 2041. As the proposal is for the repair of an existing road, it does not directly align (but is not inconsistent with) with many of the directions in the plan. The proposal is however consistent with Objective 7: Reach net zero and increase resilience and sustainable infrastructure. The Lake Macquarie City Local Strategic Planning Statement 2041 (LMC LSPS) identifies the key outcomes Council aims to achieve in relation to land uses, activities, landforms and built forms. The proposal supports the following planning priorities identified in the LMC LSPS: • Planning Priority 4: A City of Close Connections – Where People, Goods and Services Move Efficiently • Planning Priority 6: A City With a Vast Natural Environment – That is Valued, Protected and Enhanced	Positive (short-term and long-term)

Environmental factor	Impact
• Planning Priority 7: A City of Resilience – Where the People and Places are Responsive and Proactive to Change	
r) Any impact on other relevant environmental factors? In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Chapter 3 of this assessment.	Nil

4.2 Matters of National Environmental Significance

Table 4-2: Matters of national environmental significance

Environmental factor	Impact
a) Any impact on a World Heritage property? No World Heritage properties are located within proximity to the proposal where any potential impact may arise.	Nil
b) Any impact on a National Heritage place? No National Heritage places are located within proximity to the proposal where any potential impact may arise.	Nil
c) Any impact on a wetland of international importance (often called 'Ramsar' wetlands)? No wetlands of international importance are located within proximity to or downstream from the proposal.	Nil
d) Any impact on nationally threatened species, ecological communities or migratory species? No threatened ecological communities or threatened flora and fauna species listed under the EPBC Act were identified within, or near to, the proposal site. Similarly, none were considered likely to occur or rely upon the habitat to be disturbed for any of their necessary lifecycle requirements. Impacts on migratory species are not expected.	Nil
e) Any impact on a Commonwealth marine area? There would be no environmental impact on a Commonwealth marine area.	Nil
f) Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	Nil

5. Summary of safeguards and environmental management measures

This section provides a summary of the site-specific environmental safeguards and management measures identified in described in chapters 3 and 4 of this REF. These safeguards will be implemented to reduce potential environmental impacts throughout construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Transport QA specifications. Any potential licence and/or approval requirements required prior to construction are also listed.

Table 5-1: Summary of site-specific safeguards for proposed work

Factor	ID	Impact
General	G1	If the scope of the works changes at any time, review under the Roads and Maritime Services Environmental assessment procedure for routine and minor works (EIA-PO5-1) and complete any further requirements prior to undertaking works associated with the changed scope.
	G2	An environmental management plan is prepared in accordance with the specifications set out in QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing, QA Specification G10 - Traffic Management and implemented prior to the commencement of works.
	G3	Parking of vehicles and storage of plant/equipment is to occur on existing paved areas. Where this is not possible, vehicles and plant/equipment are to be kept away from environmentally sensitive areas and outside the dripline of trees.
Soil	ES1	Erosion and sediment control measures are to be implemented and maintained to: • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site. (in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)).
	ES2	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.
	ES3	Erosion and sediment control measures are not to be removed until the works are complete, and areas are stabilised.
	ES4	A progressive erosion and sediment control plan is to be prepared for the works.
	ES5	Parking of vehicles and storage of plant/equipment is to occur only within the designated proposal footprints or at nominated ancillary sites.
	ES6	Existing ground cover vegetation will be retained to the greatest extent possible to minimise the area of exposed soils.
	ES7	The use of established stockpile sites is to be in accordance with the Roads and Maritime Services Stockpile Site Management Guideline (EMS-TG-10).
	ES8	Upslope diversions will be used to direct runoff away from the proposal site to minimise the potential for surface flow to mobilise sediment or other pollutants.

	ES9	If suspected contamination is identified all work would cease and the Transport for NSW Project Manager contacted immediately.
Waterways and water quality	WQ1	There is to be no release of dirty water into drainage lines and waterways.
	WQ2	Water quality controls measures are to be used to prevent any materials (e.g. grout, sediment etc) entering drainage or waterways.
	WQ3	Shotcreting operations would not occur during periods of rainfall or where a medium or higher chance (≥40%) of rainfall is forecast by the Bureau of Meteorology.
	WQ4	Waste shotcrete would be frequently removed from the road pavement and other areas to prevent mobilisation during a rainfall event.
	WQ5	Vehicle wash down would occur in a bunded area within a nominated site compound.
	WQ6	Plant and equipment will be inspected regularly to ensure there are no leakages of fuel, oil and hydraulic fluid.
	WQ7	Chemicals and liquids will be stored in an impervious bunded area within the compound site when not in use.
	WQ8	If refuelling of plant and equipment is required on site it will take place from a small mobile tanker (or fuel pod), on flat ground and with appropriate mobile spill containment in place..
	WQ9	If an incident (e.g. spill) occurs, the Environmental Incident Procedure (Transport for NSW, 2021) is to be followed and the Transport for NSW Contract Manager and Environment Manager notified immediately.
	WQ10	An emergency spill kit is to be kept on site and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances. All staff are to be made aware of the location of the spill kit and trained in its use.
	WQ11	Procedures will be developed for managing the worksite where there is a risk of flooding, including removal and storage of plant and equipment and securing of the site, and access arrangements.
Noise and vibration	NV1	The standard mitigation measures identified in Appendix B of the Construction Noise and Vibration Guideline (Transport for NSW, 2023) will be implemented.
	NV2	A letterbox drop notification for residential receivers within 250m of the proposed compound, and receivers along the Palmers Road and Leggetts Drive sections of the detour route, will occur at least five business days prior to works starting. The notification will detail work activities, dates and hours, impacts (including any changed traffic arrangements) and mitigation measures. It will also include a contact number for enquiries and complaints.
Air quality	AQ1	Work will not be carried out during strong winds or in weather conditions where elevated levels of dust or air borne particulates are likely.
	AQ2	Vehicles transporting waste or other materials that may produce odours or dust are to be covered during transportation.
	AQ3	Stockpiles or areas that may generate dust are to be managed to suppress dust emissions in accordance with the Roads and Maritime Services Stockpile Site Management Guideline (EMS-TG-10).
	AQ5	Spoil from drilling and micro pile works will be placed directly onto the embankment reducing loading and hauling of spoil to the nominated stockpile locations.
	AH1	If Aboriginal heritage items are uncovered during the works, all works must cease in the vicinity of the find and the Transport for NSW Aboriginal Community and Heritage Partner

Non-Aboriginal heritage		and the Environment Manager contacted immediately. The steps in the unexpected heritage items procedure (Transport for NSW, 2022) must be followed.
	AH2	Site inductions will cover the location of nearby Aboriginal sites and the requirement to avoid impacts. Inductions will be informed by a map showing the location of Aboriginal archaeological sites.
Aboriginal heritage	H1	If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the unexpected heritage items procedure (Transport for NSW, 2022) must be followed. The Transport for NSW Environment Manager must be contacted immediately.
Biodiversity	BD1	Pre-clearing surveys will be carried out in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
	BD2	Native vegetation removal will be minimised through pre-construction planning.
	BD3	Vegetation clearance limits will be identified on site maps/plans and on-site exclusion zones will be established as per Guide 2: Biodiversity Guidelines Protecting and managing biodiversity on RTA projects (RTA, 2011).
	BD4	Retained trees would be clearly identified on-site prior to the commencement of work to ensure they are not indirectly impacted or cleared.
	BD5	Vegetation removal would be carried out in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011). An ecologist (or similar qualified person) is to be present on-site during the removal of the three hollow-bearing trees.
	BD6	The three hollow-bearing trees should be 'soft- felled' in sections, with hollow-limbs lowered to the ground. These should be collected and used locally as habitat as part of the off-setting requirements. Where possible, relocate locally the felled trees as opposed to the mulching of these plants. Relocation of the felled trees would aim at providing habitat for native species and their prey (as per DEC 2004 Threatened Species Survey and Assessment: Guidelines for developments and activities and Transport's Biodiversity guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)).
	BD7	The three hollow-bearing trees are to be marked during pre-clearing surveys and retained for Stage 2 of clearing (i.e., left for at least 24 hours following Stage 1 clearing). All vegetation around the hollow-bearing trees to be removed would be cleared 24 to 48 hours prior to the removal of the hollow-bearing trees. This approach isolates the hollow-bearing trees and reduces their habitat value (particularly for ground-traversing fauna that are exposed to predation).
	BD8	Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
	BD9	Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock.
	BD10	The felled trees will be cut at ground level, retaining the stump/root system in the ground, maintaining soil stabilisation. The root structure of removed trees must be left undisturbed.
	BD11	Removed native vegetation would be mulched or re-used on-site (e.g., to stabilise disturbed areas).
	BD12	Fauna that may be present on-site during works will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing

		biodiversity on RTA projects (RTA, 2011).). Prior to the start of works suitable wildlife rescuers will be identified and contact details provided to site staff.
	BD13	Inspections for the presence of any sheltering native species would be carried out within the affected culverts, as well as under vehicles and machinery prior to their use.
	BD14	Weed species would be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011) and the Biosecurity Act 2015 (general duty to prevent, eliminate or minimise any biosecurity risk). This would include disposing of weeds and weed contaminated soil at an appropriate waste management facility.
	BD15	If unexpected, threatened fauna or flora species are discovered, stop works immediately and follow the Unexpected Threatened Species Find Procedure in Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011).
	BD16	To prevent the spread of pathogens, the Best Practice Hygiene Protocols in Guide 7: Pathogen management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA, 2011) will be implemented.
	BD17	The removal of trees will be offset in accordance with the Transport Tree and hollow replacement guidelines. If tree planning is proposed, a Tree Replacement Plan is to be prepared.
	BD18	If any hollow bearing trees are identified as requiring either partial or full removal, preference will be given to only partial removal leaving the hollow in situ where possible. If partial removal is not possible, trees with hollows that are to be completely felled will be left onsite nearby for potential re-occupation rather than being removed from site. Trees identified with habitat features would be soft fallen in the presence of an onsite arborists.
	BD19	Vegetation and tree removal will be undertaken with an agreed staged approach.
Trees	Refer to safeguards BD1-BD15, proposed in section 3.7.	
Traffic and transport	TT1	During construction, traffic and/or pedestrian movements would be managed in accordance with *Traffic control at work sites – Technical manual* (version 6.1, 2022) as necessary.
	TT2	A traffic control plan will be prepared in accordance with the *Traffic control at work sites – Technical manual* (version 6.1, 2022) and Australian Standard 1742.3 Manual of uniform control devices
	TT3	Notice will be provided to road users via advance Variable Message Sign notifications on MR220 Freemans Drive on approach to the proposal site. Preconstruction Notification will also be provided to Lake Macquarie Council by Transport.
	TT4	Project team to consult with 'Customer and Network Operations Coordinators' to ensure Variable Message Signs are in place and emergency services have been contacted.
Socio-economic	S1	All complaints received during the work are to be recorded on a complaints register and dealt with promptly.
	S2	Nearby businesses (including the nearby service stations) and emergency services will be notified prior to the start of works.
Landscape character and visual amenity	V1	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
	V2	All construction related material and equipment will be removed from the proposal footprint at the completion of work and disturbed areas restored.

	V3	Construction site lighting will be oriented to minimise the risk of light spill impacts on adjacent bushland.
	V4	Opportunities to further minimise the visual contrast of the shotcrete with existing landscape character will be investigated and shotcrete would be managed in accordance with Roads and Maritime Shotcrete Design Guidelines 2016.
Waste	WM1	Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) Disposal is undertaken as a last resort (in accordance with the *Waste Avoidance & Resource Recovery Act 2001*).
	WM2	Waste material is to be reused in accordance with any waste exemptions or disposed of legally in accordance with its waste classification.
	WM3	Bulk project waste (e.g. fill) to be reused on site where suitable or sent to a site not owned by the Roads and Maritime Services (excluding EPA licenced landfills and resource recovery facilities) is to have prior formal written approval from the landowner, in accordance with Environmental Direction No. 20 – Legal Off-site Disposal of Roads and Maritime Services Waste. This includes waste transported for reuse, recycling, disposal or stockpiling.
	WM4	All construction related material and equipment will be removed from the proposal footprint at the completion of work and disturbed areas restored.
	WM5	If vegetation is to be mulched and transported off site for beneficial reuse, it is to be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the Roads and Maritime Technical Procedure: Mulch Management
	WM6	All construction related material and equipment will be removed from the proposal footprint at the completion of work and disturbed areas restored.

5.1 Licensing and approvals

Table 5-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Roads Act 1993	Road occupancy licence	Prior to the start of activity

5.2 Other requirements

Table 5-3: Other requirements

Requirement		
Environmental management plan sent to SMES for review.	Yes ☒	No ☐

6. Certification, review and decision

6.1 Certification

This minor works REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposal.

Prepared by

Signature 

Name:	Jacob Mifsud
Position:	Consultant
Company name:	bd infrastructure
Date:	1 February 2024

Minor Works REF reviewed by:

Signature 

Name:	Stuart Hill
Position:	Principal - Environment
Company name:	bd infrastructure
Date:	1 February 2024

6.2 Environment staff review

The Minor Works REF has been reviewed and considered against the requirements of sections 5.5 and 5.7 of the EP&A Act.

In considering the proposal this assessment has examined and taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity as addressed in the Minor Works REF and associated information. This assessment is considered to be in accordance with the factors required to be considered under section 171 of the Environmental Planning and Assessment Regulation 2021.

The proposal described in the Minor Works REF will have some environmental impacts which can be ameliorated satisfactorily. Having regard to the safeguard and management measures proposed, this assessment has considered that these impacts are unlikely to be significant and therefore an approval for the proposal does not need to be sought under Division 5.2 of the EP&A Act.

The assessment has considered the potential impacts of the activity on areas of outstanding value and on threatened species, ecological communities or their habitats for both terrestrial and aquatic species as defined by the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994*.

The proposal described in the Minor Works REF will not affect areas of outstanding value. The activity described in the Minor Works REF will not significantly affect threatened species ecological communities or their habitats. Therefore, a species impact statement is not required.

The assessment has also addressed the potential impacts on the activity on matters of national environmental significance and any impacts on the environment of Commonwealth land and concluded that there will be no significant impacts. Therefore, there is no need for a referral to be made to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Minor Works REF is considered to meet all relevant requirements.

6.3 Environment staff recommendation

It is recommended that the proposal to carry out slope remediation on MR220 Freemans Drive at Freemans Waterholde as described in this Minor Works REF proceed subject to the implementation of all safeguards identified in the Minor Works REF and compliance with all other relevant statutory approvals, licences, permits and authorisations.

The Minor Works REF has examined and taken into account to the fullest extent possible all matters likely to affect the environment by reason of the activity and established that the activity is not likely to significantly affect the environment or threatened species, ecological communities or their habitats.

The Minor Works REF has concluded that there will be no significant impacts on matters of national environmental significance or any impacts on the environment of Commonwealth land.

The Minor Works REF determination will remain current for five years until June 2028 at which time it shall lapse if works have not been physically commenced.

Recommended by

Signature 

Name: Renae Martin

Position: Environment and Sustainability Manager

Date: 9/02/2024

6.4 Determination

In accordance with the above recommendation, I certify that I have reviewed and endorsed the contents of this Minor Works REF, and to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under Section 170 of the EP&A Regulation, and the information is neither false nor misleading.

I determine that Transport for NSW may proceed with the activity.

Signature 

Name: Katherine Holzner

Position: Senior Manager Project Services North

Date: 4/4/2024

6.5 EP&A Regulation publication requirement

Table 6-1: EP&A Regulation publication requirement

Requirement		
Does this Minor Works REF need to be published under section 171(4) of the EP&A Regulation?	Yes ☐	No ☒

7. Definitions

Table 7-1: Definitions

Term	Definition
BC Act	*Biodiversity Conservation Act 2016*
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FM Act	*Fisheries Management Act 1994* (NSW)
LEP	Local Environmental Plan
PCT	Plant Community Type
REF	Review of Environmental Factors
SEED	Sharing and Enabling Environmental Data (online NSW data resource)
SEPP	State Environmental Planning Policy

Appendix A: Biodiversity Assessment Report

Transport for NSW

Biodiversity assessment report for REF

Slope Remediation (15094), Freemans Drive, Freemans Waterhole, NSW

February 2024

NSW GOVERNMENT

transport.nsw.gov.au

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Executive summary

A Biodiversity Assessment has been conducted as Transport for NSW is proposing to remediate slope 15094 on MR220 Freemans Drive, north of Freemans Waterhole in Lake Macquarie Council region, which was damaged during the declared natural disaster event of AGRN1025 'NSW Severe Weather and Flooding June 2022 onwards'.

This Biodiversity Assessment has been carried out by Lesryk Environmental Pty Ltd to accompany the Review of Environmental Factors being prepared for the proposal. The Biodiversity Assessment assesses the impact of the proposal to meet the requirements of the NSW *Environment Planning and Assessment Act 1979*.

To permit the proposal, based on a worst-case estimate, the construction footprint comprises about 1.48 hectare. Within this, up to about 1.04 hectare of vegetation would require disturbance/removal, inclusive of the removal of an estimated 224 trees, including three that are hollow-bearing trees (it is noted that a number of trees that are to be 'cleared' have already fallen due to the influence of the landslip). Trees are to be retained where possible.

In line with Transport for NSW's *Tree and hollow replacement guidelines* (Transport 2022b), 1224 trees are required to be re-planted and three artificial hollows would require provision within the project boundary or on land adjacent to or close by the project limits with landowner's consent. Alternatively, Transport for NSW may opt to transfer $153,750 into the Transport Conservation Fund.

Within the area investigated, no recorded species or ecological communities listed, or currently being considered for listing, under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or NSW *Biodiversity Conservation Act 2016* were recorded. In addition, no threatened plants that may be visible at other times of the year were considered to be present.

No Matters of National Environmental Significance listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* are present within, or within the vicinity of, the slope remediation site.

As 224 insect-attracting and pollen producing plants are to be cleared, three of which are hollow-bearing, and as targeted surveys for hollow-dependent fauna were not conducted, a precautionary approach to the presence of the Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat, Squirrel Glider, Little Lorikeet, and Stephen's Banded Snake was adopted. To consider the impact of the slope remediation works, including the removal of trees (three of which are hollow-bearing) would have on hollow-dependent fauna, the assessment criteria provided under Section 7.2 of the NSW *Biodiversity Conservation Act 2016* were referred to and drawn upon. Reference to these criteria concluded that the slope remediation works would not have a significant effect on hollow-dependent fauna or their habitats.

The proposal does not trigger a Species Impact Statement, nor Biodiversity Development Assessment Report.

Mitigation measures to reduce any ecological impact as a result of the proposed slope remediation work have been recommended in Section 6 of this report. Two primary measures include:

- Minimising impact through detailed design.
- Adhering to Transport's Biodiversity Guidelines (RTA 2011).

In addition, the following key mitigation measures have been provided:

- Limit vegetation removal to the minimum required to successfully permit the proposal
- Replant 1224 trees to replace the removal of 224 trees and provide three artificial hollows to replace removal of three hollow-bearing trees
  - Alternatively, Transport for NSW may opt to transfer $153,750 into the Transport Conservation Fund
- Prepare an Erosion and Sediment Control Plan to minimise soil erosion and sediment transfer off-site.

Adoption of these measures would ensure that the work proposed is carried out in an ecologically sustainable manner.

1. Introduction

1.1 Proposal background

Transport for NSW (Transport) are proposing to undertake slope remediation work downslope of MR220 Freemans Drive, near the NSW town of Freemans Waterhole (Figure 1-1). To remediate the 240 metre (m) slope, an area of about 30 m downslope from the north-west bound road pavement would also require remediation (Figure 1-2).

The declared natural disaster event of AGRN1025 'NSW Severe Weather and Flooding June 2022 onwards' has caused some damage to the Region North road transport network, with impacts on the State, regional and local networks. This report exclusively addresses restoration works of the failed slope 15094 on MR220 Freemans Drive, north of Freemans Waterhole in Lake Macquarie Council region (Transport 2023, Appendix A).

Following the initial emergency response, Transport for NSW – Natural Disaster Recovery team has been tasked to implement a permanent embankment remediation solution for the site to ensure the integrity and long-term sustainability of the road corridor (Transport 2023). The site is located 1.2 kilometres (km) from Freemans Waterhole. The planned works are on the shoulder of Freemans Drive extending for about 240 m and about 30 m downslope (Transport 2023).

As noted, the July 2022 storm event caused a downslope embankment failure on Freemans Drive. Freemans Drive is a road cutting through Sugarloaf State Conservation Area and Heaton State Forest with a high cutting through weathered sandstone rock (Transport 2023). The downslope or northbound lane of Freemans Drive is adjacent Heaton State Forest; however, the cadastral boundaries for the site have been confirmed with the proposed works not to extend beyond current boundary lines (Transport 2023).

The objectives of the proposed slope remediation works are to:

- Stabilise the slopes of the road embankments along MR220, Freemans Drive
- Improve safety for motorists using the MR220, Freemans Drive
- Minimise long-term environmental and social impacts
- Minimise disruptions to road users and the community.

Lesryk Environmental Pty Ltd (Lesryk) has been engaged to conduct the Biodiversity Assessment and investigation to consider and assess all ecological matters affecting or likely to affect the environment as a result of the proposed work. The Biodiversity Assessment Report (BAR) will accompany the Review of Environmental Factors (REF) being prepared for the proposal in compliance with the requirements of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 The proposal

Transport proposes to remediate Slope 15094 on MR220 Freemans Drive about 1.9 km north of Freemans Waterhole in the Lake Macquarie local government area (the proposal). The location of the proposal is shown in Figure 1-1. The initial slope failure encompasses a 50 metre long stretch of the downslope embankment, adjacent to the northbound lane. (Figure 1-2). The failure was caused by water infiltrating through cracked road pavement and dislodged drainage lines, creating instability and causing the toe of the embankment to fail. If left as is, water infiltration will likely result in further slope failure. The proposal includes the direct impact area of the construction footprint located at the slope failure site and ancillary areas, including the locations of two site compounds and a stockpile site (referred to collectively as the study area).

The proposed construction footprint has been extended on either side of the failure to include further areas that are at risk of slope failure. The construction footprint is about 240 m long and extends from the eastern side of MR220 Freemans Drive to about 30 m beyond the existing western guardrail, comprising of an area of about 14,800 square metres (m^2). A temporary access track is proposed within the construction footprint from MR220 Freemans Drive to the base of the slope, to provide access for construction plant and equipment.

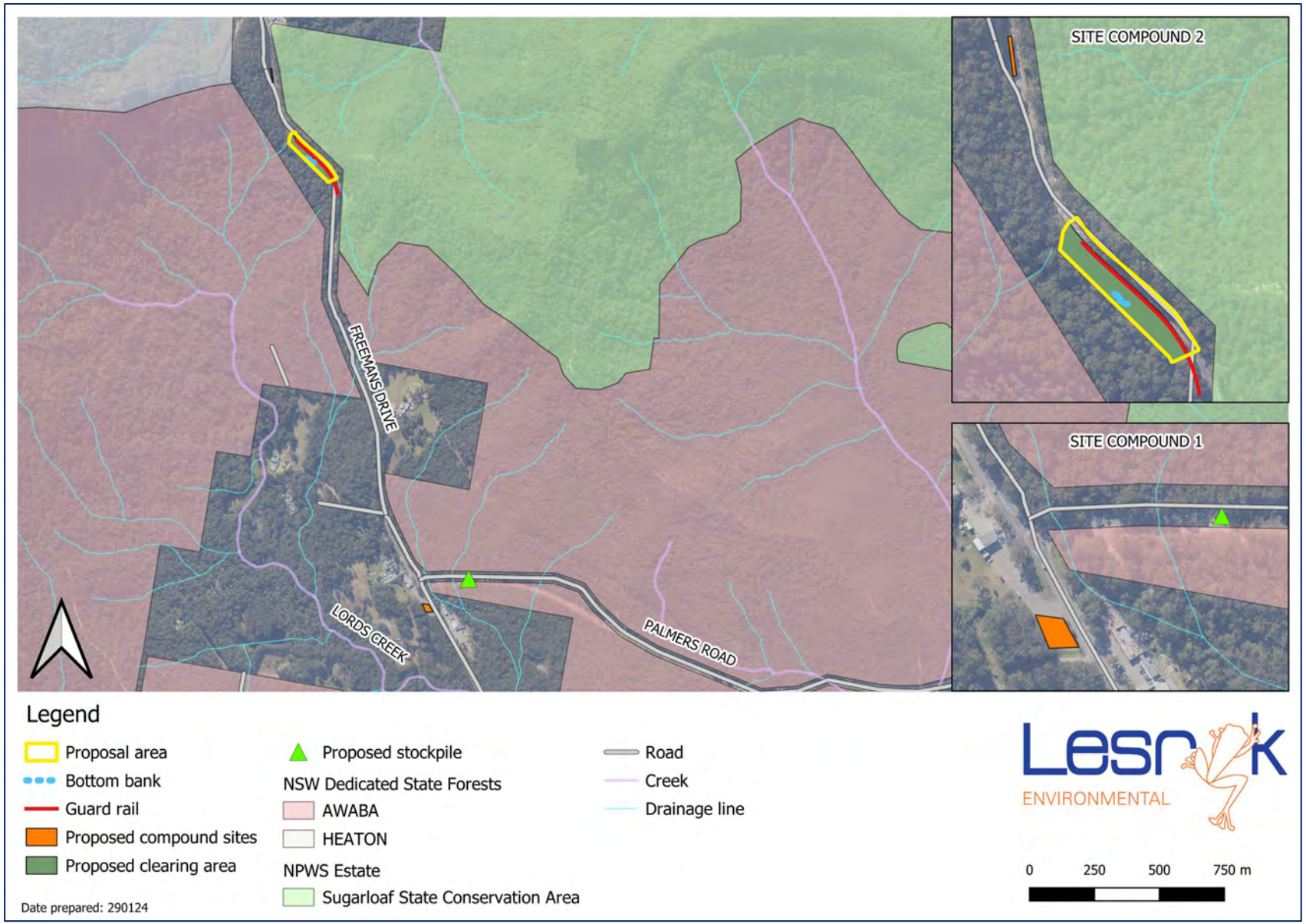

Figure 1-1: Proposal context

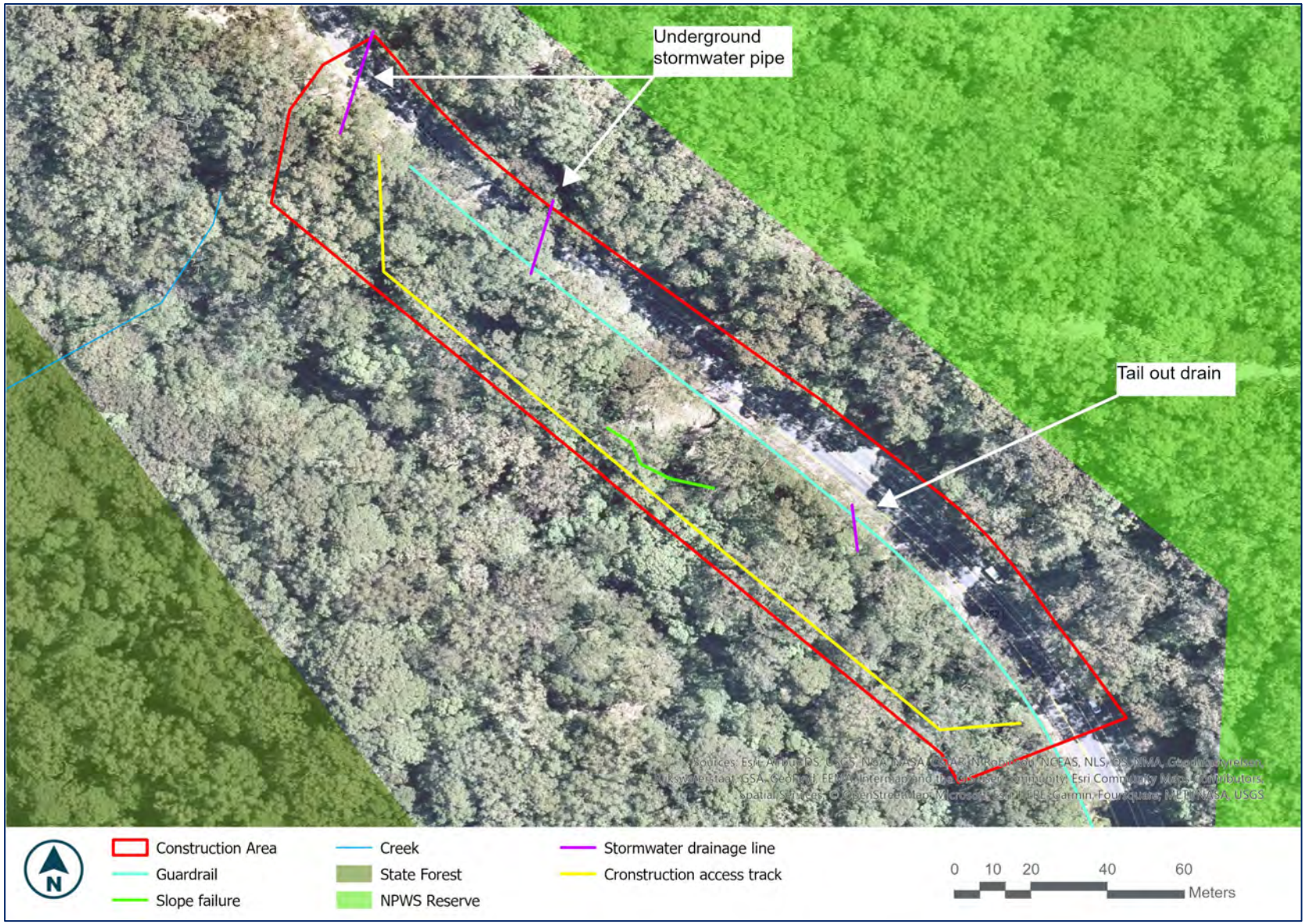

Figure 1-2: The proposal

Key features of the proposal include (with reference to Figure 1-3):

- Tree and vegetation removal that would include night works with a full road closure / detour over a period of up to two weeks
- The establishment of a temporary access track including placement of rock to form a ramp from MR220 Freemans Drive and along the toe of the slope
- Installation of a threaded rod anchor nail
- Installation of 150-millimetre (mm) diameter micropiles, pouring of 100 mm no fines concrete binding layer and pouring of a 0.52 m wide and 0.6 m deep capping beam above the binding layer
- Embankment treatment using grouted soil nails to reinforce the slope, accompanied by placement of a flexible steel mesh reinforced mat that is laid over the slope face
- Drilling of sub-horizontal drains into the rock
- Shotcrete treatment at the main failure location where required
- Shotcrete treatment of drainage lines that traverse the embankment
- Establishment of a new kerb and barrier (fixed to the capping beam) on the north-bound side of MR220 Freemans Drive
- Upgrade of two existing subsurface drainage lines including repair of existing pipes, replacement of headwalls, placement of shotcrete below outlet and placement of rock filled mattresses at the toe of the batter
- Shotcrete treatment at the southern end of the works where the kerb tails out
- Milling and re-sheeting a portion of the road pavement
- The use of ancillary areas for two site compounds and stockpiling activities.

To permit the slope remediation work, vegetation management—including the removal of up to 224 trees—is required.

Up to two compound facilities would be required for the proposal.

- Site compound No.1 is an existing hardstand area located about 2 km south of the proposal on the western shoulder of MR220 Freemans Drive. It has an area of about 800 m^2 and would be used for worker amenities and some storage. No tree removal is proposed.
- Site compound No. 2 is an existing hardstand area located approximately 200 m north of the proposal on the western shoulder of Freemans Drive, within the road reserve in association with the existing United Petrol Station. It has an area of about 200 m^2 and would be used for worker amenities and some storage. No tree removal is proposed. It is acknowledged consultation with United Petrol Station landowners will be required.

The proposed stockpile site is an existing Transport stockpile site located about 2 km south of the proposal adjacent to the southern side of Palmers Road. It has an area of approximately 500 m^2 and would be used, if required, to temporarily stockpile any additional soil not utilised in the proposal.

The following machinery/equipment would be used during the proposed work:

- Small and medium size excavators
- Soil/rock nail drilling rig which is a small rig on rubber tracks
- Knuckle boom sled nailing platform
- Six-wheel dump trucks; tip trucks
- Concrete delivery trucks and concrete pumps
- Elevated work platforms and booms
- Chainsaws, vegetation mulchers
- Light vehicles
- Mobile crane
- Telehandler and franna cranes may be required
- Traffic control equipment.

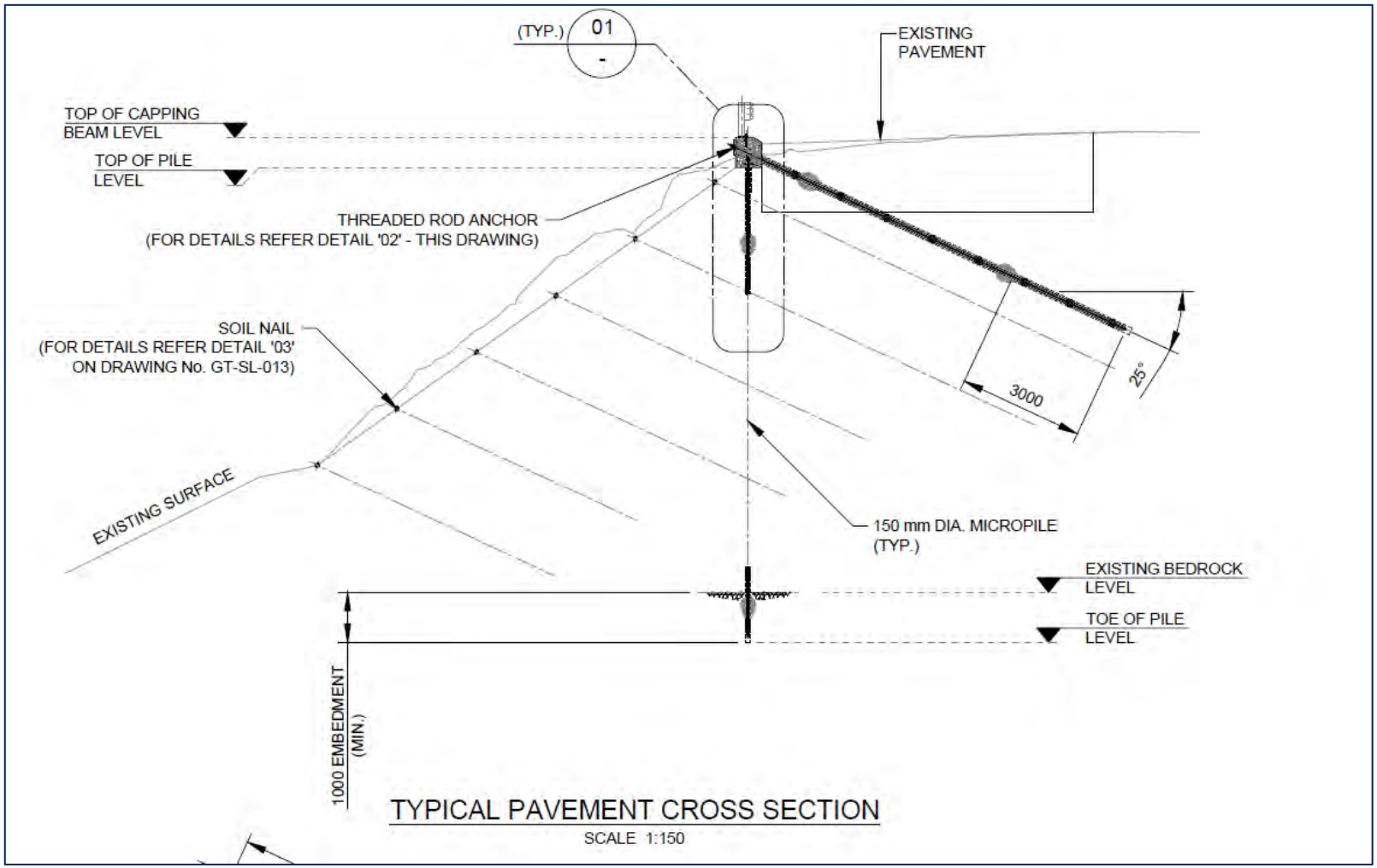

Figure 1-3: Proposal typical cross section

The proposal is anticipated to commence in the 3rd and 4th quarter of 2024 and take approximately between five and eight months to complete.

Work would be carried out during the following working hours:

- 7am to 6pm Monday to Friday
- 8am to 4pm Saturdays
- 6pm to 7am night works, Monday to Friday
- No works on Sundays and Public Holidays.

Night works are required for tree removal where a crane will need to occupy both lanes necessitating a full road closure and detour. Implementing the full road closure at night would avoid periods where traffic volumes are highest and therefore impact fewer road users. Extended works on Saturday have been proposed should site conditions change (e.g., further deterioration in the slope) requiring works to be expediated.

1.2.1 Assessment areas

The study area assessed within this report is inclusive of the failed slope 15094, a nominated buffer that encompasses land immediately surrounding the failed slope, and any additional areas which are likely to be affected by the proposal (i.e., ancillary sites – compound/stockpile), either directly or indirectly (i.e., in which 'disturbances would occur' [movement of machinery, personnel etc]). The study area is subject to the conducted ecological investigation. Based on a worst-case estimate, the study area totals approximately 1.63 hectares (ha).

The study area comprises:

- Proposal area (Construction footprint) encompassing an area of about 1.48 ha (14,800 m^2) (with reference to Figure 1-2):
  - 240 m length of work (extending from the eastern side of MR220 Freemans Drive) by 30 m width beyond the existing western guardrail
  - disturbance/removal of up to 1.04 ha of vegetation (i.e. the proposal area excluding the existing road, and based on approximately 240 m length of work by 30 m width, plus 10 m buffers encompassing land immediately surrounding the failed slope) to achieve the objectives of the proposal, including the removal of up to 224 mature native trees (three being hollow-bearing)
  - establishment of temporary access track, expected to be about 3 m wide
  - indirect disturbance through movement of personnel and vehicles/machinery
- One spoil/stockpile location and two compound sites (totalling about 1500 m^2)
  - Existing Transport stockpile site has an area of about 500 m^2
  - Site compound No.1 has an area of about 800 m^2
  - Site compound No. 2 has an area of about 200 m^2

The operational footprint of the proposal would be less than the construction footprint.

1.3 Legislative context

A REF is prepared to satisfy Transport's duties under s.5.5 of the EP&A Act to "examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity" and s.5.5 in making decisions on the likely significance of any environmental impacts. This biodiversity impact assessment forms part of the REF being prepared for the Freemans Drive Slope Remediation Project and assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and threatened ecological communities or their habitats is assessed using the assessment of significance (commonly known as 'five-part test') at Section 7.3 of the BC Act. Where a significant impact is likely to occur, a Species Impact Statement (SIS) must be prepared in accordance with the Environment Agency Head's requirements, or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

In September 2015, a “strategic assessment” approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Transport’s road activities being assessed under Division 5.1 (formerly Part 5) of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species.

As a result, Transport road proposals assessed via an REF:

- Must address and consider potential impacts on EPBC Act listed threatened species, populations, ecological communities, and migratory species, including application of the “avoid, minimise, mitigate and offset” hierarchy
- Do not require referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for these matters, even if the activity is likely to have a significant impact
- Must use the BAM to calculate credits that would offset significant impacts on EPBC Act listed threatened species, ecological communities and migratory species.

To assist with this, assessments are required for all relevant biodiversity values in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013).

2. Methods

2.1 Personnel

Personnel involved in the assessment, and their qualifications, are identified in Table 2-1.

Table 2-1: Personnel

Name	Role	Qualifications
Mr Deryk Engel	Director and Senior Ecologist. Project management, field investigation, Biodiversity Assessment Report (BAR) review and quality assurance	B.Env.Sc. (Hons)
Mr Paul Burcher	Botanist, site investigation, contribution to BAR	B.App.Sc
Ms Isabel Burcher	Site investigation, BAR write-up	B.Sc.
Ms Chelsea Tiller	Field ecologist, site investigation.	B.Soc.Sc.
Mr Peter Monsted	Entry of data into the BAM-C and generation of VIS	B.Sc.M.Sc BAM Assessor Accreditation No. BAAS22011

2.2 Background research

Prior to carrying out any fieldwork, known databases and any previous studies conducted in the region were consulted to identify the diversity of ecological communities, flora and fauna species known for, or potentially occurring in, the study region. The identification of those known or potentially occurring native species and communities within this portion of the Lake Macquarie LGA, particularly those listed under the Schedules to the EPBC, BC and/or FM Acts, thereby permits the tailoring of the field survey strategies to the detection of these plants and animals, their vegetation associations and/or necessary habitat requirements. By identifying likely species, particularly any threatened plants and animals, either the most appropriate species-specific survey techniques may be selected (should their associated vegetation communities/habitat requirements be present) or a precautionary approach to their presence adopted.

The carrying out of a literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are considered and drawn upon as required. This approach therefore increases the probability of considering the presence of, and possible impact on, all known and likely native species, particularly any plants and animals that are of regional, State and/or national conservation concern. This approach also avoids issues inherent with a one off ‘snap-shot’ study.

A list of all databases, date these were accessed, and the search area employed is provided in Table 2-2.

Other reports and documents referred to are provided within the bibliography section of this report.

All these databases and reports were reviewed and drawn upon where relevant. While reviewing these documents, particular attention was paid to identifying relevant ecological matters listed, or currently being considered for listing, under the Schedules of the EPBC, BC and/or FM Acts, plants, animals and ecological communities that have been recorded in the region and which may occur within, or in the vicinity of, the study area.

The proposal’s construction footprint is located about 15 m upslope of a nearby unnamed tributary of Lords Creek (a non-perennial watercourse), which flows into Lake Macquarie via Dora Creek. The slope remediation works is expected to stabilise and minimise further erosion of the roadside slope. This would help maintain watercourse structure and would minimise impact on water quality associated with the failure and erosion of the slope. The proposal also involves repair and outlet treatments at two existing cross drainage lines. The proposed compound No.1 is about 50 m from a non-perennial tributary of Lords Creek, while the proposed stockpile is immediately adjacent to another tributary.

Table 2-2: Database searches

Database/Information sources	Date accessed	Search area
Protected Matters Search Tool (PMST) (DCCEEW 2023a)	May 2023	10 km buffer on study area
Register of critical habitat (DCCEEW 2023e)	May 2023	N/A
BioNet Atlas (DPE 2023a)	May 2023	10 km buffer on study area
Areas of Outstanding Biodiversity Value register (DPE 2023c)	May 2023	N/A
NSW WeedWise Database (DPI 2023a)	May 2023	Lake Macquarie LGA
Fisheries NSW Spatial Data Portal (DPI 2023b)	May 2023	Central Rivers layer
NSW State Vegetation Type Map (State Government of NSW and DPE 2022)	May 2023	Study area
BioNet Vegetation Classification database (NSW Government 2023a)	May 2023	N/A
Biodiversity Values Map and Threshold Tool (NSW Government 2023b)	May 2023	Study area
PlantNet (2023)	May 2023	N/A
SEED map viewer (NSW Government 2023c)	May 2023	Study area
Threatened Species website (OEH 2023)	May 2023	N/A
Groundwater Dependent Ecosystems Atlas (BoM 2023b)	May 2023	Study area
National Flying-fox monitoring viewer (DCCEEW 2023f)	May 2023	Study area

Impacts on nearby watercourses (beyond existing inputs from Freemans Drive) are considered to be minor. The nearest mapped Key Fish Habitat is Lords Creek, this located about 500 m south-west of the proposal area (see Figure 1-1). No consultation with DPI Fisheries regarding the NSW *Fisheries Management Act 1994* (FM Act) is required for the proposal. This view is supported through the consultation of applicable databases listed below, confirming no listed fish or their habitats occur in proximity to the proposed slope remediation site.

Field guides and standard texts used include:

- Brooker and Kleinig (1999) [used to identify eucalypts]
- Fairley and Moore (2010) [other vegetation]
- Cogger (2014) [reptiles and frogs]
- Anstis (2017) [frogs]
- Churchill (2008) [flying mammals]
- Simpson and Day (2010) [birds]
- Van Dyck and Strahan (2008) [non-flying mammals]
- Triggs (1996) [identification of scats, tracks and markings]

Nomenclature follows that in these texts, or within the EPBC and BC Acts. It is noted that the current accepted scientific names for some of the threatened fauna species previously recorded in this locality are not consistent with the names used/provided under either the EPBC and/or BC Acts. In these instances, nomenclature used within this report follows the current approved scientific conventions.

Where applicable, any TECs were classified and named according to the NSW Scientific Committee's Final and Preliminary Determinations [various dates].

The conservation significance of those ecological communities, plants and animals recorded is made with reference to:

- The EPBC and BC Acts
- Vegetation mapping of the study region (State Government and DPE 2022)
- The BioNet Vegetation Classification database (NSW Government 2023a).

2.3 Vegetation assessment

2.3.1 Vegetation mapping

Vegetation of the locality has been mapped and described in the NSW State Vegetation Type Map (SVTM) (State Government of NSW DPE 2022). Mapping identifies the most likely Plant Community Type (PCT) to occur in a given polygon. Figure 2-1 illustrates the SVTM in relation to the study area (inclusive of ancillary sites). Refer also to Section 3.1 for further details of PCTs and vegetation zones.

It is acknowledged the SVTM mapped six PCTs within the study area; however, on-site ground-truthing found the mapping to be inaccurate, with only PCT 3150 Hunter Coast Ranges Turpentine Wet Forest identified within the study area.

2.3.2 Vegetation survey and classification

Vegetation zones

Referencing Section 3.1 of this report, one vegetation zone that would be affected by the proposal was identified, being a patch of low condition/disturbed PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest. The vegetation zone was readily assessed by way of its characteristic canopy species, extent of weed cover and landscape position.

While compound site No.1 on Freemans Drive is also mapped as PCT 3150, the field investigation found that the NSW SVTM at this site was inaccurate, as no native vegetation was present within the area. The assemblage of primarily exotic plants present does not conform to any native vegetation community. Compound site No.1 meets the Transport criteria for assessing vegetation in low condition without a vegetation integrity score as greater than 90% of ground cover vegetation is cleared.

While compound site No.2 is mapped on Figure 2-1 as PCT 3581, it is in fact an existing hardstand area on the western shoulder of Freemans Drive and has no native vegetation present.

Plot-based vegetation survey

As the area of PCT 3150 was less than 2 ha at the slope site, one BAM plot was surveyed within the one vegetation zone of this PCT (this undertaken in accordance with subsection 4.3.4 of the BAM) (Table 2-3). Due to access constraints associated with the failed slope area, the BAM plot was placed within the area proposed to be cleared, at the foot of the slope (within vegetation characteristic of what would have been present on the slope itself), this extending from a very disturbed Lantana-infested area into more intact vegetation (Figure 2-2). The results of the BAM plot are presented in Appendix B. A BAM plot was not required in the stockpile and compound sites as these are cleared areas where the vegetation is in low condition.

Table 2-3: Minimum number of plots required and completed per vegetation zone

Veg zone	PCT	Condition	Area (ha)	No. plots required	No. plots completed (plot IDs)
1	3150 Hunter Coast Ranges Turpentine Wet Forest	Disturbed	1.04	1	1: FD01

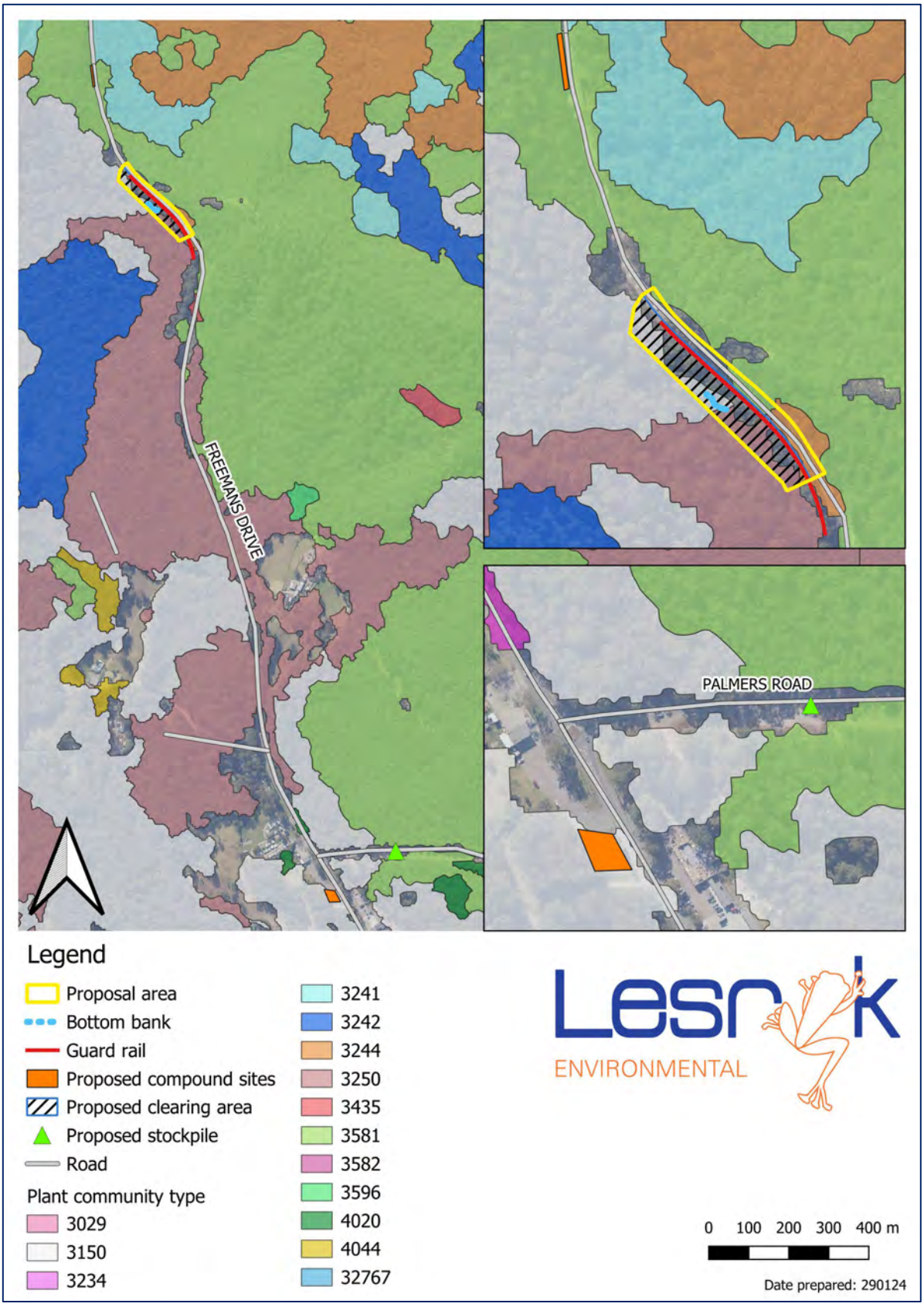

Figure 2-1: State Vegetation Type Mapping

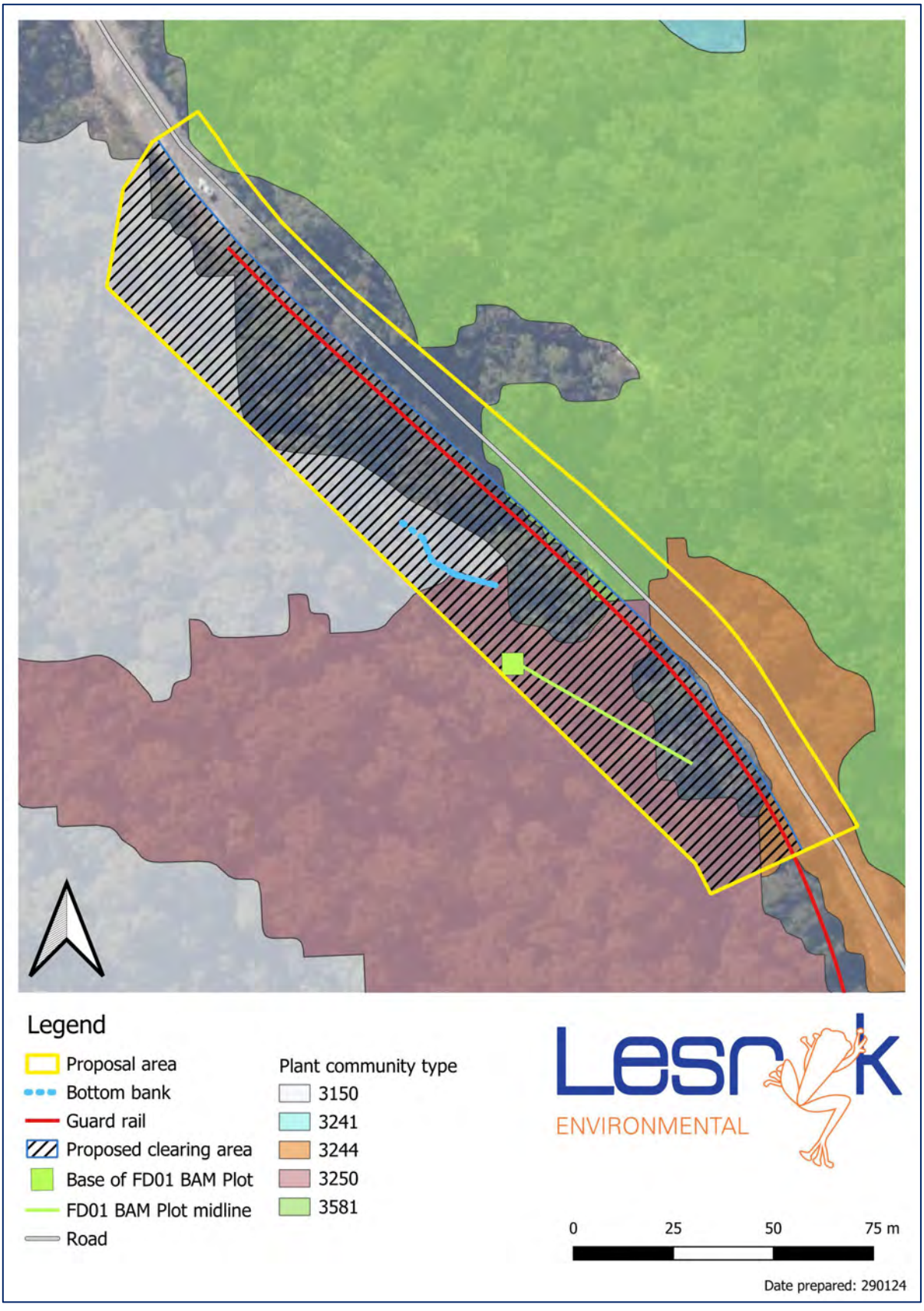

Figure 2-2: Vegetation plot-based survey location

2.3.3 Patch size

The patch size was calculated in a GIS using a combination of aerial photography (the Public NSW Imagery layer) and the SVTM (State Government of NSW and DPE 2022). The calculation for the one vegetation zone within the construction footprint was done in accordance with s.4.3.2 of the BAM. The result is provided in Section 3-1 of this BAR.

2.3.4 Native vegetation cover

In accordance with Section 3.2 of the BAM, native vegetation cover in the 'landscape assessment area' was calculated in a GIS using a combination of aerial photography (the Public NSW Imagery layer) and the SVTM (State Government of NSW and DPE 2022). The results are presented in Table 2-4.

Table 2-4: Native vegetation cover in the assessment area

Assessment area (ha)	557
Total area of native vegetation cover (ha)	534
Percentage of native vegetation cover (%)	96
Class (0-10, >10-30, >30-70 or >70%)	>70

2.4 Threatened species assessment

A biodiversity assessment of the study area was carried out by Deryk Engel, Paul Burcher, Isabel Burcher and Chelsea Tiller on 10 May 2023 from 9-11am. The weather experienced during the site investigation was moderate temperatures [~19°C], clear skies, a moderate breeze, and sunny conditions.

The purpose of the field investigation was to identify those vegetation communities, fauna habitats, plants and animals present within, and in close proximity to, the study area that are of State and/or national conservation significance as listed under the Schedules to the EPBC, BC and/or FM Acts.

While conducting the habitat assessments, efforts were made to identify features such as known vegetation associations, geological features [e.g., caves or suitable cave substitutes], feed trees, mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the lifecycle requirements of those threatened plants and animals previously recorded in the study region (as listed in Appendix C).

The survey methods employed during the field investigation were:

- The identification of those plants present, including within any areas affected by direct and indirect impacts
- The identification of the structure of those vegetation communities and fauna habitats present at, and close to, the proposed work area
- The direct observation of those fauna species present within or near to the study area
- Diurnal call identifications of those fauna species present, with all calls being identified in the field
- The identification of any indirect evidence such as tracks, scats, scratching, and diggings that would suggest the presence of a particular fauna species
- Leaf litter and ground debris searches for sheltering reptiles and amphibians.

Where required, a more detailed description on one or more of the survey methods employed is provided below.

As no waterways are present within, or close to, the study area, no aquatic survey was necessary. A consideration of matters with regard to the FM Act is not required.

2.4.1 Habitat suitability assessment

An assessment of available habitat for each threatened species, population or community identified in the database searches, and their likelihood of occurrence, is provided in Appendix C.

2.4.2 Targeted flora surveys

Targeted (species specific) surveys for threatened plants were conducted based on the results of the literature review, including consideration of the habitat requirements of those threatened flora species identified as potentially occurring in the study area (see Appendix C), aerial photography interpretation and the site specifics of the study area.

Prior to the field survey, three threatened flora species were considered to have a moderate likelihood of occurring based on local records and their association with the mapped PCTs. These were Scrub Turpentine (*Rhodamnia rubescens*), Native Guana (*Rhodomyrtus psidioides*) and Red Helmet Orchid (*Corybas dowlingii*) (Table 2-5). The survey methods employed, and level of effort required were generally based on the descriptions provided in the following:

- The Threatened Biota Database Collection (TBDC) (DPE 2023b)
- The publication: *Threatened Species Survey and Assessment: Guidelines for developments and activities* (working draft) (DEC 2004)
- The *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (State of NSW and DPIE 2020a).

Table 2-5: Targeted threatened flora survey details

Species name	EPBC Act	BC Act	Identification	Survey effort compliant?[1]	Results
Rhodamnia rubescens	CE	CE	Not recorded	Yes	Although PCT 3150 is suitable habitat for the species it was not recorded during this survey or that of Biosis (2022). The species is distributed sporadically through suitable habitat and the site is highly disturbed. The survey timing and conditions were suitable for this species, which is obvious when present.
Rhodomyrtus psdioides	CE	CE	Not recorded	Yes	Although PCT 3150 is suitable habitat for the species it was not recorded during this survey or that of Biosis (2022). The species is distributed sporadically through suitable habitat and the site is highly disturbed. The survey timing and conditions were suitable for this species, which is obvious when present.
Corybas dowlingii		E	Not recorded	No	The timing of the survey was early for this species, which flowers during June and July. However, the timing of the surveys would have coincided with the presence of leaves, as they are not present all year. No *Corybas* or *Acianthus* species, with which it could be confused with when not flowering, were recorded. Furthermore, habitat is substantially degraded at the site. Therefore, although associated with PCT 3150, it is considered the species has a low likelihood of occurring.

Although not all parts of the study area were accessible by foot, it is considered that sight lines were sufficient to permit a visual assessment of the presence/absence of *Rhodamnia rubescens* and *Rhodomyrtus psdioides*. It is considered highly unlikely that *Corybas dowlingii* would occur on the highly disturbed, low condition vegetation of the slope, which was not accessible.

2.4.3 Targeted fauna surveys

Given the nature of the vegetation present, no threatened fauna is considered to occur as resident populations within or close to the slope remediations site. With reference to the Likelihood of Occurrence table (Appendix C), and based on the observations made during the diurnal investigation – the disturbed and modified nature of the area investigated (i.e., road corridor and 'denuded' slope due to the impacts associated with the landslide), the identification of those habitats present, and limitations regarding slope access, as none would occur, it was not considered necessary to employ any species-specific survey methods targeting threatened fauna (e.g., nocturnal surveys, echolocation [targeting Yangochiroptera hereafter referred to as microbats]). It is acknowledged the majority of fauna in Appendix C are considered to have a low likelihood of occurring and, of the few species considered to have a moderate likelihood, a precautionary assessment was conducted.

The survey methods that were conducted are as follows:

Diurnal investigation

During the field investigation, birds were identified using visual identification of observed individuals or aural identification of their vocalisations. In addition to a 20-minute dedicated survey that was conducted below the landslip area (researcher on Redbank Road fire trail at Easting 357984; Northing 6351051), incidental birds heard while traversing the site or while assisting with the BAM plot survey were noted.

If present, other features such as the presence of culverts, caves and large logs were also inspected. When searching these, a hand-held torch was used. Refer to Section 3.4 and 5.1.2 of the BAR for results.

Ground debris searches

Ground debris searches were carried out on foot within the limited number of vegetated portions of the proposed work area. This involved conducting random meanders through these areas and turning over any occurrences of natural debris or urban refuse.

While conducting the ground debris searches, tracks, diggings and characteristic scats were also searched for, and identified in the field.

2.5 Tree and hollow survey

Due to safety considerations associated with accessing the slope, Lesryk has opted to draw upon the findings of the Preliminary Biodiversity Investigation report prepared by Biosis (Biosis 2022). A visual inspection was conducted from the road to ensure the Biosis data remains appropriate, but a full recount was not conducted. Due to access constraints, Biosis did not record tree species or DBH's. That stated, Biosis did indicate in Table 2 of their report (and reproduced as Table 5.2 in this document) that there were nine trees with DBH's larger than 100 cm, 76 in the 50 to 100 cm range, 97 (20 to 50 cm) and 42 (5 to 20 cm) (Biosis 2022).

During the course of the current investigation, the dominant species of trees recorded within the area surveyed were Rough-barked Apples, Blackbutts and Sydney Blue Gums, with Turpentines, Cheese Trees, Jackwood, Forest Oak and other plants occurring as smaller trees.

Native tree removal count

The number of trees to be removed was derived from Section 4.1 of the Preliminary Biodiversity Investigation report prepared by Biosis (2022), this noted in the Biosis study as being conducted in accordance with Transport's Tree and Hollow Replacement Guidelines.

The May 10 inspection noted the number of native trees within the proposed works area appeared to be consistent with the findings of the Preliminary Biodiversity Investigation (Biosis 2022).

Within the area investigated, no amenity trees are present. Refer to Section 5.1.1 of the BAR for further details of the tree count and impact of removal of native vegetation.

Hollow-bearing tree survey

A hollow-bearing tree count was conducted by Biosis concurrent with the native tree removal count, as detailed in the Preliminary Biodiversity Investigation Report (Biosis 2022). Three hollow-bearing trees were identified during the course of that inspection, all mapped within the investigation area (Biosis 2022).

During the course of the field investigations conducted as part of this BAR, the hollow-bearing trees were identified as being two Sydney Blue Gums and one Blackbutt, these having a DBH greater than 100 cm. Refer to Section 5.1.2 of the BAR for the hollow-bearing tree figure and further details of impact to hollow-bearing trees.

2.6 Aquatic surveys

Lords Creek is located about 500 m south-west of the proposal area. The proposed works will not impact any aquatic species or their habitat; therefore, no aquatic surveys were conducted for this proposal.

2.7 Limitations

By the completion of the field investigation a total of about eight person hours of active searches had been accumulated. Given the disturbed nature, physical condition and size of the proposed work area, this is considered more than adequate when endeavouring to determine the diversity of native species present, their habitats and vegetation associations, and the conservation status of each of these.

Given the instability and steepness of the slope requiring remediation, access to all parts of the study area that required investigation was not possible. Visual inspections were conducted from the road shoulder above, and from the bottom of, the site.

Binoculars were used to assist with the identification of plant species and presence of habitat features such as nests or hollows.

Apart from the survey timing not coinciding with the flowering period of the Red Helmet Orchid (refer to s.2.4.1), no adverse seasonal constraints to the field investigation were encountered. Given that, were the species present (or similar species) its leaves would have been detectable, and that most of the study area is in lower condition than that sampled, no mitigation is required to manage this constraint.

While not considered to compromise the scientific rigor of the field assessment, no specific surveys (i.e., nocturnal work) were carried out. To overcome this limitation:

- Database searches were conducted for threatened species, populations and ecological communities known to occur within the region
- The precautionary principle was adopted where necessary (i.e., suitable habitat for those threatened species known to occur, or that have been previously recorded within the surrounding locality, was identified).

Not all flora and fauna can be fully accounted for within any given study area. The presence of threatened species is not static; and changes often in response to longer term natural forces that can, at any time, be dramatically influenced by human-made disturbances.

This report is based upon data acquired from the current investigation. However, data gathered is indicative of the environmental conditions of the site at the time the field work was conducted.

3. Existing environment

The study area is primarily located within the road corridor of Freemans Drive, north of Freemans Waterhole, with the road width being about 12 m. Freemans Drive traverses a steep decline, with a local relief of about 10 m throughout the 240 m length of the investigated roadway.

Up to two compound facilities would be required for the proposal. Both are existing hardstand areas, previously disturbed/cleared; No.1 located about 2 km south of the proposal on the western shoulder of MR220 Freemans Drive, within the road reserve in association with the existing United Petrol Station, and No.2 located about 200 m north of the proposal on the western shoulder of Freemans Drive.

An existing Transport stockpile site is proposed for use during the project, located about 2 km south of the proposal adjacent to the southern side of Palmers Road, within a cleared grassland.

Regarding the compound and stockpile sites, none are proximate to any potential sensitive areas necessitating consideration. PCTs surrounding these sites are not listed TECs. Mitigation measures have been recommended in Section 6 to ameliorate any potential impacts occurring beyond the study area as a result of the proposal.

In July 2022, following significant rainfall during a storm event, the investigated section of Freemans Drive experienced major disruption from landslides, erosion, fallen trees and pavement damage. Where the slope has failed, road damage including cracking is visible.

The investigated slope is on a steep gradient, with some vegetation present on the slope. Surrounding, and in, the area investigated is open forest characterised by a uniform canopy of trees 30 m in height, a midstory of isolated eucalypt saplings, and isolated small trees to 8 m, an understorey of natives and weeds to 1 m, and groundcover to 1 m. Groundcover consists of grasses, weeds and vines. The slope is characterised by exposed earth with vegetation disturbed by weeds.

For reference, a photographic record of the area investigated is provided in Appendix D.

Freemans Drive traverses north to south between the Sugarloaf State Conservation Area (located 25 m to the east) and Awaba State Forest (about 56 m west), and in proximity to the Heaton State Forest (about 300 m to the north east). That stated, the proposed works are limited to the confines of the road corridor, and do not extend beyond current cadastral boundary lines (Appendix A).

Though present beyond the slope remediation site, no drainage lines are present within the study area. Lords Creek is located about 500 m south-west of the construction footprint, and is mapped as KFH. Beyond existing inputs from Freemans Drive, impacts on this waterway due to the undertaking of the slope remediation works are considered to be minor.

Reference to the Biodiversity Values Map and Threshold Tool (BVMTT) (NSW Government 2023b) did not identify any areas mapped as having Biodiversity Values within, or close to, the study area.

Reference to the Soil Landscape of the Singleton 1:250,000 Sheet report (Kovac and Laurie 1991) and mapping (State Government of NSW and DPE 2023) indicates the study area is located within the Ogilvie soil landscape (Figure 3-1).

Ogilvie landscape geology is formed by the Narrabeen Group, with parent rock consisting of sandstone, shale and conglomerate and *in situ* weathered parent rock and derived colluvium (Kovac and Laurie 1991). This soil landscape covers steep hills and escarpments with sandstone and conglomerate outcrops forming cliffs; occasional benches occur within some ravines along drainage lines (Kovac and Laurie 1991). The main soils are shallow loams and sands with other soils including Brown Solodic Soils on the lower parts of the slopes; Siliceous Sands and sandy Earths occur in drainage lines on the lower slopes of Mount Arthur (Kovac and Laurie 1991). Minor sheet erosion is common, and some mass movement seen in road cuttings (Kovac and Laurie 1991).

Reference to the SEED map viewer (NSW Government 2023c) to identify the extent of acid sulfate soils within the study area shows that the area investigated is mapped wholly within Class 5 (Figure 3-1). Typically, acid sulfate soils are not found in Class 5 areas.

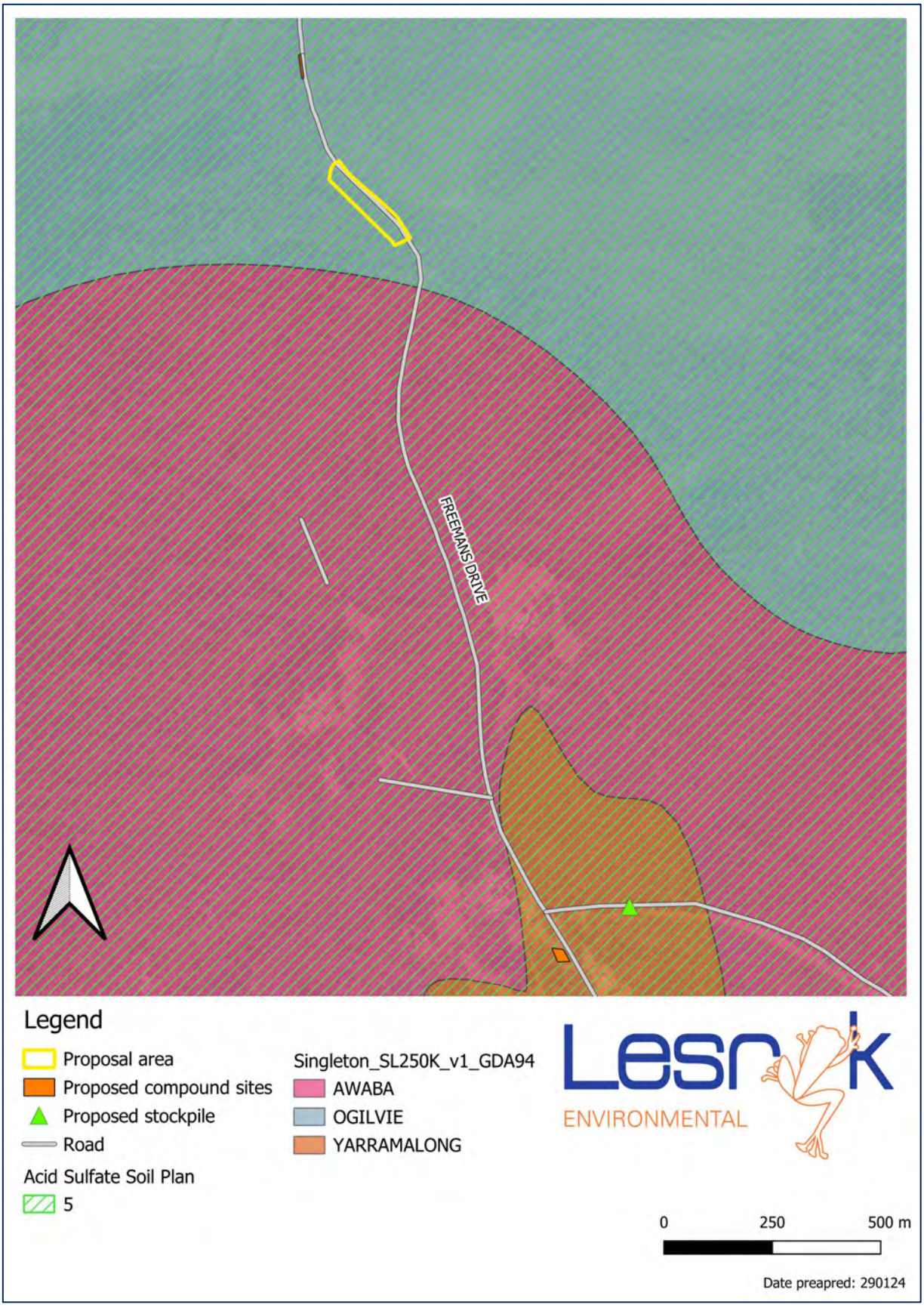

Figure 3-1: Soil landscapes and acid sulfate soil

For reference, Table 3-1 identifies attributes of the area investigated.

Table 3-1: Site attributes

Site Attributes	
Estimated size (ha)	Study area totals about 1.63 ha
Metres above sea level	Between 130 m and 140 m
Climate[1]	Mean summer high: 28.7 °C (January) Mean winter low: 5.0 °C (July) Mean annual rainfall: 1142.0 mm
Waterbody	N/A
Critical habitat	No
IBRA Bioregion/Subregion	Sydney Basin/Wyong
Mitchell Landscape	Watagan Ranges
Soil Landscape	Ogilvie (Figure 3-1)
NPWS estate	N/A

3.1 Plant community types and vegetation zones

Reference to the SVTM (State Government of NSW and DPE 2022) (see Figure 2-1) indicates that the following PCTs are present within the study area:

- PCT 3150 - Hunter Coast Ranges Turpentine Wet Forest
- PCT 3241 - Lower North White Mahogany Spotted Gum Moist Forest
- PCT 3242 - Lower North Ranges Turpentine Moist Forest
- PCT 3244 - Lower North Spotted Gum Mahogany-Ironbark Sheltered Forest
- PCT 3250 - Northern Foothills Blackbutt Grassy Forest
- PCT 3581 - Hunter Coast Foothills Apple Forest.

In conducting the site investigation, the mapping was found to be inaccurate with the only PCT in the study area being identified as PCT 3150 Hunter Coast Ranges Turpentine Wet Forest. Only one vegetation zone within this PCT (low/disturbed condition) was identified (Figure 3-2, Table 3-2). It was considered unnecessary to provide a vegetation map of the stockpile and compound sites or include them in Table 3-2 as the areas are hardstand or cleared, with no native vegetation present.

[1] Cooranbong (Lake Macquarie AWS) – This being the nearest operating weather station to the area investigated.

Figure 3-2: Plant community type within the proposal area

Table 3-2: Plant community types and vegetation zones

Veg. zone	Plant community type	Threatened ecological community	Area (ha)	Patch size class	VI score
			Subject land		
1 (Study area)	3150 - Hunter Coast Ranges Turpentine Wet Forest	No	1.04	>100 ha	68

3.1.1 PCT 3150: Hunter Coast Ranges Turpentine Wet Forest

Description

One PCT was identified within the study area, details of which are provided below.

PCT ID	3150
PCT name	Hunter Coast Ranges Turpentine Wet Forest
Vegetation class	North Coast Wet Sclerophyll Forests
Vegetation formation	Wet Sclerophyll Forests (shrubby sub-formation)
Estimate of per cent cleared	10.36%
Area in subject land	Up to 1.04 ha
Conservation status	N/A
Vegetation zones	Zone 1 (Low/Disturbed); Plots: 1 (FD01)

Justification for PCT selection

It is considered that the remnant vegetation at the site conforms to PCT 3150 as described in the BioNet Vegetation Classification, as:

- it is within a listed IBRA region (Sydney Basin) and sub-region (Wyong)
- the dominant canopy species are *Angophora floribunda* and *Eucalyptus saligna*, which are diagnostic species
- the remnant groundcover species *Microlaena stipoides* is listed as a diagnostic species
- its topographical position (sheltered slope) is consistent with the PCT's landscape description.

Floristic and structural summary of PCT 3150 within the study area

Growth form	Typical species
Trees	*Eucalyptus saligna, Angophora floribunda, Glochidion ferdinandi, Cryptocarya glaucescens, Melaleuca styphelioides*
Shrubs	*Lantana camara, Synoum glandulosum, Claoxylon australe*
Grass and grass-like	*Entolasia stricta, Microlaena stipoides, Gahnia melanocarpa, Carex appressa*
Forb	*Dichondra repens, Dianella caerulea, Gymnostachys anceps*
Fern	*Blechnum cartilagineum, Blechnum ambiguum*
Other	*Dioscorea transversa, Stephania japonica, Tetrastigma nitens, Geitonoplesium cymosum*
Exotic	*Solanum mauritianum*
High Threat Exotic	*Lantana camara*

Condition states

Only one vegetation zone was sampled, the results of the BAM plot being presented in Appendix B. The condition of the vegetation was considered to be low/disturbed with a vegetation integrity (VI) score of 68.[2]

The relatively high VI score is a result of the BAM plot being placed at the foot of the slope and extending from a very disturbed Lantana-infested area into more intact vegetation. The VI of the vegetation that would be impacted is expected to be less than 68 (i.e., the plot is in higher condition).

3.2 Threatened ecological communities

No TECs were identified within the study area.

3.3 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDE) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Some examples of ecosystems which depend on groundwater are:

- Wetlands
- Red gum forests, vegetation on coastal sand dunes and other terrestrial vegetation
- Ecosystems in streams fed by groundwater
- Limestone cave systems
- Hanging valleys and swamps.

Reference to the Groundwater Dependent Ecosystems Atlas (BoM 2023b) identified low – moderate potential terrestrial (Figure 3-3; indicated by red ellipse) within the study area. No aquatic or subterranean GDE were identified or analysed for the study area.

3.4 Threatened species

Prior to conducting the field investigation, a review of the DCCEEW PMST and BioNet databases (DCCEEW 2023a, DPE 2023a) identified 28 threatened flora species and 68 threatened fauna species listed under the EPBC and/or BC Acts that have been previously recorded or are considered to have habitat within 10 km of the study area (Appendix C). Those species that have been previously recorded within 10 km of the study area as per the BioNet Atlas are presented in Figures 3-4 and 3-5 (note: the locations where some species were recorded overlap). Due to a lack of their necessary habitats within the area investigated, oceanic, estuarine and wetland species were not considered.

Prior to the field survey, three threatened flora species were considered to have a moderate likelihood of occurring based on local records and their association with the mapped PCTs. The results of targeted surveys for these species are presented in Table 2-5 (refer to p13 of the BAR).

In the case of fauna, numerous highly mobile threatened species with large territorial requirements (e.g., bats, birds) may traverse or occupy the study area on occasions. Only those that have a documented association with those habitat components that were identified within, and close to, the study area were considered for assessment under the EPBC and/or BC Acts.

While previously recorded within and/or predicted as having habitat within 10 km of the study area, the majority of threatened species identified during the literature search were assessed to have only a 'low' likelihood of occurrence, given the disturbed and highly modified condition of the slope investigated. These species would not occur within, or be reliant upon, the disturbed road corridor or the adjacent landslip affected slope. The majority of these animals and plants have specific habitat requirements (as identified in Appendix C), no significant components of which were observed within, or close to, the proposed work area. Better resources are present within the surrounding, larger stands of bushland.

[2] Entry of data into the BAM-C and generation of VIS was conducted by Peter Monsted BAM Assessor Accreditation No. BAAS22011.

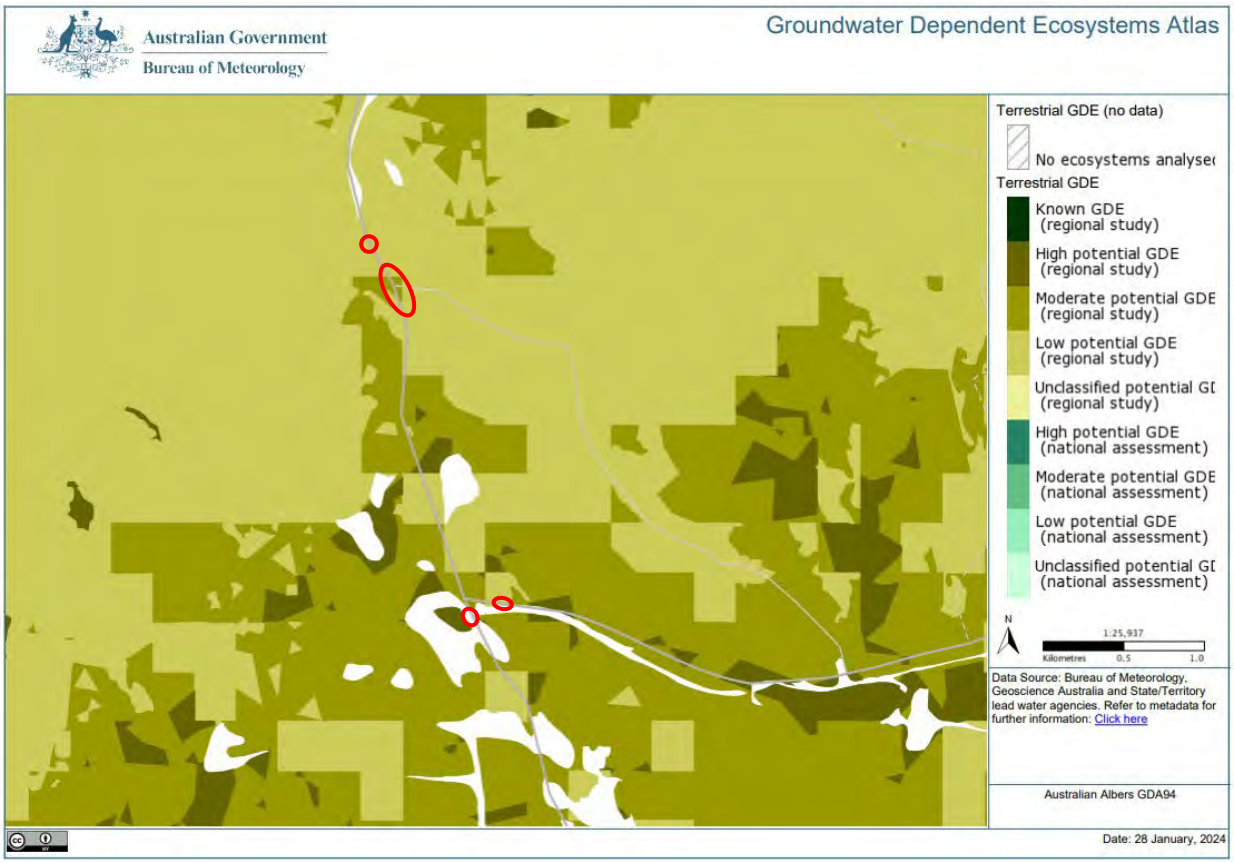

Figure 3-3: Groundwater dependent ecosystems

Reference to the National Flying-fox monitoring viewer (DCCEEW 2023f) did not identify any flying-fox camps present within, or near to, the study area. The nearest 'occupied' Flying-fox camp (Blackalls Park [605]) is located 11 km east of the study area; last surveyed during 2018, with between 2500 and 9999 Grey-headed Flying-fox (*Pteropus poliocephalus*) individuals being recorded. While individuals from this colony may fly over and/or forage within, and close to, the study area, the Grey-headed Flying-fox (Vulnerable, EPBC and BC Acts) is not considered to be reliant on the vegetation that would be cleared to permit the slope stabilisation works for any of its lifecycle requirements.

Reference to the BioNet Atlas (DPE 2023a) identified one previous Koala record within the study area – this being a roadkill in 2002. Surrounding previous Koala records are over 400 m beyond the failed slope site (see Figure 3-5, Koala records denoted by green diamond). Within the study area, the following Koala use trees are present: Sydney Blue Gum, Rough-barked Apple, Smooth-barked Apple, White Mahogany, Grey Gum, Turpentine and Forest Oak. While some use trees will be removed, no Koala feed tree species were recorded. Additionally, although considered and targeted, no evidence (i.e., sightings, calls, scats etc.), particularly at the base of the Koala use trees, to suggest that the investigated area supported a resident Koala population was identified during the investigation. Given better, more suitable extant habitat beyond the study area for Koalas (within the surrounding conservation and protected lands), it is considered that already minimal quality potential Koala habitat within the proposal site has been adversely exacerbated by the impacts associated with the slope failure, and are likely to adversely influence the potential for the presence of any Koalas; therefore, no Koalas are anticipated to rely on the site. Refer to Section 3.7 for further consideration of the Koala under SEPP (Biodiversity and Conservation) 2021.

By the completion of the field survey, 15 native birds and 3 mammals had been recorded within, or in proximity to, the proposed slope remediation area (Table 3-3). None of the species recorded are listed, or currently being considered for listing, under the EPBC or BC Acts.

Though considered and targeted, no indirect evidence (such as V-notched trees, crushed casuarina cones, large stick nests, white-wash accumulations, 'cigar' shaped scats at the base of known feed trees [indicative of Koalas *Phascolarctos cinereus*]) to suggest the presence of a viable local population of threatened fauna occurring within, or close to, the slope remediation site was obtained.

The native species recorded are protected, as defined by the BC Act, but considered to be common to abundant throughout the surrounding region. The species recorded would not be solely reliant upon those habitats present within, or near to, the slope remediation site such that the removal or further disturbance of these would threaten the 'local' occurrence of these animals. The species recorded are all expected to be present within both the study area and surrounding locality post-work.

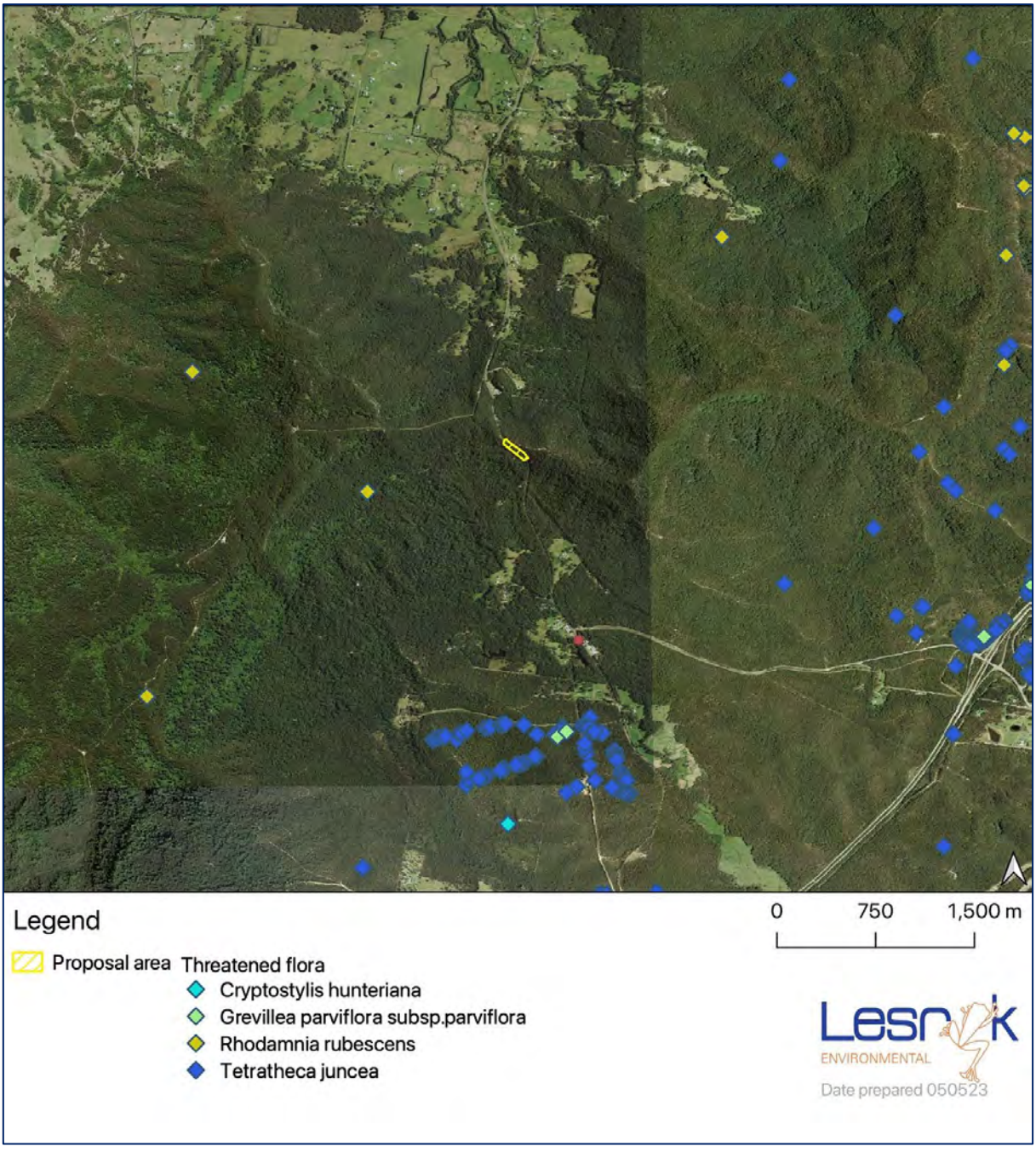

Figure 3-4: Threatened flora species previously recorded within 10 km, in the vicinity of the study area

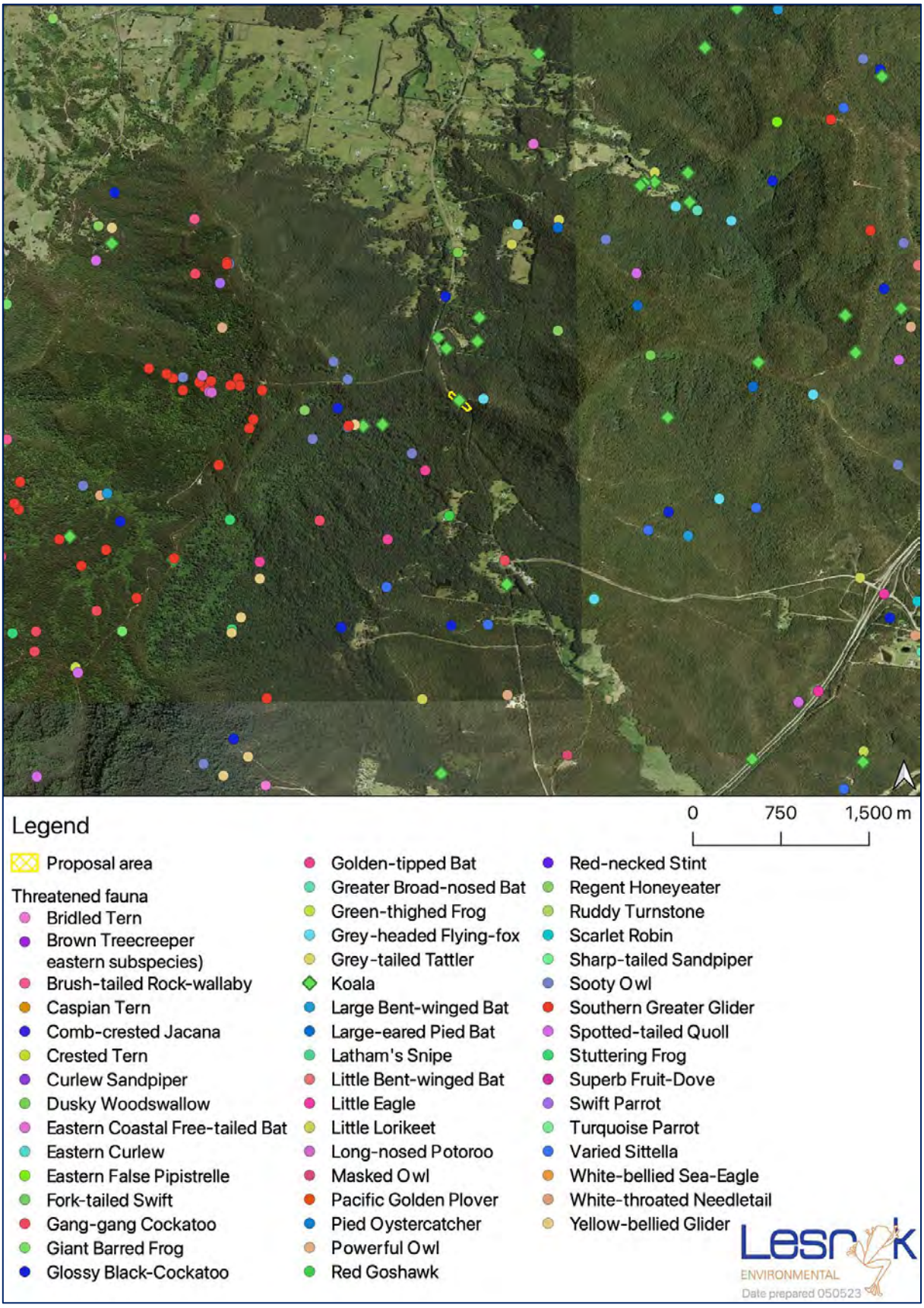

Figure 3-5: Threatened fauna species previously recorded within 10 km, in the vicinity of the study area

Table 3-3: Recorded fauna

Common Name	Scientific Name	Detection method
BIRDS		
Musk Lorikeet	*Glossopsitta concinna*	Heard calling
Rainbow Lorikeet	*Trichoglossus moluccanus*	Heard calling
White-browed Scrub-wren	*Sericornis frontalis*	Observed
Brown Thornbill	*Acanthiza pusilla*	Observed
New-holland Honeyeater	*Phylidonyris novaehollandiae*	Observed
Lewin's Honeyeater	*Meliphaga lewinii*	Observed
Bell Miner	*Manorina melanophrys*	Observed
Yellow-faced Honeyeater	*Lichenostomus chrysops*	Observed
Eastern Spinebill	*Acanthorhynchus tenuirostris*	Observed
White-throated Treecreeper	*Cormobates leucophaea*	Heard calling
Grey Fantail	*Rhipidura albiscapa*	Observed
Red-browed Firetail	*Neochmia temporalis*	Observed
Magpie-lark	*Grallina cyanoleuca*	Observed
Pied Butcherbird	*Cracticus nigrogularis*	Heard calling
Australian Magpie	*Gymnorhina tibicen*	Observed
MAMMALS		
Swamp Wallaby	*Wallabia bicolor*	Road kill noted
Long-nosed Bandicoot	*Perameles nasuta*	Characteristic diggings seen
Eastern Grey Kangaroo	*Macropus giganteus*	Characteristic scats observed

3.5 Areas of outstanding biodiversity value

The DCCEEW's Register of Critical Habitat (DCCEEW 2023e) and DPE's Area of Outstanding Biodiversity Value (AOBV) register (DPE 2023c) (in conjunction with Part 3 of the Biodiversity Conservation Regulation 2017) per listings provided under the EPBC and/or BC Acts, did not identify any gazetted areas of critical habitat or AOBV for any flora or fauna species or communities occurring within or near the proposed work area.

3.6 Wildlife connectivity corridors

Reference to SEED Dataset mapping (NSW Government 2023c) identifies the proposed work area is part of the Awaba SF Fauna Corridor (Figure 3-6), and Wet Coastal Ranges – Escarpment corridor (Figure 3-7) for both the Yellow-bellied Glider and Sooty Owl. The proposal is not mapped as being located within Fauna Key Habitat.

Several barriers to ground traversing fauna are currently present within the area surveyed, including Freemans Drive itself. The presence of Freemans Drive (being about 12 m wide) currently presents an adverse influence on the east-west movement patterns of those ground traversing species recorded or expected to occur within the investigated area.

The area investigated, while present along and adjacent to a 240 m length of the existing road corridor of Freemans Drive, is located within a bushland environment that connects into a surrounding heavily vegetated landscape. A relatively continuous vegetated corridor encompassing several conservation reserves and protected lands extends from [within the surrounding region] Sugarloaf State Conservation Area (about 4 km north-east of the slope remediation site) to the Watagans National Park (6 km to the south-west). The connectivity of this corridor is important for the dispersal, movement, interbreeding and migratory needs of a number of native species.

While 224 trees will be removed, due to the presence of similar plants beyond the limits of the slope, arboreal species that rely on gliding to move between the tree canopy will still be able to do so post-slope stabilisation. The conducting of the works within a portion of this corridor will not significantly increase any canopy widths, particularly east and west of Freemans Drive. It is noted that the failure of the slope has resulted in some trees to fall within the landslip area, this 'naturally' producing breaks in the tree canopy. The removal of additional mature trees would not have a significant adverse cumulative impact when associated with this situation.

With reference to Figure 3-6, the proposal would not isolate or further fragment any habitat areas, nor erect any additional barriers to the movement and dispersal patterns of flying species (i.e., birds, bats), nor any gliding arboreal mammals, that may be currently negotiating Freemans Drive at this location. Beyond existing influences, the undertaking of the works will not affect any fauna movements, nor will it have an adverse cumulative impact when associated with the existing situation.

Post-work, flying species, and those highly tolerant of traversing urban environments/infrastructure, would still be able to move across and through the proposed works area. Given the scope of work proposed, ground traversing species currently negotiating this road network are considered to continue to do so post-slope remediation.

Post-work, natural or assisted revegetation of the slope would also permit the movement / dispersal of native species.

Figure 3-6: Fauna Corridors relative to the study area

Figure 3-7: Climate Change Corridors relative to the study area

3.7 SEPP (Biodiversity and Conservation) 2021

Chapter 4 - Koala Habitat Protection 2021

Lake Macquarie LGA is identified under Schedule 2 - LGAs of the SEPP and is within the Central Coast Koala management area. This Policy seeks to encourage the proper conservation and management of areas that provide habitat for Koalas.

Chapter 4 'Koala habitat protection 2021' of the SEPP only applies to development applications assessed under Part 4 of EP&A Act, not those considered under Part 5. That stated, it is Transport's practice to consider the SEPP criteria as part of the environmental assessment process.

No Koala Plan of Management exists for the locality.

Within the study area, the following Koala use trees are present: Sydney Blue Gum, Rough-barked Apple, Smooth-barked Apple, White Mahogany, Grey Gum, Turpentine and Forest Oak. While some use trees will be removed, no Koala feed tree species were recorded. Given better, more suitable extant habitat beyond the study area for Koalas (within the proximate conservation areas), the loss of some use trees is not considered significant. Furthermore, with reference to Section 3.4 of this report, no evidence to suggest the study area supported a resident Koala population was detected and no previous Koala records within the prior 10 years have been recorded within, or near to, the study area. Therefore, the overall study area was assessed to adversely influence the potential for the presence of any Koalas, and none are anticipated to rely on the site.

In accordance with the following definitions provided under Chapter 4, Section 4.2 of the SEPP, the study area is not considered to constitute Core Koala habitat:

(a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

The carrying out of the proposed work would not require the preparation of a Plan of Management for the conservation and management of areas of Koala habitat.

3.8 Matters of national environmental significance

No TECs, or threatened flora and fauna species listed under the EPBC Act were recorded within, or near to, the study area.

Reference to the PMST (DCCEEW 2023a) identified the following within a 10 km buffer centred on the proposal:

- Hunter Estuary Wetlands (Wetlands of International Importance [Ramsar Wetlands])
- five TECs
- 62 Threatened Species
- 19 Migratory Species

The study area is located from 10-20 km upstream of the identified Ramsar Wetland, and will not affect this. None of the threatened ecological communities or species predicted to occur within 10 km of the study area would be reliant upon the fauna habitats or vegetation communities present within the investigated area, and none would be affected by the conducting of the slope remediation activities proposed.

4. Avoidance and minimisation

The key principles of Transport's 2022 Biodiversity Policy (Transport 2022c), and the associated impact on the natural and social environment, is that Transport should aim to:

- avoid and minimise biodiversity impacts to the fullest extent reasonably practicable
- apply mitigation measures, including measures to reduce habitat fragmentation effects, to the fullest extent reasonably practicable
- provide offsets through either biodiversity credit purchase or Biodiversity Conservation Fund (BCF) payment of the required number and type of biodiversity credits in accordance with recognised methodologies, and/or delivered conservation measures in accordance with the requirements of the Policy and guidelines.

Application of avoid and minimise principles

The objective of the proposal is to remediate failed slope 15094. While disturbance/removal of about 1.04 ha of native and introduced vegetation is unavoidable in order to achieve the overall objectives of the slope stabilisation project, the amount and quality of bushland to be cleared/disturbed is considered to provide minimal habitat resources for those species recorded, or potentially occurring, given the extent of similar retained vegetation within the surrounding locality.

Without the conducting of the slope remediation work, the site is predicted to continue to deteriorate. Continued deterioration (i.e., further landslips and slope instability) of this site is expected to affect a wider area and impact additional plants, including mature hollow-bearing trees, vegetation communities and fauna habitats.

The proposed work would take place within and adjacent to the existing disturbed road corridor of the investigated section of Freemans Drive; as such, the potential to avoid wider impacts to biodiversity is high.

To permit the proposed work, 224 trees (comprised of 42 small, 97 medium, 76 large and nine very large (as per Biosis 2022)) would be removed. The proposed work would not clear all trees present within the construction footprint, only those that have already fallen as a result of the slope failure, and those immediately adjacent and below this area that have potentially been compromised or required to permit the scope of works. The three hollow-bearing trees recorded are recommended to be retained where possible. The retention of others within the investigated area will continue to maintain habitat connectivity.

Vegetation clearance would be limited to the minimum required to successfully complete the proposal; with the selection of equipment to be used also aimed at minimising clearance requirements. Vegetation clearance and work limits would be identified both on site maps/plans and on-site through the erection of temporary exclusion fencing, bunting or similar in accordance with Guide 2: Exclusion zones of Transport's Biodiversity Guidelines (Figure 4-1) (RTA 2011). Fencing etc. would be established at the outer limits of the drip line of any retained trees present and the areas marked as 'no-go zones', to avoid indirect impact.

To avoid the removal of additional vegetation, the temporary stockpile/compound sites required to assist the proposal would be located within existing cleared/disturbed sites off the shoulders of Freemans Drive and Palmers Road (see Figure 1-1).

Designs for remediation of the slope are currently being finalised. The design process will involve an assessment to consider suitable remediation options and select the most appropriate solution regarding minimising impact on the ecological values of the study area wherever possible.

TABLE 2.1: OPTIONS FOR FENCING OF EXCLUSION ZONES.

Fencing Type Option		Description
Type 1	 FIGURE 2.2: Chain wire fencing (Photo: Angie Radford).	Chain wire fencing for high risk and highly sensitive sites.
Type 2	 FIGURE 2.3: Split polypipe covering the upper strand of barbed wire prevents entanglement of fauna (Photo courtesy of www.wildlifefriendlyfencing.com).	Stock fencing or similar can be used where permanent protection is desired (eg boundary fencing). Barbed wire should not be installed in a designated wildlife crossing zone (eg near glider poles or rope canopy bridges).
Type 3	 FIGURE 2.4: Para-web material and signage to mark out exclusion zone (Photo: Josie Stokes).	Para-web material and star pickets are most commonly used for temporary fencing of specific and small areas (eg individual trees, small pockets of vegetation), or where there is high/moderate risk of intrusion.
Type 4	 FIGURE 2.5: Reflective spinning tape (Photo: Angie Radford).	Capped star pickets and reflective spinning tape (helicopter tape) is typically used for larger areas with moderate/low risk of intrusion.
Type 5	 FIGURE 2.6: Mulch berm (Photo: Angie Radford).	Where the risk of intrusion is low, earth bunding, mulch berms, sediment fencing or flagging tape may be used. It may not be suitable for exclusion zones but is often used to delineate areas.

Figure 4-1: Exclusion zone examples (Extract: Guide 2 - Biodiversity Guidelines)

5. Impact assessment

Potential impacts as a result of conducting the activity include the construction footprint of about 1.48 ha, incorporating the disturbance/removal of up to 1.04 ha within this of native and exotic vegetation, including the removal of up to 224 trees (three of which are hollow-bearing). While there is no native vegetation present at the two compound site locations, the potential for indirect impacts from the temporary use of these sites has also been considered.

No TECs or threatened flora or fauna species were recorded. Similarly, upon completion of the survey and consideration of the condition of the vegetation, the threatened flora species that were considered to have a moderate to high likelihood of occurring prior to the survey were considered to have a low likelihood of occurrence in the proposed work area.

Further potential impacts include temporary noise and/or vibration levels, erosion, injury and/or mortality to fauna, edge effects, weed proliferation and introduction of pathogens.

No significant adverse impact is expected during the operational phase of the proposal.

Mitigation measures have been provided in Section 6 of this report.

5.1 Construction direct impacts

5.1.1 Removal of native vegetation

By the completion of the field survey a number of native and exotic species were recorded within the area investigated (Appendix E). It is noted that Appendix E is not intended to be a comprehensive list of all species present within the area investigated, and only represents those plants that were recorded while conducting searches for:

- those native species and ecological communities of State and/or national conservation concern that are known, or expected to occur, in the locality
- weeds of significance that would require treatment (refer to Section 5.2.4).

Based on a worst-case estimate it is expected that 1.04 ha of native and exotic vegetation would be disturbed/removed to permit the proposal (Table 5-1). Similar resources will be retained within the study area and beyond. Post-slope stabilisation, the sites would be permitted to naturally regenerate.

Within the study area, 224 trees (comprised of 42 small, 97 medium sized, 76 large, and nine very large trees) three of which are hollow-bearing trees (Biosis 2022) have been recorded, and face removal to permit the slope remediation work (Table 5-2). Of those mature trees to be removed, avoidance of significant increases in canopy width would be applied. Nine extra-large trees may require removal (Biosis 2022). No amenity trees require clearing.

To replace the loss of 224 trees, Transport's Tree and hollow replacement guidelines (Transport 2022b) provides a calculation to assess the number of replacement plants. Refer to Section 7.2 of the BAR for the tree and hollow replacement plan.

In line with the calculation, 1224 trees would require planting and three artificial hollows would require provision (Table 5-3). Alternatively, Transport may opt to transfer $153,750 into the Transport Conservation Fund. Transfer of funds must occur prior to commencement of work.

Table 5-1: Summary of direct impacts on native vegetation

Veg. zone	Plant community type (PCT)	Broad condition class	TEC	Area to be impacted (ha or m^2)[1]
Veg disturbance Area	PCT 3150 – Hunter Coast Ranges Turpentine Wet Forest	Low-Disturbed	N/A	1.04 ha

Table 5-2: Tree and hollow count

Tree size	Count
Small tree (DBH 5 – 20 cm)	42
Medium tree (DBH 20 – 50 cm)	97
Large tree (DBH 50 – 100 cm)	76
Very Large tree (DBH > 100 cm)	Nine
Hollow	Three

Table 5-3: Calculated tree replacement or [alternative] cost transfer into the Transport Conservation Fund

Tree size	Estimated native tree removal (worst-case scenario)	Required number of replacement trees	Required cost transfer into Transport Conservation Fund
Small trees	42	84	$5250
Medium trees	97	388	$48,500
Large trees	76	608	$76,000
Extra Large trees	9	144	$22,500
Hollow-bearing trees	3	Three artificial hollows	$1500
Total	224 & three HBT	1224 trees & three HBT	$153,750

Stabilisation of the slope will include shotcrete treatment of the main failure locations and those drainage lines that traverse the embankment. In addition, a flexible steel mesh reinforced mat will be laid over the slope face. Whilst some regeneration of grasses and shrubs may be possible, given the nature of the matting used, regeneration of trees and tall shrubs will not occur. Without ongoing management and treatment, weeds such as Lantana (which were commonly recorded in the surrounding bushland) are expected to proliferate on the stabilised slope post-remediation. It is noted that weeds are common throughout the upslope areas and, without a broader multi-agency approach to the management of these, on-going treatment of those exotic plants that establish on the remediated slope is not considered to be sustainable or financially viable. Therefore, vegetation within the proposal area is not considered likely to naturally regenerate following completion of works. The works proposed do not meet any of the activities excluded from the requirement of replacing trees or hollows (Transport 2022b). The works proposed are not considered low-risk activities.

Relevant to the proposal's impact on vegetation, the following Key Threatening Processes (KTP) are applicable:

- Clearing of native vegetation – Schedule 4, BC Act
- Loss of hollow-bearing trees – Schedule 4, BC Act
- Removal of dead wood and dead trees – Schedule 4, BC Act

Given the extent of similar resources within the study area and beyond, and provided recommended mitigation measures are adopted, the loss of 1.04 ha of native and exotic vegetation, including three hollow-bearing trees, and removal of dead wood and dead trees, is not considered to significantly contribute to, or increase the impact of, these KTP.

Clearing within the study area would be carried out in accordance with Guide 4 of the Biodiversity Guidelines (RTA 2011) to minimise disturbance to surrounding flora and fauna habitats.

A recommendation has been made to, where possible, relocate locally the felled trees as opposed to the mulching of these plants. Relocation of the felled trees would aim at providing habitat for native species and their prey (as per DEC

2004 ‘Threatened Species Survey and Assessment: Guidelines for developments and activities’ and Transport’s ‘Biodiversity guidelines: Protecting and managing biodiversity on RTA projects’ (RTA 2011)).

5.1.2 Removal of threatened fauna habitat

Of the 224 trees to be removed, three are hollow-bearing (Figure 5-1). No birds or arboreal species were observed entering, existing or investigating the hollow-bearing trees during the investigation.

The diameter of the entrance cavities for the three hollow-bearing trees would permit access/use by microbats, and several small to medium sized birds/arboreal non-flying mammals.

The loss of these trees, considering the extent of similar resources present adjacent to and beyond the limits of the slope remediation works, would not significantly affect the extent of foraging and/or breeding sites available for these species. The cleared trees, some of which have already fallen due to the landslip, would also not limit the extent of insect attracting or pollen producing plants present in this locality.

While resources available for use by those hollow-dependent threatened fauna previously recorded (or expected to occur) within this portion of the Lake Macquarie LGA would be cleared, the impact of this on populations of these animals is not considered significant.

To further consider the impact of the slope remediation works on hollow-dependent species, the criteria provided under Section 7.3 of the BC Act have been referred to (Appendix F). Use of these criteria concluded that the slope stabilisation works would not have a significant effect on hollow-dependent threatened fauna or their habitat. As such, preparation of a Species Impact Statement [or alternatively, a BDAR] is not triggered.

During the sight inspection, no V-notched trees indicative of the feeding behaviour of the Yellow-bellied Glider (*Petaurus australis*) (Vulnerable, BC Act) were observed. In addition, no crushed casuarina cones indicative of the feeding behaviour of Glossy Black-cockatoos (*Calyptorhynchus lathami*), large stick nests, white-wash accumulations, caves or suitable cave-substitutes, or ephemeral drainage lines are present. Those culverts present were inspected and not found to be suitable for occupation by cave-dependent microbats. They were noted to support occurrences of spider webs, the presence of these indicating that no animals are entering or existing the culverts present (if animals were using these sites their movements would ‘clear’ the cobwebs).

With reference to Section 3.7, while the proposal will remove 1.04 ha of vegetation, including some Koala use trees, given retained suitable habitat within, and beyond, the study area (where the majority of past Koala records occur), the Koala (Endangered, EPBC and BC Acts) is not considered to rely on the study area for its lifecycle requirements. No Koala feed tree species were identified.

No further threatened fauna habitat important to the local occurrence of threatened species previously recorded within the surrounding region was observed within the area investigated.

No further KTP than those identified above in Section 5.1.1 pertain to the removal of habitat.

Removal of habitat, including the three hollow-bearing trees, within the construction footprint would be carried out in accordance with Guide 4 of the Biodiversity Guidelines (RTA 2011).

5.1.3 Removal of threatened flora

No threatened flora species listed under the EPBC or BC Acts were recorded or considered likely to occur within the area investigated; as such, as no threatened species are considered to be adversely impacted by the proposal, the conducting of assessments referring to the EPBC Act’s Significant Impact Guidelines and Section 7.3 of the BC Act is not required.

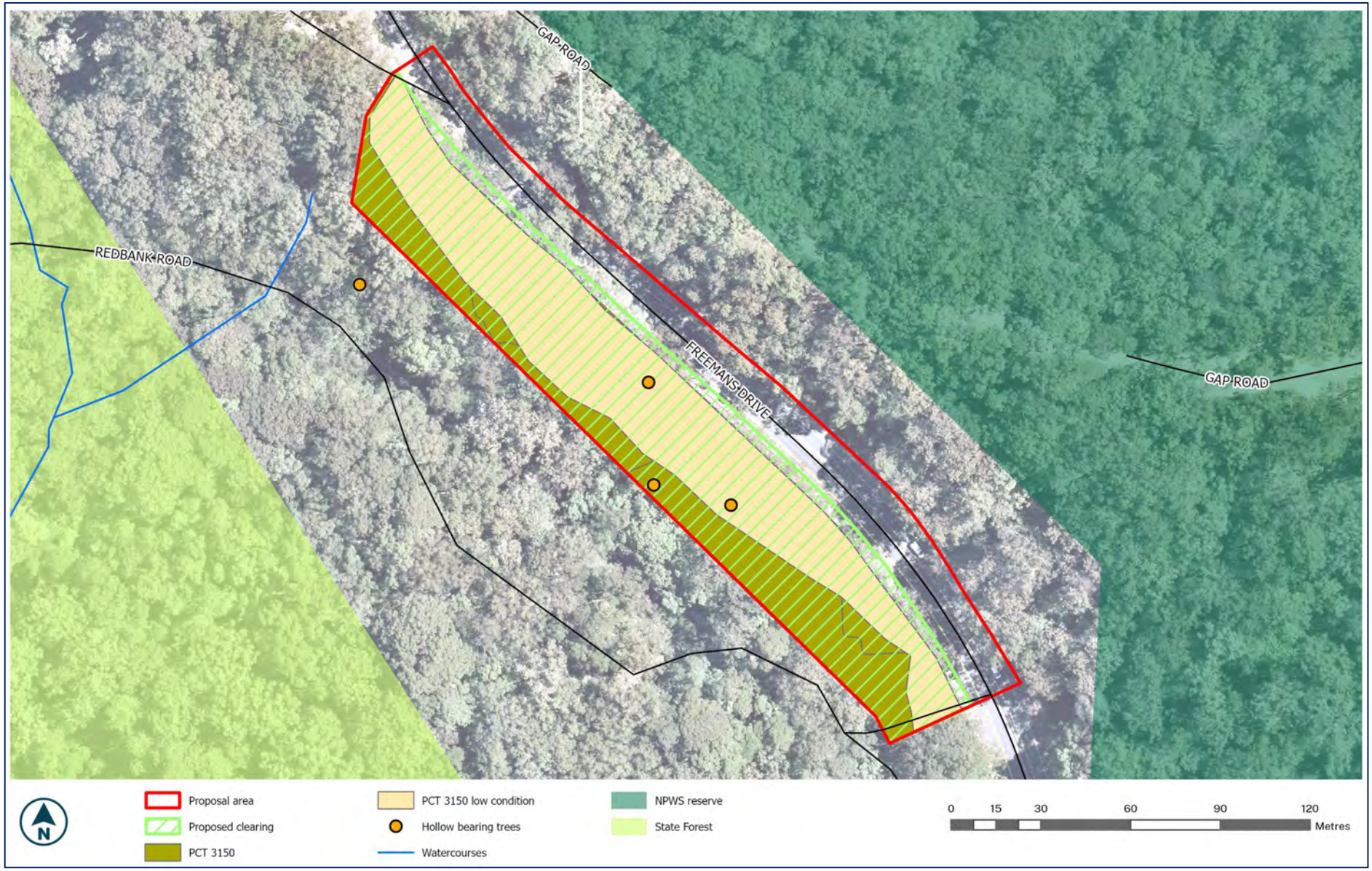

Figure 5-1: Recorded hollow-bearing trees (data Biosis 2022)

5.1.4 Aquatic impacts

Beyond existing conditions, the works proposed would not result in any direct or indirect adverse impact on those unnamed tributaries that occur beyond the limits of the work. The slope remediation works is expected to stabilise and minimise further erosion of the roadside slope. This would help maintain watercourse structure and would minimise impact on water quality associated with the failure and erosion of the slope. The proposal also involves repair and outlet treatments at two existing cross drainage lines.

No land identified by SEPP Resilience and Hazards 2021 (i.e., coastal wetlands) occurs within, or near to, the study area.

No aquaculture, commercial or recreational fishing occurs within, or near, the study area.

During the proposed work, where construction activities have the potential to impact the water quality of nearby waterways (i.e., changes to turbidity and sedimentation) through erosion, off-site sediment movement and dirty water. Erosion and sediment control measures will be implemented and maintained in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004). Temporary stockpile sites will be managed in accordance with Transport's Stockpile Site Management Guideline (EMS-TG-10).

5.1.5 Injury and mortality

Vegetation clearing to permit the proposal would involve the removal of up to about 1.04 ha, inclusive of 224 trees (including three that are hollow-bearing), groundcover vegetation, shrubs and natural ground debris. Given the proposal would be conducted within a previously disturbed environment (due to the existing landslip), there is minimal expectation that sheltering animals would be injured during the course of the proposed work.

Native fauna could be present within the three hollow-bearing trees that are to be cleared, the removal of these would potentially injure wildlife. Vegetation removal will be conducted in accordance with *Guide 4: Clearing of vegetation and removal of bushrock* (RTA 2011) and would include use of soft fall techniques and the on-site presence of a qualified ecologist (or similar) during the hollow-bearing tree removal works.

During the construction phase of the proposal some urban adaptable, sheltering fauna species (i.e., frogs and ground-traversing mammals) could be present and be subject to injury. Mitigation measures to minimise the impact of the proposed work on animals, if present (such as checking beneath vehicles/machinery prior to their use) have been provided to address this matter (Section 6).

Beyond current levels of impact due to the existing presence of Freemans Drive and the volume of traffic that typically uses this network, the operation phase of the proposal is not expected to significantly increase injuring or mortality of fauna within the study area. The proposal is not expected to significantly alter vehicle strikes on those fauna species recorded or potentially occurring than may be currently transpiring. The proposal would not have an adverse impact on the long-term viability of these species or their local populations.

5.1.6 Groundwater dependent ecosystems

Low - moderate potential terrestrial GDE has been identified within the study area (BoM 2023b).

In reference to the DPI (Office of Water)'s *Risk assessment guidelines for groundwater dependent ecosystems* (Serov *et al.* 2012), the proposed slope remediation work is not likely to result in changes to water quantity, water quality, an aquifer structure or land use to the extent that there is an expected impact to GDEs; nor would it involve groundwater extraction. With the adoption of mitigation measures, the conducting of the proposal would not contribute to the off-site movement of sediment. The objective of the proposal, to remediate the failed slope, would improve otherwise adverse effects if left untreated.

5.2 Indirect and operational impacts

5.2.1 Edge effects on adjacent native vegetation and habitat

Weeds are readily spread (and are spreading) by existing dispersal factors such as wind, birds, water and the movement of vehicles along Freemans Drive. Clearing and opening up of new vegetation edges can facilitate the recruitment of these species and provide opportunity for the establishment of other weed species. These weeds are often able to out-compete native flora and fauna species and reduce the habitat values of these areas. While this is the case, edge effects beyond those that are currently occurring along the section of Freemans Drive investigated are not expected to be exacerbated due to the carrying out of the proposed work.

5.2.2 Wildlife connectivity and habitat fragmentation

Temporary measures incorporated as part of the proposed work (i.e., erosion and sediment controls, exclusion fencing) would be established in accordance with applicable guidelines to prevent direct or indirect impact on fauna.

The proposed slope remediation work, including the removal of about 1.04 ha of vegetation, including 224 mature trees, is not considered to isolate or further fragment any habitat areas or erect any additional barriers to the movement and dispersal patterns of flying species (i.e., birds, bats), any gliding arboreal mammals, nor ground traversing species that may be currently negotiating Freemans Drive. Similar resources retained within the study area, and the surrounding lands, permit the opportunity for dispersal of species.

In the operational phase of the proposal (post-work), flying species, and those highly tolerant of traversing urban environments/infrastructure, currently negotiating the proposed work area of the existing road network, are considered to continue to do so post-work.

5.2.3 Injury and mortality

The potential for fauna injury and mortality impact, beyond that identified during the construction phase of the proposal (Section 5.1.5) or currently occurring along Freemans Drive at this location, would not increase during the operational phase of the proposal.

5.2.4 Invasion and spread of weeds

Under the *Biosecurity Act 2015*, 'all plants are regulated with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.'

Of the introduced plant species recorded, Lantana is listed:

- As Priority Weeds in the Hunter region (which includes Lake Macquarie LGA) (DPI 2023a)
- Under Schedule 3 of the NSW Biosecurity Regulation 2017
- As Weeds of National Significance (WoNS)[3] (Weeds Australia 2023).

The relevant Regional Recommended Measure for Lantana under the Biosecurity Regulation is "Land managers should mitigate spread of the plant from their land." Therefore, control of Lantana prior to the commencement of the works is recommended. As part of the ongoing maintenance of the road corridor, regular monitoring of this weed is recommended.

5.2.5 Invasion and spread of pests

Beyond the existing diversity of exotic species and pests recorded and predicted to occur, the stabilisation of the slope and use of the ancillary areas (i.e., compounds/stockpile sites) will not have an adverse cumulative impact. The works will not benefit any exotic pests at the expense of native species. Exotic plants and animals currently occupy, and occur in proximity to, the proposed works area.

5.2.6 Invasion and spread of pathogens and disease

There is a risk that the proposal would introduce, spread or exacerbate the plant diseases caused by *Phytophthora cinnamomi* and Myrtle Rust (*Puccinia psidii*). These diseases are most likely introduced or spread through the importation or movement of soil, water and landscaping materials, either directly or through incidental attachment to machinery.

'Infection of native plants by *Phytophthora cinnamomi*' and 'Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)', are listed KTP's under the BC and EPBC Acts, respectively. 'Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae' is listed as a KTP under the BC Act and the disease is covered by the EPBC Act listing of 'Novel biota and their impact on biodiversity' as a KTP.

[3] The list of WoNS is part of a combined State and Commonwealth initiative to combat invasive species.

Although there was no obvious evidence for the presence of *Phytophthora cinnamomi* or Myrtle Rust in the vegetation of the study area, recommendations to disinfect vehicles and machinery prior to their use within the study area have been presented in Section 6.

5.2.7 Changes to hydrology

The proposed work would not result in any direct or indirect adverse impact on surface hydrology within the study area. Provided recommended mitigation measures are adopted, the proposal is not considered to significantly impact the hydrological or ecological integrity of the surrounding environment.

5.2.8 Noise, light, dust and vibration

During construction, activities associated with the proposal have the potential to generate air quality, dust (i.e., earthwork, exposed soils and removal of vegetation), noise and/or vibration impact, and exhaust emissions associated with the movement of vehicles, use of machinery, the presence of personnel and the occupation of the failed slope site and ancillary areas.

It is also acknowledged that night works are required for tree removal, to be scheduled between 6pm to 7am, Monday to Friday.

Artificial light pollution can mimic, mask or confuse natural light signals (AG 2023), causing:

- mistimed activity, growth or breeding
- disturbed sleep and circadian rhythms
- disorientation and poor navigation
- attraction to artificial lights
- encounters with new predators
- reduced survival and reproduction.

There is no current artificial light source along this section of Freemans Drive, with the exception of vehicles travelling at night.

The nearest sensitive receiver is the Watagan Forest Motel, about 450 m (direct line) north of the construction footprint.

Based on the observations made during the diurnal investigations of habitats present, given the disturbed and modified nature of the road corridor and failed slope (due to the impacts associated with the landslide), it was not considered that nocturnal species would be significantly reliant on the study area, particularly in consideration of better, more suitable habitat beyond the project boundary within the surrounding conservation areas. There will be a temporary, uncommon increase in noise, light and/or vibration during night hours; however, this is expected to be short-term, for a period of up to two weeks, and only during the initial stage of the project to permit tree removal. The night work is not expected to last the entire nominated 13-hour nightly period (6pm – 7am).

During daylight hours, given the presence of the existing road corridor and traffic use, it is not considered that the proposed work would result in adverse changes to existing levels of noise, vibration and/or light such that there would be a significant impact to native fauna species or sensitive receivers.

The potential noise, vibration, light, dust, air quality impacts and exhaust emissions are considered to be minor, temporary and localised. Where required, the Draft Construction Noise Guideline (NSW EPA 2020) would be referenced, as would compliance of all vehicles and machinery with industry noise guidelines. Mitigation measures are provided in Section 6 of the BAR.

5.3 Cumulative impacts

The proposal, being the remediation of the failed slope and upgrading of the associated infrastructure, is required as a result of the July 2022 storm event and subsequent deterioration of the construction footprint and study area. The cumulative area of assessment (i.e., study area) totals about 1.63 ha, and is composed of:

- Construction footprint comprising an area of about 1.48 ha
  - 240 m length of work (extending from the eastern side of MR220 Freemans Drive) by 30 m width beyond the existing western guardrail

  - disturbance/removal of up to 1.04 ha of vegetation (i.e., the proposal area excluding the existing road, and based on about 240 m length of work by 30 m width, plus 10 m buffers at the limits of the works) to achieve the objectives of the proposal, including the removal of up to 224 mature native trees (three being hollow-bearing)
  - establishment of temporary access track, expected to be about 3 m wide
  - indirect disturbance through movement of personnel and vehicles/machinery
- One spoil/stockpile location and two compound sites (totalling 1500 m^2)
  - Existing Transport stockpile site has an area of about 500 m^2
  - Site compound No.1 has an area of about 800 m^2
  - Site compound No. 2 has an area of about 200 m^2

The operational footprint of the proposal would be less than the construction footprint.

Cumulative negative effects of the proposal are the removal of 1.04 ha of vegetation, including 224 trees, that will require night works with a full road closure/detour over a period of up to two weeks. However, the removal of 224 trees will be offset in line with Transport's The Tree and Hollow Replacement Program, whereby 1224 trees are required to be re-planted and three artificial hollows would require provision within the project boundary or on land adjacent to or close by the project limits with landowner's consent. Alternatively, Transport for NSW may opt to transfer $153,750 into the Transport Conservation Fund.

Cumulative beneficial impacts as a result of the proposal would include:

- Remediation of the failed slope on Freemans Drive and any associated infrastructure
- Remediated environmental conditions
- Improved, safer road conditions.

With reference to the NSW Government's Planning Portal (NSW Government 2023d), no current or future development applications or State Significant projects have been identified in the surrounding vicinity of Freemans Drive.

In consideration of the vegetation and habitat removal assessed within this report, the proposal is not expected to contribute to an adverse cumulative ecological impact in a local and regional context; nor is it considered to further contribute to the decline of any threatened species, populations or ecological communities within the locality. The works will not remove any TEC, threatened species or any areas of their habitat, nor further fragment or isolate areas of bushland. Given the assessment conducted through this BAR, provided recommended mitigation measures are adhered to, no accesses, drainage patterns, flood behaviour or biodiversity (including connectivity of habitat and wildlife movement) would experience any cumulative environmental impact during the construction, remediation or operation phases of the proposal.

The conducting of the proposal is not expected to have a cumulative impact on any existing or planned developments within the surrounding locality. While community impacts (e.g., temporary road closure) are a result during the proposed work, this will be limited, and implementing the full road closure at night would avoid periods where traffic volumes are highest and therefore impact fewer road users.

5.4 Assessments of significance

No MNES listed under the EPBC Act were recorded, and none were considered to be present at other times of the year, within the landslip site. Assessments with reference to the EPBC Significant Impact Guidelines are not required.

A number of hollow-dependent species have been previously recorded in the study region (Appendix C). Considering the structure of the hollow-bearing trees to be removed, and the diameters of their entrance cavities, these plants could be occupied by microbats and small to medium size birds/arboreal mammals. As surveys for these species were not conducted, a precautionary approach has been adopted and an assessment conducted (Appendix F). The findings of this assessment are summarised in Table 5-4.

It was considered that, as there was a low likelihood of occurrence of the Red Helmet Orchid (Vulnerable, BC Act), given the condition of the vegetation and that no plants that could be the vegetative form of the species were found, a significance of assessment test was not required on this species.

It was concluded that the proposal would not have a significant impact on any potentially occurring hollow-dependent fauna, or their habitats. The preparation of a SIS (or alternatively a BDAR) is not required.

Table 5-4: Summary of BC Act significance assessments findings

Significance assessment question *(per Section 7.2 of the BC Act and Threatened Species Test of Significance Guidelines (OEH 2018))*						
Threatened species, or communities	a	b	c	d	e	Likely significant impact?
Hollow-dependent species	N	X	N	N	N	No
Y *= Yes (negative impact),* ***N*** *= No (no or positive impact),* ***X*** *= Yes/No answer not applicable,* ***?*** *= unknown impact.*						

6. Mitigation

Table 6-1 provides a number of mitigation measures that aim to ensure that the proposed work carried out does not have an adverse impact on those environments that occur within or near to the study area.

Where applicable, safeguards are made with reference to Transport's *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).

Table 6-1: Mitigation measures

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B01	General	An Erosion Sediment Control Plan (ESCP) would be prepared for the proposal and would be in line with the publication *Managing Urban Stormwater: Soils & Construction Guidelines* (Landcom 2004).	Detailed design	Effective	No	Project Manager/ Contractor
B02		A Construction Environmental Management Plan (CEMP) would be prepared for the proposal.	Prior to construction	Effective	No	Project Manager/ Contractor
B03		The following temporary stockpile and compound sites will be utilised for the proposal: • An existing Transport stockpile site, located about 2 km south of the proposal, adjacent to the southern side of Palmers Road, • No.1 compound site – about 2 km south of the proposal on the western shoulder of MR220 Freemans Drive; and • No.2 compound site – about 200 m north of the proposal on the western shoulder of Freemans Drive. These will be located within the identified existing hardstand, cleared areas, and managed in accordance with Transport's Stockpile Site Management Guideline (EMS-TG-10).	Prior/during construction	Effective	No	Project Manager/ Contractor
B04		The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened ecological communities and threatened fauna or flora not assessed in the biodiversity assessment, are identified in the study area.	During construction	Proven	No	Environment manager
B05		Spill kits commensurate with the type and quantity of hazardous material used must be available on-site.	During construction	Effective	No	Project Manager
B06		If required, refuelling of machinery is to occur within an impervious bunded area located more than 50 m from any drainage line to prevent the escape of substances into the surrounding environment.	During construction	Effective	No	Contractor
B07	Removal of native vegetation	Native vegetation removal will be minimised through detailed design.	Detailed design	Effective	There would be a residual impact from the loss of 1.04 ha of native/exotic vegetation, including 224 trees composed of 42 small trees, 97	Project Manager

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
					medium trees, 76 large trees and 9 extra large trees; including three hollow-bearing trees).	
B08		Vegetation clearance limits would be identified both on site maps/plans and on-site through the erection of temporary exclusion fencing, bunting or similar in accordance with *Guide 2: Exclusion Zones* (RTA 2011).	Prior to construction	Effective	No	Project Manager/ Environment manager/ Contractor
B09		Fencing etc. would be established at the outer limits of the drip line of any retained trees and the areas marked as 'no-go zones' to avoid direct impact.	Prior to construction	Effective	No	Project Manager/ Environment manager/ Contractor
B10		Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* (RTA 2011).	Prior to construction	Effective	No	Project Manager/ Environment manager
B11		Retained trees would be clearly identified on-site prior to the commencement of work to ensure they are not indirectly impacted or cleared.	Prior to construction	Effective	No	Project Manager/ Environment manager
B12		Vegetation removal will be undertaken in accordance with *Guide 4: Clearing of vegetation and removal of bushrock* (RTA 2011). Clearing of native vegetation would be limited to the minimum required to successfully permit the proposal.	During construction	Effective	There would be a residual impact from the loss of 1.04 ha of native/exotic vegetation, including 224 trees composed of 42 small trees, 97 medium trees, 76 large trees and 9 extra large trees; including three hollow-bearing trees).	Contractor
B13		Removed native vegetation would be mulched or re-used on-site (e.g., to stabilise disturbed areas).	During/post construction	Effective	No	Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B14		Vegetation removal work is not to be conducted during periods of high winds.	During construction	Effective	No	Contractor
B15		To replace the loss of an estimated 224 trees, Transport will either re-plant 1224 trees or transfer $153,750 into the Transport Conservation Fund as per the Tree and hollow replacement guidelines (Transport 2022b). The development of Tree and Hollow Replacement Plan, or payment to the fund, is to occur before clearing starts.	Pre/post construction	Effective	No	Project Manager/ Environment manager
B16		Native vegetation will be re-established in accordance with *Guide 3: Re-establishment of native vegetation* (RTA 2011).	Post construction	Effective	No	Contractor
B17	Removal of threatened fauna habitat	Threatened fauna habitat removal will be minimised through detailed design.	Detailed design	Effective	The loss of three hollow-bearing trees, and some Koala use trees.	Project Manager
B18		Given their locations measures should be adopted to retain as many hollow bearing-trees as possible.	Detailed design	Effective		Project Manager
B19		Habitat removal will be undertaken in accordance with *Guide 4: Clearing of vegetation and removal of bushrock* (RTA 2011). Should it be required, an ecologist (or similar qualified person) is to be present on-site during the removal of one or more of the three hollow-bearing trees.	During construction	Effective		Contractor
B20		The three hollow-bearing trees should be 'soft- felled' in sections, with hollow-limbs lowered to the ground. These should be collected and used locally as habitat as part of the off-setting requirements. Where possible, relocate locally the felled trees as opposed to the mulching of these plants. Relocation of the felled trees would aim at providing habitat for native species and their prey (as per DEC 2004 *Threatened Species Survey and Assessment: Guidelines for developments and activities* and Transport's *Biodiversity guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011)).	During construction	Effective		Contractor/ Environment manager
B21		The three hollow-bearing trees are to be marked during pre-clearing surveys and retained for Stage 2 of clearing (i.e., left for at least 24 hours following Stage 1 clearing). All vegetation around the hollow-bearing trees to be removed would be cleared 24 to 48 hours prior to the removal of the hollow-bearing trees. This approach isolates the hollow-bearing trees and reduces their	During construction	Effective		Contractor/ Environment manager

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		habitat value (particularly for ground-traversing fauna that are exposed to predation).				
B22		Fauna will be managed in accordance with *Guide 9: Fauna handling* (RTA 2011). The ecologist is to liaise with the tree felling contractor and collect, and relocate locally, any sheltering native fauna. Nocturnal species, such as microbats or arboreal possums, should be released at dusk.	During construction	Effective	No	Ecologist/licenced wildlife carer
B23		Habitat will be replaced or re-instated in accordance with *Guide 5: Re-use of woody debris and bushrock* and *Guide 8: Nest boxes* (RTA 2011).	During construction	Proven	No	Contractor/ Environment manager
B24		To replace the loss of a calculated 'occupied' hollow from the cumulative three hollow-bearing trees to be removed, three artificial hollows as per the Tree and hollow replacement guidelines would be established. The development of Tree and Hollow Replacement Plan, or payment to the fund, is to occur before clearing starts.	Pre/post construction	Effective	No	Project Manager/ Environment manager
B25	Removal of threatened flora	The unexpected species find procedure is to be followed under *Guide 1: Pre-clearing process* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011) if threatened flora species, not assessed in the biodiversity assessment, are identified in the study area.	During construction	Proven	No	Environment manager
B26	Changes to hydrology	Changes to existing surface water flows will be minimised through detailed design.	Detailed design	Effective	Minor alterations to surface water flows.	Project Manager
B27	Edge effects on adjacent native vegetation and habitat	Exclusion zones will be set up at the limit of clearing in accordance *with Guide 2: Exclusion zones* (RTA 2011).	Prior/During construction	Effective	No	Project Manager/ Environment manager
B28	Injury and mortality of fauna	Inspections for the presence of any sheltering fauna would be carried out beneath vehicles/machinery prior to use.	During construction	Effective	While provided mitigation measures are effective in minimising fauna injury and mortality, they are unlikely to	Contractor
B29		Any sheltering native species would be collected and relocated locally (nocturnal species to be released on dusk).	During construction	Effective		Ecologist/licenced wildlife carer

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		If injured, native wildlife would be taken to a local veterinarian or wildlife carer for treatment. Once rehabilitated, these native animals must be released at their point of capture. Exotic injured wildlife would be taken to a local veterinarian and treated appropriately.			completely prevent it. Some loss of individuals of native animal species may occur during construction and operation of the road. However, the potential mortality of fauna is unlikely to significantly increase the likelihood of the loss of any local native animal populations.	
B30	Invasion and spread of weeds	Weed species will be managed in accordance *with Guide 6: Weed management* (RTA 2011).	Prior/During construction	Effective	No	Environment manager
B31		In accordance with the NSW Biosecurity Act 2015, the presence of Lantana on-site would be controlled prior to the commencement of the proposed work, thereby mitigating impacts on adjoining land to which it could spread. Lantana cannot be mulched and re-used on site and must be separated from other vegetation. No lantana waste is to be stockpiled.	Prior/During construction	Effective	No	Environment manager
B32		As part of the ongoing maintenance of the road corridor, regular monitoring of Lantana is recommended.	Post construction	Effective	No	Project Manager
B33		Weed contaminated green waste will be disposed of appropriately at a licensed landfill facility, or buried/composted on site in accordance with a procedure developed for the project.	During/post construction	Effective	No	Contractor
B34		All vehicles/machinery would enter the site via stabilised areas to prevent the introduction and spread of weed seeds and/or pathogens.	During construction	Effective	No	Contractor
B35	Invasion and spread of pests	While not expected, if required, pest species will be managed within the study area.	During construction	Effective	No	Environment manager

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B36	Invasion and spread of pathogens and disease	Pathogens (e.g., *Phytophthora cinnamonmi*) will be managed in accordance with *Guide 2: Exclusion zones and Guide 7: Pathogen management* (RTA 2011), including the following hygiene protocols: • Before entering and leaving the work site, workers are to remove excess soil and mud and then spray boots, tools, gloves and small equipment with recommended disinfectant supplied by the contractor (70% Methylated spirits / 30% Water) until runoff is clear. • Avoid unnecessary soil disturbance.	During construction	Effective	Minimal. With the implementation of measures, the risk of introducing pathogens would be low.	Project Manager/ Contractor
B37	Noise, light, dust and vibration	Noise and vibration impact will be minimised through detailed design.	Detailed design	Effective	No	Project Manager
B38		Potential dust impact generated from activities (e.g., mulching) would be monitored (i.e., to ensure it is not reducing traffic visibility). If dust impact is more than manageable, work will stop and the work method reviewed.	During construction	Effective	No	Contractor
B39		All plant/equipment to be used on site will be designed and operated to control the potential emission of smoky exhaust fumes into the atmosphere. All machinery/vehicles are to be operated within standard guidelines.	During construction	Effective	No	Contractor
B40		Construction activities would be limited to the period: • 7am to 6pm Monday to Friday • 8am to 4pm Saturdays • 6pm to 7am night works, Monday to Friday • No works on Sundays and Public Holidays.	During construction	Effective	No	Contractor

7. Offsets and other measures

7.1 Thresholds

The proposed works would trigger thresholds set out by No Net Loss Guidelines (Transport 2022a) listed in Table 7-1 (refer to Section 7.2 of this report).

Table 7-1: Offset thresholds (Transport No Net Loss Guidelines)

Impact	Threshold	Triggered
Works involving clearing of a CEEC	Where there is any clearing of an CEEC in 'moderate to good' condition	No
Works involving clearing of an EEC	Where clearing of a EEC ≥ 2 ha in 'moderate to good' condition	No
Works involving clearing of VEC	Where clearing of VEC ≥ 5 ha in 'moderate to good' condition	No
Works involving clearing of any habitat for a known species credit fauna species or clearing of breeding habitat (as defined by the TBDC) for dual-credit fauna species (excluding exotic and planted vegetation that cannot be assigned to a plant community type)	Where clearing ≥ 1 ha in 'moderate to good' condition	No
Works involving removal of known threatened flora species and their habitat	Where loss of individuals is ≥10 or where clearing of habitat is ≥ 1 ha	No
Type 1 or Type 2 key fish habitats	Where there is a net loss of habitat	No
Any residual biodiversity impact that doesn't require offsets in accordance with the No Net Loss Guideline is to be assessed against the requirements of the Tree and Hollow Replacement Guideline.	Any clearing of hollows and/or trees ≥5cm DBH	Yes – clearing of 224 trees (including three hollow-bearing). Refer to Table 7.2 below.

Table 7-2: Assessment of vegetation impacts against thresholds

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha or m^2)[1]	Threshold triggered?
Study Area	PCT 3150	Low-Disturbed	Not a TEC	1.04 ha	Tree replacement is required.

7.2 Biodiversity offset strategy/tree and hollow replacement plan

The proposed work will require the removal of 224 trees; three of which are hollow-bearing (it is acknowledged and recommendations for the retention of the three hollow-bearing trees, given their position on the slope, have been proposed). Vegetation within the proposal area is not considered likely to naturally regenerate following completion of work. The works do not meet any of the exclusions in the *Tree and hollow replacement guidelines*.

Transport's *Tree and hollow replacement guidelines* (Transport 2022b) provides a calculation to assess the number of replacement plants (Table 7-3). In accordance with Section 2.4 of the Tree and hollow replacement guidelines, where tree replacement cannot be accommodated locally [or only partially], payment must be made to Transport's

Conservation Fund as per the rates set out in Table 7-4. For trees with multiple stems/trunks, the replacement/payment required is only calculated for the largest stem DBH.

To offset the loss of 224 trees, 1224 plants would need to be planted within, or near, the project area; with the provision of three artificial hollows to replace the three hollow-bearing trees to be removed (should this be required). This is based on a preliminary tree count conducted by Biosis (2022) and will be verified / updated during pre-clearing surveys.

Alternatively, Transport may opt to transfer $153,750 into the Transport Conservation Fund as per the required rates listed in the *Tree and hollow replacement guidelines*. Transfer of funds must occur prior to commencement of work.

Table 7-3: Tree replacement requirements

Tree size	Tree replacement requirement
Small tree (DBH 5 – 20 cm)	Plant minimum two trees
Medium tree (DBH 20 – 50 cm)	Plant minimum four trees
Large tree (DBH 50 – 100 cm)	Plant minimum eight trees
Very Large tree (DBH > 100 cm)	Plant minimum 16 trees
Hollow replacement requirement	Provide three artificial hollows for every occupied hollow removed[4]

Table 7-4: Transport Conservation Fund contributions

Tree size	Tree replacement requirement
Small tree (DBH 5 – 20 cm)	$125
Medium tree (DBH 20 – 50 cm)	$500
Large tree (DBH 50 – 100 cm)	$1000
Very Large tree (DBH > 100 cm)	$2500
Hollow	$500

8. Conclusion

To permit the proposed slope remediation work along the investigated 240 m section of Freemans Drive, an estimated 1.04 ha of vegetation disturbance/removal is required; this including the removal of 224 trees, three of which are hollow-bearing.

Within the area investigated, no TECs or threatened flora or fauna species listed, or currently being considered for listing, under the EPBC or BC Acts were recorded. Similarly, considering the quality and structure of the PCT present, no threatened flora was considered likely to occur.

Small to medium size hollow-dependent fauna (listed under the BC Act) may be present in association with the three hollow-bearing trees that require removal. As targeted surveys were not conducted, and as sheltering and foraging resources for these animals are to be removed, a precautionary approach was adopted. To consider the impact the slope remediation works may have on these animals, the criteria provided under Section 7.3 of the BC Act were referred to. With reference to these criteria, it was concluded that the loss of 224 insect-attracting and pollen producing plants, three of which are hollow-bearing, would not have a significant effect on hollow-dependent fauna or their habitats.

The three hollow-bearing trees to be removed, given the limited size of their entrance cavities, would not be suitable for large raptors, owls or birds such as the Glossy-Black Cockatoo.

The proposal does not trigger a SIS, or a BDAR.

The findings of the current investigation support and confirm the observations made by Biosis during the course of their preliminary biodiversity investigation of this site (Biosis 2022).

To offset the loss of 224 trees, 1224 trees would require re-planting and three artificial hollows would require provision (within the project boundary or on land adjacent or close to the project with landowner's consent) in line with Transport's *Tree and hollow replacement guidelines*. Alternatively, Transport may transfer $153,750 into the Transport Conservation Fund. Transfer of funds must occur prior to commencement of work.

Mitigation measures have been recommended in Section 6, to reduce any ecological impact as a result of the proposed work. Two primary measures include:

- Minimising impact through detailed design
- Adhering to Transport's *Biodiversity Guidelines* (RTA 2011).

In addition, the following key mitigation measures have been provided:

- Limit vegetation removal to the minimum required to successfully permit the proposal
- Replant 1224 trees to replace the removal of 224 trees, and provide three artificial hollows to replace the removal of three hollow-bearing trees
    - Alternatively, Transport may opt to transfer $153,750 into the Transport Conservation Fund.
- Prepare an ESCP to minimise soil erosion and sediment transfer off-site.

With adherence to those recommendations provided in this report, no ecological constraints to the proposal proceeding as planned were identified or considered likely to occur.

The adoption of the mitigation measures provided would ensure that the proposal is carried out in an ecologically sustainable manner.

9. Glossary

Term	Definition
Accredited person or assessor	Means as person accredited under section 6.10 (of the BC Act) to prepare reports in accordance with the BAM.
Artificial hollows	Artificial hollows, including hollows carved into a tree, nest boxes attached to trees and salvaged hollows can be used to provide supplementary breeding habitat and shelter for hollow-dependent fauna where hollows have been removed. When designed, built, installed and monitored correctly artificial hollows can provide an alternative to natural fauna habitat.
Biodiversity Assessment Method	The Biodiversity Assessment Method is established under section 6.7 of the BC Act. The BAM is established for the purpose of assessing certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values.
Biodiversity offsets	The gain in biodiversity values achieved from the implementation of management actions on areas of land, to compensate for losses to biodiversity values from the impacts of development (State Government of NSW and DPIE 2020c).
BioNet Atlas	The DPE database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish.
BioNet Vegetation classification	Refers to the vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW.
Construction footprint	The area to be directly impacted by the proposal during construction activities. See also definition for subject land.
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.
Direct impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (the BC Regulation). This includes impacts from activities related to the construction or operational phase of the proposal (State Government of NSW and DPIE 2020c).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (State Government of NSW and DPIE 2020c).
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g., transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (State Government of NSW and DPIE 2020c).
Landscape assessment area	The area which includes the subject land and a 1500 m buffer surrounding the outside edge of the boundary of the subject land or 500 m along each side of the centre line of a linear-shaped proposal.
Local population	The population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly

Term	Definition
	demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions: • The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area. • The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area. • The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time or return year to year.
Matter of national environmental significance	A MNES is any of the nine defined components protected by a provision of Part 3 of the EPBC Act.
Mitigation	Action to reduce the severity of an impact.
Native vegetation	Has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act. In summary, a) trees (including any sapling or shrub or any scrub) b) understorey plants c) groundcover (being any type of herbaceous vegetation) d) plants occurring in a wetland. A plant is native to New South Wales if it was established in New South Wales before European settlement (BC Act). Native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). Marine vegetation is covered by the provisions of the FM Act.
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (State Government of NSW and DPIE 2020c).
Operational footprint	The area that will be subject to ongoing operational impacts from the proposal. This includes the road, surrounding safety verges and infrastructure, fauna connectivity structures and maintenance access tracks and compounds.
Patch size	An area of native vegetation that: • occurs on the development site or biodiversity stewardship site • includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site (State Government of NSW and DPIE 2020c).
PlantNET	An online database of the flora of New South Wales which contains currently accepted taxonomy for plants found in the State, both native and exotic.
Population	A group of organisms, all of the same species, occupying a particular area (DPIE 2020a).
Species credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits (State Government of NSW and DPIE 2020c). This is analogous with the definition of 'candidate species.'

Term	Definition
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection (State Government of NSW and DPIE 2020c).
Study area	The area directly affected by the proposal (subject land or construction footprint) and any additional areas likely to be affected by the proposal, either directly or indirectly.
Subject land	Land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the landscape assessment area which surrounds the subject land (i.e., the area of land in the 1500 m buffer zone around the subject land or 500m buffer zone for linear proposals). In the case of a biodiversity certification proposal, subject land includes the biodiversity certification assessment area (State Government of NSW and DPIE 2020c). See also definition for construction footprint.
Threatened Biodiversity Data Collection	A publicly assessable online database (registration required) which contains information for listed threatened species, populations and ecological communities (State Government of NSW and DPIE 2020c). Part of the BioNet database.
Tree	As per Australian Standard 4970-2009 a tree is considered to be a long-lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).
Vegetation integrity (score)	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT. The vegetation integrity score is the quantitative measure of vegetation condition calculated by the BAM-C (State Government of NSW and DPIE 2020c).
Vegetation zone	A relatively homogeneous area of native vegetation on a development site, clearing site, land to be biodiversity certified or biodiversity stewardship site that is the same PCT and has the same broad condition state (State Government of NSW and DPIE 2020c).

10. Abbreviations

Term	Definition
AOBV	Area of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BCF	Biodiversity Conservation Fund
BOS	Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	*Environment Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
KFH	Key Fish Habitat
KTP	Key Threatening Process
LGA	Local Government Area
mm/cm/m/m2/km/ha	Millimetres, centimetres, metres, square metres, kilometres, hectares
MNES	Matters of national environmental significance
NSW	New South Wales
PCT	Plant community type
PMST	Protected Matters Search Tool
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
TBDC	Threatened Biodiversity Data Collection
TECs	Threatened ecological communities (VECs, EECs and CEECs)
Transport	Transport for NSW
VIS	Vegetation Information System
WoNS	Weeds of National Significance

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Appendix A: Transport Minor Works REF brief

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Resource 4

Environmental assessment procedure for routine and minor works

Minor works REF brief

Freemans Drive, Freemans Waterhole, Slope Remediation

Minor works review of environmental factors briefs

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Appendices

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Appendix B	Minor Works Review of Environmental Factors (MWREF) template
Appendix C	EIA-N04 Guideline for landscape character and visual impact assessment
Appendix D	EIA-P05-G01-T02 Environmental Assessment Procedure for Routine and Minor Works Safeguard list (Resource 2)
Appendix E	EMF-BD-GD-0011 No Net Loss Guidelines
Appendix F	EMF-BD-GD-0129 Tree & Hollow Replacement Guideline
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1 Introduction

1.1 Purpose

Transport for NSW (TfNSW) requires the services of a professional services Contractor (the Contractor) to prepare a Minor Works Review of Environmental Factors (MWREF) and biodiversity assessment report to fulfil the requirements of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and to consider all matters affecting or likely to affect the environment because of the proposal.

1.2 Proposal description

The declared natural disaster event of AGRN1025 'NSW Severe Weather and Flooding June 2022 onwards' has caused some damage to the Region North road transport network, with impacts on the state, regional and local networks. This brief exclusively addresses restoration works of the failed slope 15094 on MR220 Freemans Drive, north of Freemans Waterhole in Lake Macquarie Council region.

Following the initial emergency response, Transport for NSW – Natural Disaster Recovery team has been tasked to implement a permanent embankment remediation solution for the site to ensure the integrity and long-term sustainability of the road corridor. The site is located 1.2km from Freemans Waterhole, NSW 2323. The planned wotks are on the shoulder of Freemans Drive extending for approx 150m.

The MWREF report will also need to include a detailed biodiversity review as there is potential threatened species within the proposed footprint of the works.

1.3 Background

Background information relevant to the proposal that would assist in the response to this brief includes the following:

As noted, July 2022 storm event caused a downslope embankment failure on Freemans Drive at Freemans Waterhole, NSW. Freemans Drive is a road cutting through Sugaloaf State Conservation Area and Heaton State Forest with a high cutting through weathered sandstone rock. On the downslope or northbound lane of Freemans Drive Heatons State Forest howevere the cadastral boundaries for the site have been confirmed wiuth the proposed works not to extend beyond current boundary lines.

This immediate embankment failure is approximately 60m long however the overall embankment along Freemans Drive is starting showing signs of movement which could result in extra embankment stabilisation, detail design pending. Due to the current unknown extent of works, the proposed study area is covering any increase in the construction works.

Figure 1 – Street view of Freemans Drive prior post embankment failure

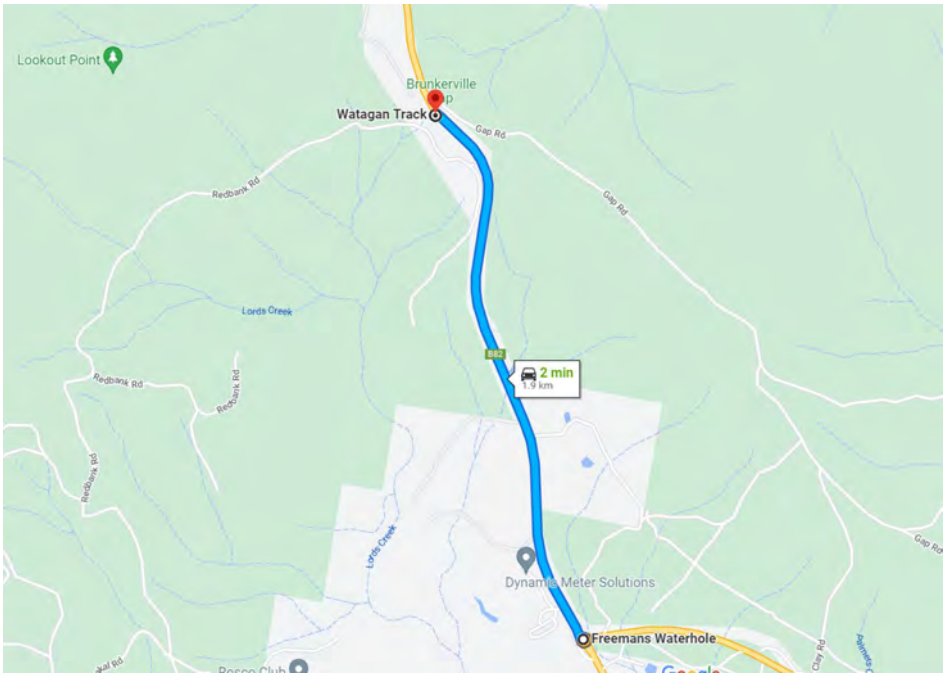


Figure 2 – Aerial showing Freemans Drive work sites from Freemans Waterhole, NSW, 2323

1.3.1 Investigations completed to date:

To support early project planning, Transport for NSW has undertaken a number of preliminary desktop assessments noted below. Desktop searches are noted for information purposes only and it is the MWREF Consultant's scope of works to confirm these results by undertaking their own due diligence.

1. Aboriginal Cultural Heritage - Figure 3 (below) provides confirmation from NSW Government Aboriginal Heritiage Information Management System (AHIMS), there are six (6) known Aboriginal sites recorded in the general area but otuside the porposed work area.

AHIMS Web Services (AWS)
Search Result

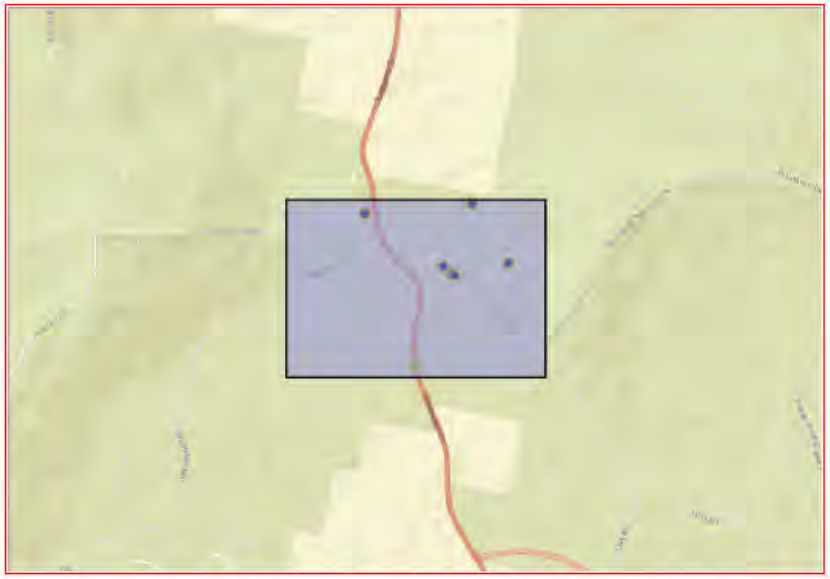
Your Ref/PO Number : Freemans Drive
Client Service ID : 723700
Date: 18 October 2022

Harrison Yardley
6 Stewart Avenue
Newcastle West New South Wales 2302
Attention: Harrison Yardley
Email: harrison.yardley@transport.nsw.gov.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -32.9751, 151.4743 - Lat, Long To : -32.9661, 151.4897, conducted by Harrison Yardley on 18 October 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

6	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Figure 3 – AHIMS desktop results

TfNSW will complete Roads and Maritime Services procedure for Aboriginal cultural heritage consultation and investigation process prior to the finalisation of the MWREF.

2. Native Title – Figure 4 (below) confirms there are known results recorded within the general area and likely (unconfirmed) if they are within the footprint of the works. It is the MWREF Contractors scope of works to validate the accuracy of this information.

Tribunal file no.

Federal Court file no.

Short name

Case name

State or Territory: ALL

Registered Native Title Body Corporate*

Representative A/TSI body area

Local government area: Lake Macquarie City Council

Determination type: ALL

Legal process: ALL

Determination outcome: ALL

Determination date between and

Sort by: Determination date

Search >

*Please note: current contact details for the Registered Native Title Body Corporate are available from the Office of the Registrar of Indigenous Corporations www.oric.gov.au

Your search returned **6** matches.

Short name	Case name	Legal process	Determination date	Outcome
Biraban Local Aboriginal Land Council	Biraban Local Aboriginal Land Council v Attorney-General of New South Wales	Unopposed	24/02/2022	Native title does not exist
Awabakal Local Aboriginal Land Council	Awabakal Local Aboriginal Land Council v Attorney General of New South Wales	Unopposed	20/10/2020	Native title does not exist
Bahtabah Local Aboriginal Land Council	Bahtabah Local Aboriginal Land Council v Attorney General of New South Wales	Unopposed	26/08/2020	Native title does not exist
Bahtabah Local Aboriginal Land Council #1	Bahtabah Local Aboriginal Land Council v New South Wales Native Title Services Limited	Unopposed	20/03/2007	Native title does not exist
Bahtabah Local Aboriginal Land Council #2	Bahtabah Local Aboriginal Land Council v New South Wales Native Title Services Limited	Unopposed	20/03/2007	Native title does not exist
Bahtahbah Local Aboriginal Land Council	Bahtahbah Local Aboriginal Land Council	Unopposed	19/06/2003	Native title does not exist

Figure 4 - Native Title Desktop Search Results

3. State Heritage – Figure 5 (below) confirms there <u>are</u> <u>known</u> results recorded within the general footprint of the works however as noted, it is the MWREF Contractors scope of works to validate the accuracy of this information.

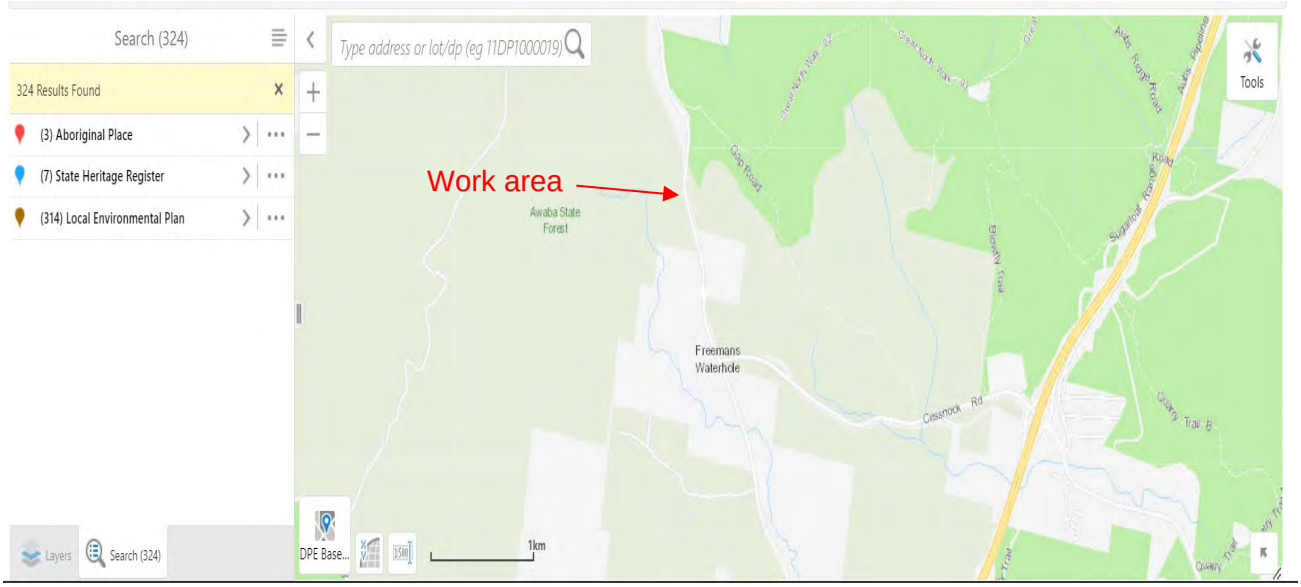


Figure 5 - State Heritage Inventory Desktop Search Results

4. Australian Heritage database – Figure 6 (below) confirms there are no known results recorded within the genral footprint of the works however as noted, it is the MWREF Contractors scope of works to validate the accuracy of this information.

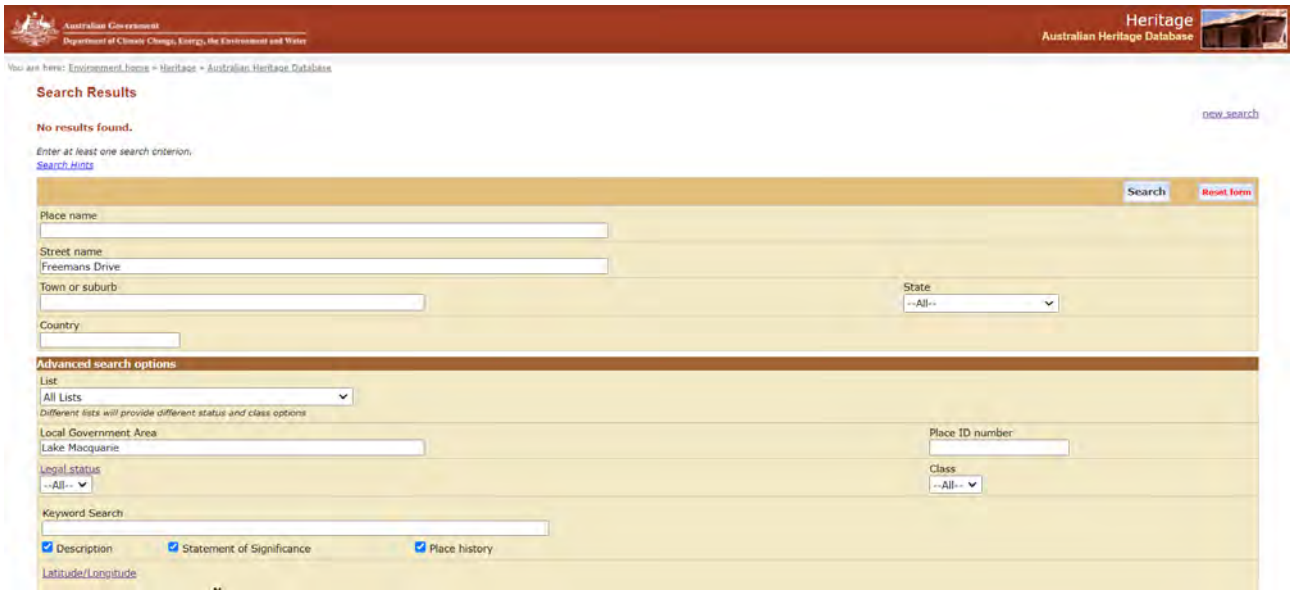


Figure 6 - Australian Heritage Database Desktop Search Results

5. Cadastral boundaries:

The Freemans Drive slope failure has the Heaton State Forest located on the western side of the road reserve, shown in Figure 7a. Works are unlikely to extend beyond the road reserve as Transport for NSW has had the cadastral boundaries confirmed for this area, Figure 7b.

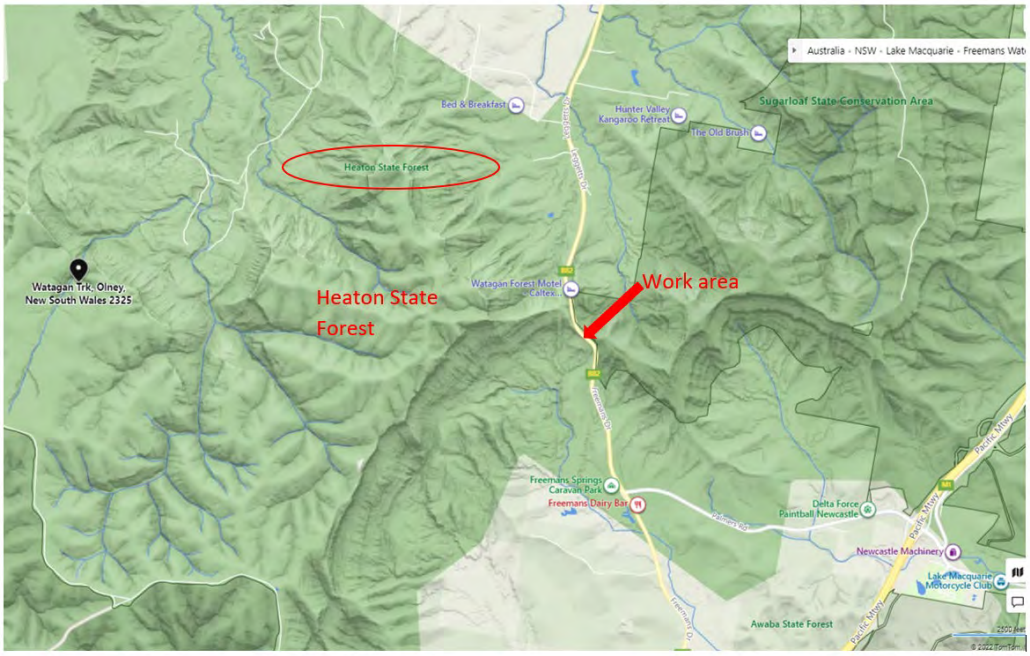


Figure 7a – Aerial detailing land title adjacent to the works (downslope)

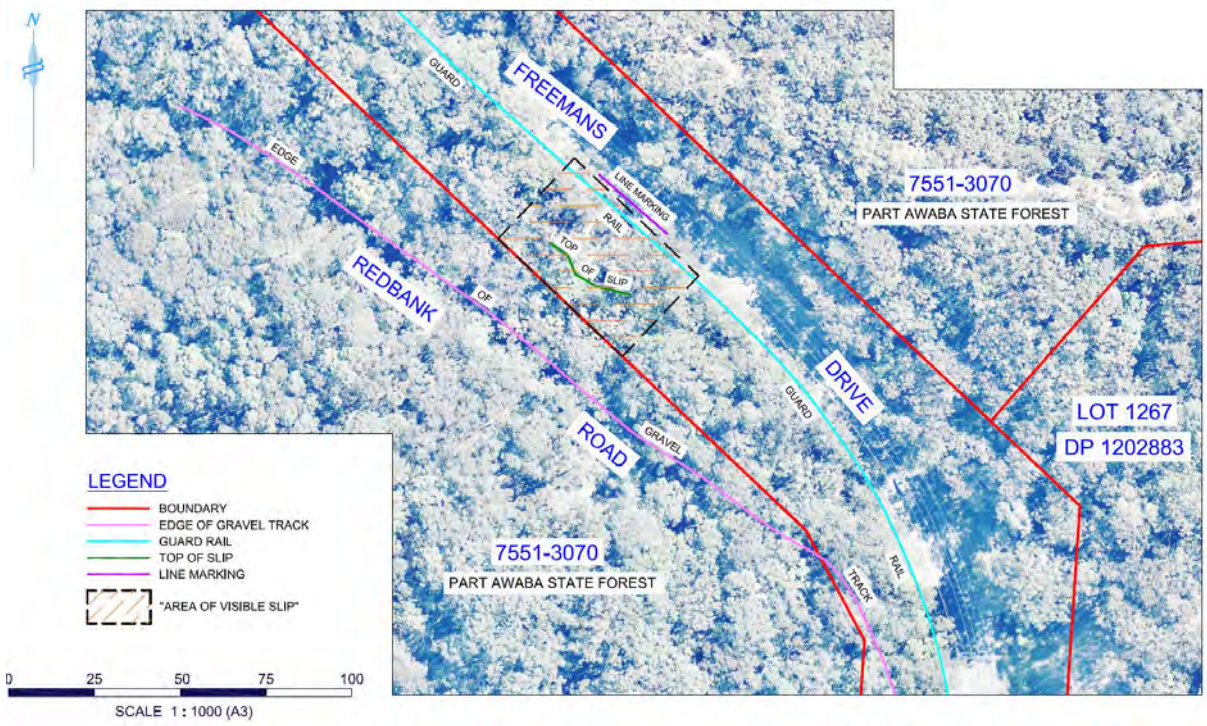


Figure 7b – Aerial detailing confirmed cadastral boundary

1.4 Minor Works Review Environmental Factors Study Area

The study area for the MWREF includes future construction works which will be one of two design options (refer to section 1.5).

Because the design is still in development the MWREF study area is 4,800m2. Referring to Figure 8, the study starts from the following google maps starting point (*-32.968671793498224, 151.48031826324097*) and continues 240m south towards Freemans Waterhole and 20m west down the embankment from the back of the exisiting guardrailing.

Figure 8 – Aerial of proposed study areas

1.4.1 Site Compounds & Spoil Locations

Previously noted in MWREF studies Transport for NSW has highlighted propsoed spoil stockpiles and site compound locations.

The MWREF will need to include a temporary spoil stockpile and site compound. These two locations have been selected because it is within the road reserve or has previously been used for this purpose from Transport for NSW road works.

1.4.1.1 Site compounds

The site compound (*-32.98513686, 151.48601110*), will be the main compound because of its close proximity to the work area.

It is located within the road reserve however consulation with the United Petrol Station will be required. The site is located approx. 2km south from the work site and is on the shoulder of Freemans Drive within an already disturbed / cleared area Figure 9.

Figure 9 – Aerial view of site compound

1.4.1.2 Spoil / Stockpile Locations

Spoil from the works will be minimal with an unknown quanitity until detail design has been finalised.

The preference will be to use any spoil on site to reshape the exisiting embankment profile and if needed additional spoil will get loaded and hauled to a temporary stockpile 2km south from the work site. This temporary location has been carefully selected because the area has previously been used as a stockpile and is within the road reserve.

The project intends to have the spoil removed from this location within 3 months from completion of the works. Google maps reference on the location (*-32.984116893, 151.48759569*).

Greenwaste from any clearing works will be taken off site and disposed of at a licenced waste management facility that is managed by Lake Macquarie City Council, Local Government for the area.

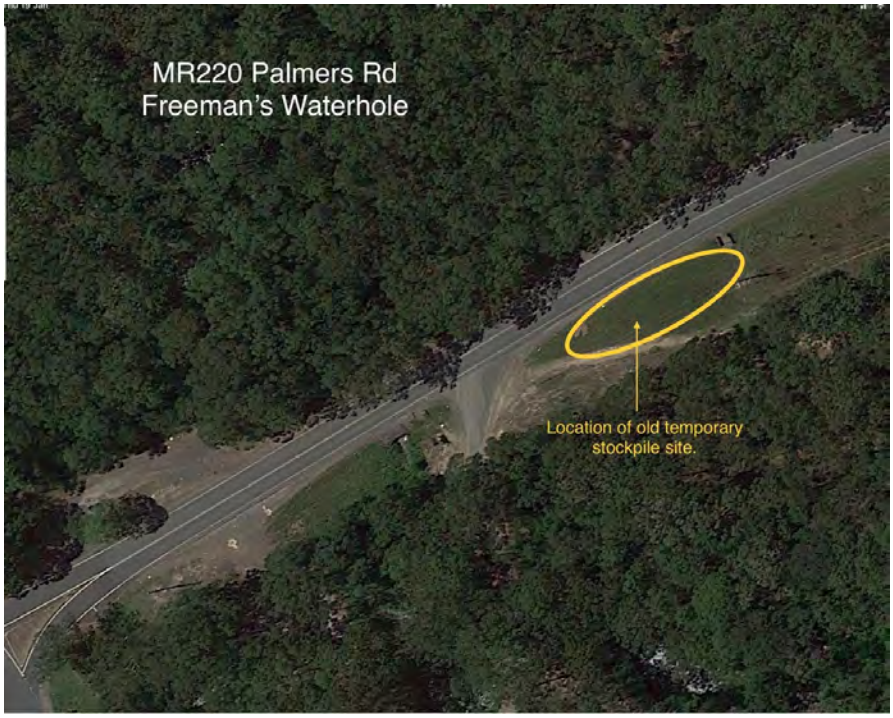


Figure 10 – Aerial spoil stockpile location

1.5 Proposed Construction Works:

Referring to Figure 11 and 12 (below), the slope treatment for the site is still being determined with one of two options to be agreed as the proposed remedial works.

- Soil nail with shotcrete

This is a common treatment for embankment stabilisation however it offers the most enviromental distrubance. Referring to Appendix H, section 6, this design option offers the most amount of tree clearing however the proposed study area is covering the potential disturbance footprint.

- Anchored solider piled wall

The design option would require less environmental disturbance but likely higher construction cost. The scale of the works is largerly maintained on the shoulder / verge of the exisiting road and trees may be required to be removed due to disturbance to the SRZ of neighbouring trees, Appendix H Arborists report. Transport will decide during the development of the MWREF which design option has been agreed as the final remedial works.

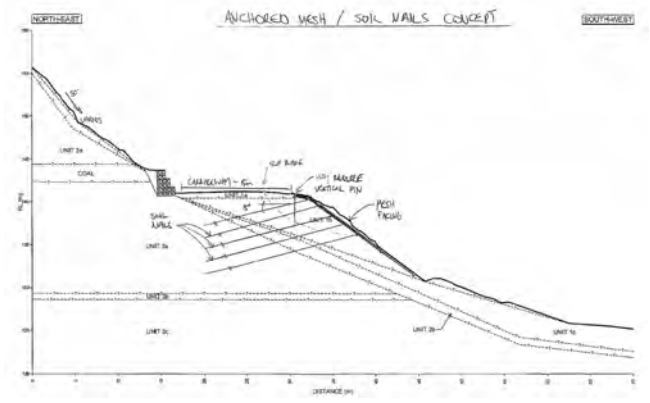


Figure 11: Soil nail wall with shotcrete

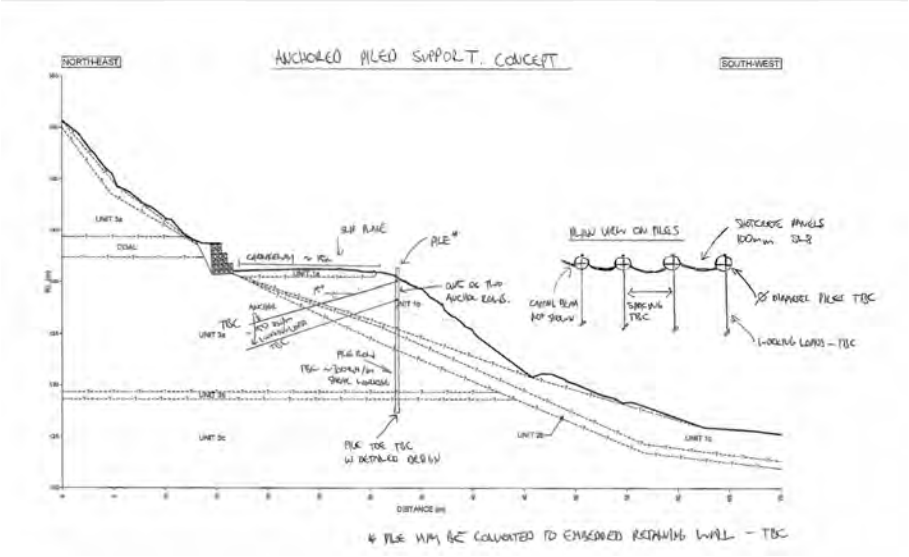


Figure 12: Anchored solider pile wall

1.6 Construction Detail

1.6.1 Construction work hours

Work will be carried out during the normal construction working hours for expected duration of 20 - 30 week program (weather permitting):

- Monday to Friday - 7am to 6pm
- Saturdays – 8am to 4pm
- Sundays and Public Holidays – no works

1.6.2 Construction Access:

Construction access will be from the crest of the slope on Freemans Drive. Referring to Figure 7b, at the toe of the embankment there is a gravel travel track within Heaton State Forest called “Redbank Road”. This track is unccessiable by vehciles and will not be used for accessing the site to complete the works.

Because the main access point to complete the works is from Freemans Drive, there will be a lane closure in place for the duration of the works. At times the works may require a full road closure.

1.7 Project information

The following project information is appended to this brief to assist in your response:

- Referring to section 2.2 (Appendix A) Biodiversity brief to be developed by the Consultant which includes the following documentation:
  - TfNSW - EMF-BD-GD-0011, No Net Loss Guidelines (A guide for biodiversity offsets measures) (Appendix E)
  - TfNSW - EMF-BD-GD-0129, Tree and hollow replacement guidelines (Appendix F)
- Transport for NSW Minor Works Review of Environmental Factors (Minor Works REF) template (Resource 5) (Appendix B).

The Consultant will have access to the following additional information to assist with the preparation of the Minor Works REF:

- Transport for NSW Environmental assessment procedure for routine and minor works.
- EIA-N04 Title Guideline for landscape character and visual impact assessment (Appendix C)

Below is a list of relevant Transport for NSW specifications that will apply to the proposal to assist the Consultant in developing mitigation measures without repetition.

- EIA-P05-G01-T02 Resource 2 Environmental Assessment Procedure for Routine and Minor Works Safeguard list (Appendix D).

Transport for NSW is providing the following site-specific information to support the development of this MWREF:

- Preliminary Biodiversity Investigation (Appendix G)
- Arborists Report (Appendix H)

  Note – referring to Appendix A from this report, trees recommended for immediate removal for road safety reasons have been removed by the time a contract has been awarded for the commencement of this MWREF report.

2 Scope and methodology

2.1 General

The Minor Works REF should be prepared in accordance with the MWREF Template (Resource 5) (Appendix B).

Before commencing the Minor Works REF, it is expected that the Consultant will undertake and document the following tasks:

- Accompany the Transport for NSW Project Manager and Senior Environmental and Sustainability Officer on a site visit to discuss the proposal and establish clear lines of communication. The site visit must be attended by the person(s) managing and writing the Minor Works REF.
- Review existing information to determine potential environmental constraints, including literature reviews and database search results, feedback from community consultation if available, concept designs, construction footprint, construction methodology, etc
- Prepare and submit methodologies for the Minor Works REF and any specialist studies for Transport for NSW approval. Any changes to the agreed methodology and scope of work for the Minor Works REF and specialist studies must be approved in writing by the Transport for NSW representative before they are commenced
- Prepare and submit a schedule (program) for the Minor Works REF to be prepared in consultation with the Transport for NSW project team for Transport for NSW approval
- Provide a map, overlain by the proposal, indicating the proposed area of any field surveys to the project manager for discussion and modification as required.

Submission of each version of the MWREF must be accompanied by evidence of how comments received on the previous draft/s have been addressed. Further preparation of the Minor Works REF must not proceed until Transport for NSW has approved the responses to comments and any doubts or differences of opinion have been resolved.

All GIS (geographical information systems) data collected as part of the work described in this brief must be provided to Transport for NSW as part of the contract.

2.2 Specialist studies

In addition to the above it is expected that the following specialist investigations would be required and undertaken by the Contractor:

- Biodiversity Assessment

Any report that does not adhere to the Environmental assessment procedure for routine and minor works (EIA-P05-1), including the requirements for adequate quality, will not be accepted as an output by Transport for NSW.

2.2.1 Biodiversity Assessment Report

The successful consultant will be required to complete a biodiversity assessment for the study areas noted in section 1.4 and report on these findings in accordance with EMF-BD-GD-0010-TT4 (Appendix A).

3 Report presentation, review, and quality

3.1 Report presentation

The standard for all reports prepared by the Contractor must meet the following as a minimum:

- The draft and final copies of reports must be professionally edited and vetted for typographical and grammatical errors before submission to Transport for NSW
- The reports must follow the Transport for NSW Editorial style guide (March 2014)
- Spelling must be consistent with the Australian Macquarie Dictionary
- All reports should be written in clear and concise plain English
- All reports are to be prepared to meet the Web Content Accessibility Guidelines (WCAG) 2.0, Level AA
- Jargon, acronyms, and technical words should be clearly explained at the first point of reference in the reports. Acronyms that are not generally common knowledge should be avoided throughout the report and written in full
- Figures, tables, and graphs should be used to convey information where possible rather than lengthy text descriptions. Titles, scales, and legends (including north points) should be included as appropriate
- Any maps included must be based on topographical information rather than cadastral information. If published maps are reproduced their source must be acknowledged and referenced. Maps and diagrams should include appropriate legends, scale and bearing.
- Photos of the study area should be provided in the appendix of the report. Photos are to be in jpeg format
- Any appendices, annexures and attached data files must be clearly labelled and readily referenced into the body of the reports
- Draft copies of reports are to be clearly watermarked ‘draft’
- The report covers and all documents in general must be produced in accordance with the Transport for NSW visual identity manual. All documents should be of a standard suitable for public availability. The Contractor must liaise with a member of the Transport for NSW graphics panel for the preparation of materials for public availability. No ‘branding’ of the report with the preferred Contractor’s logo or name should occur.

3.2 Review and quality

Allow for one review of each report/working paper, including an acceptable first draft and final draft version.

Evidence must be if comments provided by Transport for NSW during the review of previous version/s of reports have been addressed by the Contractor. Where Transport for NSW comments provided in draft versions have not been accepted the consultant must discuss with the Transport for NSW representative prior to finalising the report.

Dependent on the quality of the reports submitted for review several Transport for NSW reviews may be required. Reports must not be finalised until written approval from the Transport for NSW representative is received.

Transport for NSW expects a high standard of quality for Minor Works REFs and associated documents. The completeness of the environmental impact assessment and the reputation of Transport for NSW rely upon the quality of the Minor works REF produced. A high-quality Minor works REF has the following characteristics:

- Follows basic EIA principles
- Is technically accurate
- Is comprehensive

- Is easy to read and written in plain English
- Language and technical information are consistent throughout the document
- Is right first time – with no need for re-work.

Transport for NSW will decide whether to accept the Minor Works REF as meeting the deliverable under the contract. Minor Works REFs will not be accepted as a first and final draft until an adequate standard of quality is achieved. Guidance on this decision is provided in the table below.

Deliverable	Standard required to be adequate
Adequate final draft	• A document free of technical weaknesses and/or omissions • A document written in plain English and in accordance with the current Transport for NSW Editorial Style Guide • No further value-adding review required prior to submission for sign-off
Adequate draft	• A document that may have minor technical weaknesses and/or omissions • A document largely written in plain English and in accordance with the current Transport for NSW Editorial Style Guide • Comments may require additional work and further review prior to submission for sign-off
Document that cannot be accepted as adequate	• A document requiring substantial work to address technical weaknesses and/or omissions. The document may require considerable additional effort to provide a complete and accurate description and assessment of the proposal to meet environmental assessment requirements under Division 5.1 of the EP&A Act. In some cases the comments required may be too extensive to justify the time input required to thoroughly review

4 Project supervision, schedule, outputs, and fees

4.1 Project supervision

Contact details for the Transport for NSW representative for the project are as follows:

Michael Coyte
Project/Contract Manager
Project Services | Regional & Assets
Regional and Outer Metropolitan
Transport for NSW

M 0403 868 412
E Michael.Coyte2@transport.nsw.gov.au

Any questions relating to this brief should be directed to the Transport for NSW representative.

4.2 Project schedule

Preparation of the Minor Works REF commences upon issue of a letter of acceptance. The timeframes for preparation and finalisation of the Minor Works REF are as follows:

Activity/output	By when
Attendance at inception meeting / site visit	TBC – Consultant to confirm
Submit methodologies and scope for the Minor Works REF for Transport for NSW review and approval	TBC – Consultant to confirm
Initiate T&ISEPP and other statutory consultation	TBC – Consultant to confirm
Submit draft Minor Works REF for Transport for NSW review	TBC – Consultant to confirm
TfNSW review	TBC – Consultant to confirm
Finalise Minor Works REF	TBC – Consultant to confirm

The submission of the scope of specialist studies is a hold point. Preparation of the Minor Works REF will not proceed until Transport for NSW has approved the scope of specialist studies. The project schedule allows two weeks for the Transport for NSW to return comments on draft reports.

4.3 Project outputs

All reports submitted to Transport for NSW must adhere to the Minor Works REF template (Appendix B). Any report that does not adhere to this procedure, including the requirements for adequate quality, will not be accepted as an output by Transport for NSW.

Time delays because of any inadequate reports submitted to Transport for NSW will be the responsibility of the Contractor. Transport for NSW will not accept time and/or cost variations due to inadequate deliverables submitted by the Contractor. Transport for NSW may, at its discretion, return any documentation without undertaking the required review if the document is deemed to be

of poor quality or is not completed to the required standard. In this instance, Transport for NSW will not accept time and or cost variations.

Requirements for report production are:

- The electronic copies for all reports are to be provided in both MS Word format (compatible with Word 2007) and Adobe pdf format
- All final reports are to be prepared to meet the Web Content Accessibility Guidelines (WCAG) 2.0, Level AA
- Production of any hard copy report required by the professional services contract is to involve a low environmental impact. Reports are to be produced using the following guidance:
  - Use low impact report paper
  - Gloss-coated paper and lamination must not be used
  - Printing and photocopying are to be double sided
  - Employ binding methods that facilitate recycling
  - Use plant-based inks were cost and performance competitive.

4.4 Project fees and payment

Payment will be made in accordance with fee proposal and contract documents. No additional work outside the agreed cost estimate is to be undertaken without prior written approval of the Transport for NSW representative as identified in Section 4.1 above.

5 Response to brief

A tender reply to this brief must be submitted to the Transport for NSW representative identified above in Section 4.1 no later than close of business **Friday 17 February 2023.**

Responses to this brief will be evaluated against the following assessment criteria:

Criteria	Address
a) Understanding of the brief	• Detail your understanding of the brief and the required outputs • The scope of the work proposed must be clearly restated in the words of the tenderer • Any restatement must address the issues and requirements outlined in these documents • Provide proposed methodologies for any specialist studies.
b) Technical skills	• The company's technical skills • The technical skills of any sub-consultant companies (separate to the above) • The nominated project team (including sub-consultants). Provide CVs and the proposed role and time that each nominated person will spend on each deliverable/task for the project • Include a primary REF writer and a senior staff member who will be responsible for certifying the quality of all deliverables • Outline supervisory arrangements in place for effective management of all sub-consultants.
c) Recent experience	• Provide recent relevant experience for the company • Provide recent relevant experience for any sub-consultancy companies (separate to the above) • Identify the experience of all proposed personnel (including sub-consultants) including an outline of their roles and responsibilities for the experience listed • Dates must be indicated for all experience.
d) Estimated costs and value for money	• A fixed price cost is required for the works • A budget breakdown is to be included identifying each work element showing total hours, hourly rates, lump sum and disbursements, for the tenderer and any sub-consultants • Address the requirements of the brief.
e) Robustness of estimated costs	• That the estimated costs are adequate and realistic to achieve the purpose of the brief.
f) Time performance	• Include a detailed program of works and due dates.
g) Quality assurance process	• Include internal quality assurance processes including details of completion and certification by senior environment staff.
h) Additional information	• Include any other additional information that may be relevant in the selection of the successful tenderer.

The tenderer must submit a conforming tender but may submit an alternate tender in addition to the conforming tender. An alternate tender may be submitted where the tenderer proposes a

variation from the requirements of these briefing documents. Scope changes and reasons for the variation must be clearly identified in the alternative tender.

6 Additional information

6.1 Right of Access

It is a requirement of Transport for NSW that the Transport for NSW representative and Transport for NSW quality manager must always have right of access to the Contractor's premises where activities on the project are taking place.

If you require any further information, please contact the Transport for NSW representative.

6.2 Work, health, and safety

The Contractor must incorporate work, health and safety in all aspects of the project. Safety of field workers in the vicinity of roads, heavy vehicle and general traffic is paramount. All personnel involved in the field work must read and sign a Safe Work Method Statement (SWMS) prepared by the Contractor prior to the commencement of any field work. A signed copy of the SWMS is to be provided to the Transport for NSW prior to accessing the site. The wearing of a high visibility safety vest is mandatory during the field surveys.

Prior notification to landowners will be required before undertaking any field inspections and surveys within privately owned land. The Transport for NSW representative should be contacted at least ten (10) working days before field inspections and surveys are to commence so the necessary arrangements can be made.

6.3 Permits

For the purpose of this brief, "permit" includes any statutory consent, approval, authorisation, or landowner's permission.

The Contractor shall ensure that all necessary permits have been obtained for undertaking the investigations and that all work is carried out in accordance with these permits. Copies of the relevant permits should be supplied with the response to this brief or, where this is not feasible, provided to the Transport for NSW representative prior to commencement of field surveys. A person not covered by these permits may not participate in surveys under this contract in a manner that contravenes the conditions of any permit. Delays and difficulties relating to obtaining permits must be brought to the attention of the Transport for NSW representative.

6.4 Privacy

The Contractor is required to manage the receipt and storage of project information in accordance with Transport for NSW policies and procedures for data privacy.

Appendix A

EMF-BD-GD-0010-TT4 Biodiversity Assessment Template for REF

Appendix B

Minor Works Review of Environmental Factors (MWREF) template

Appendix C

EIA-N04 EIA-N04 Guideline for landscape character and visual impact assessment

Appendix D

EIA-P05-G01-T02 Environmental Assessment Procedure for Routine and Minor Works Safeguard list (Resource 2)

Appendix E

EMF-BD-GD-0011 No Net Loss Guidelines

Appendix F

EMF-BD-GD-0129 Tree & Hollow Replacement Guideline

Appendix G

Preliminary Biodiversity Investigation

Appendix H

Arborists Report

Transport.nsw.gov.au

contactus@rms.nsw.gov.au

Customer feedback
Transport for NSW
Locked Bag 928,
North Sydney NSW 2059

Appendix B: Plot-based field data sheets

BAM Plot - Field Survey Form

		Survey Name		Plot Id		Surveyor(s)		
Date	10/05/2023	Freemans Drive		FD01		Paul Burcher, Deryk Engel, Isabel Burcher, Chelsea Tiller		
Zone: 56	Datum: GDA94	**IBRA region**	Sydney Basin	**Photo #**	01	Zone ID	1	
Easting: 358060	Northing: 6351032	**Plot Dimensions** (i.e. 20 x 20 in 20 x 50)	20 x 20 in 20 x 50	**Midline Bearing**	120^0 Magnetic °			
Likely Vegetation Class		North Coast Wet Sclerophyll Forests					Confidence H (M) L	
Plant Community Type		3150 Hunter Coast Ranges Turpentine Wet Forest			EEC: No		Confidence H (M) L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.

Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline

BAM Attribute (400 m^2 plot)		Sum values
Count of **Native Richness**	**Trees**	5
	Shrubs	5
	Grasses etc.	5
	Forbs	6
	Ferns	4
	Other	9
Sum of **Cover** of native vascular plants by growth form group	**Trees**	82
	Shrubs	3
	Grasses etc.	6
	Forbs	1
	Ferns	2
	Other	2
High Threat Weed cover %		50

This table can be completed after entering data into available tools. It is not required in the field.

BAM Attribute (20 x 50 m plot)		
Stem classes		
dbh cm	# Tree Stems Count[5]	Stems with Hollows
80 +	2	
50 – 79	4	
30 – 49	8	
20 – 29	2	
10 – 19	24	
5 – 9	6	
< 5	2	Re: tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length	34	

Plot disturbance	Clearing (i.e. logging)	Erosion	Grazing	Fire damage	Storm damage	Weediness
Y/N	Y	Y			Y	Y

[5] Counts apply when the number of stems within a size class is </= 10. Above use estimates 10, 20, 30…100, 200, 300. Living stems only. Multi stemmed trees largest stem. Hollow- only presence of a stem containing hollow. Stems may be dead and may be shrubs.

Site No: FD01

No.	Species	Cover	No.	GFG	Stratum	N, E, HTE	No	Species	Cover	No.	GFG	Stratum	N, E, HTE
1	*Angophora floribunda*	50	3	TG	U	N	29	*Carex appressa*	2	50	GG	G	N
2	*Eucalyptus saligna*	10	2	TG	U	N	30	*Livistona australis*	0.5	1	OG	M2	N
3	*Lantana camara*	50	100	SG	M2	HTE	31	*Eupomatia laurina*	0.1	1	SG	M2	N
4	*Blechnum cartilagineum*	2	20	EG	G	N	32	*Adiantum aethiopicum*	0.1	5	EG	G	N
5	*Solanum mauritianum*	0.5	10	SG	M2	E	33	*Pseuderanthemum variabile*	0.1	1	FG	G	N
6	*Microlaena stipoides*	0.1	50	GG	G	N	34	*Cayratia clematidea*	0.1	1	OG	G	N
7	*Blechnum ambiguum*	0.2	10	EG	G	N	35	*Blechnum wattsii*	0.1	1	EG	G	N
8	*Glochidion ferdinandi*	20	5	TG	M1	N	36	*Oplismenus aemulus*	0.1	10	GG	G	N
9	*Gymnostachys anceps*	0.1	5	FG	G	N	37						
10	*Pandorea pandorana*	0.1	10	OG	G	N	38						
11	*Dichondra repens*	0.5	100	FG	G	N	39						
12	*Dianella caerulea*	0.2	20	FG	G	N	40						
13	*Synoum glandulosum*	2	5	SG	M1	N	41						
14	*Geitonoplesium cymosum*	0.2	50	OG	G	N	42						
15	*Entolasia stricta*	3	1000	GG	G	N	43						
16	*Claoxylon australe*	0.5	10	SG	M2	N	44						
17	*Gahnia melanocarpa*	1	20	GG	G	N	45						
18	*Tetrastigma nitens*	0.1	5	OG	G	N	46						
19	*Hydrocotyle sp*	0.1	50	FG	G	N	47						
20	*Dioscorea transversa*	0.1	20	OG	G	N	48						
21	*Stephania japonica*	0.1	5	OG	G	N	49						
22	*Geranium homeanum*	0.1	10	FG	G	N	50						
23	*Smilax australis*	0.1	1	OG	G	N	51						
24	*Cryptocarya glaucescens*	0.1	1	TG	G	N	52						
25	*Rubus moluccanus*	0.1	10	OG	G	N	53						
26	*Geranium solanderi*	0.1	20	FG	G	N	54						
27	*Parsonsia straminea*	0.1	1	OG	G	N	55						
28	*Melaleuca styphelioides*	2	1	TG	M1	N	56						

Appendix C: Habitat suitability assessment

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey or has been recorded within the past five years (known from a reputable source).
High	A species is considered highly likely to occur in the study area if: • *There are previous credible records on BioNet within the study area from the last 10 years and suitable habitat is present.* **OR** • *The species is highly mobile, is dependent on identified suitable habitat within the study area (i.e., for breeding or important life cycle periods such as winter flowering resources) and has been recorded recently (within five years) on BioNet in the locality. This also includes species known or likely to visit the study area during regular seasonal movements or migration.*
Moderate	A species is considered moderately likely to occur in the study area if: • *Any suitable habitat (e.g., foraging) is present in the study area, the species is highly mobile and has been recorded in the locality in the last 10 years on BioNet. The species may be unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area.* **OR** • *The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the study area and has been recorded in the locality in the last 10 years on BioNet.* **OR** • *For flora species that are associated with PCTs in the study area (see TBDC) or have been recorded in the locality in the last 10 years on BioNet – the associated PCT/habitat present in the study area is not degraded and the species was not targeted by surveys in accordance with the BAM and relevant survey guidelines. In addition, for flora species known to occur in disturbed areas (e.g., orchids), records from any time within the locality may warrant inclusion in this category.*
Low	A species is considered to have a low likelihood of occurring in the study area if: • *For highly mobile species, the species may be an occasional visitor, but habitat similar to the study area is widely distributed in the locality, meaning that the species is not dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitats in the study area and the species has not been recorded in the locality in the last 10 years on BioNet.* **OR** • *The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the study area and has not been recorded in the locality in the last 10 years on BioNet.* **OR** • *For flora species that are associated with PCTs in the study area (see TBDC) and the species was not identified following targeted surveys in accordance with the BAM and relevant survey guidelines. Flora species that have been recorded in the locality on BioNet at any time, associated suitable habitat (see the TBDC) is not present in the study area, though similar habitats of the same vegetation formation is present in the study area.*
Unlikely	Suitable habitat for the species is absent from the study area.

Note: Species underlined are those which only the EPBC PMST predicted as having habitat in the search area. All other species have been recorded within 10 km of the study area.

Note: As these habitats are not present, no pelagic, estuarine, wetland or fish species have been included in the following table.

Given that the proposed work is not located within the Commonwealth marine area, this being from 3 to 200 nautical miles from the coast, no species listed as marine under the EPBC Act have been considered; nor has the marine status of any species been acknowledged. Therefore, of those species listed as Migratory on the EPBC Act only those in the Migratory Terrestrial category are included.

Key

V – vulnerable E – endangered CE – critically endangered M – migratory

Habitat requirements were generally extracted from DCCEEW (2023a), OEH (2023), Harden (1992-2002), Frith (2007), Churchill (2008), Cogger (2014) and Van Dyck and Strahan (2008) with other references used being identified in the bibliography.

Habitat suitability assessment table

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
PLANTS						
Bynoe's Wattle *Acacia bynoeana*	V	E	Species	Occurs in heath or dry sclerophyll forest on sandy soils. Not associated with PCT 3150.	36 (DPE) PMST	Unlikely.
Charmhaven Apple *Angophora inopina*	V	V	Species	Endemic to the Central Coast region of NSW. Occurs most frequently in four main vegetation communities: Eucalyptus *haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest, *Hakea teretifolia–Banksia oblongifolia* wet heath, Eucalyptus *resinifera–Melaleuca sieberi–Angophora inopina* sedge woodland and Eucalyptus *capitellata–Corymbia gummifera–Angophora inopina* woodland/forest. Not associated with PCT 3150.	25 (DPE) PMST	Unlikely.
Thick-lipped Spider-orchid *Caladenia tessellata*	V	E	Species	Generally found in grassy sclerophyll woodland on clay loam or sandy soils. Not associated with PCT 3150.	PMST	Unlikely.
Netted Bottle Brush *Callistemon linearifolius*		V	Species	Grows in dry sclerophyll forest on the coast and adjacent ranges. Not associated with PCT 3150.	38 (DPE)	Unlikely.
Variable Midge Orchid *Corunastaylis insignis/ Genoplesium insigne*	CE	CE	Species	Recorded from four localities between Chain Valley Bay and Wyong in Wyong LGA. A small population also occurs within City of Lake Macquarie LGA. Appears to be associated with PCT 1636 Scribbly Gum – Red Bloodwood – *Angophora inopina* (not always present) heathy woodland on lowlands of the Central Coast and variations containing *Angophora costata* (Smooth-barked Apple). Flowering period is typically from September to October, but has been recorded flowering in mid to late November to early December. Known locations/populations of plants	51 (DPE) PMST	Unlikely.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
				exhibit dormancy for greater than four years. Not associated with PCT 3150.		
Red Helmut Orchid *Corybas dowlingii*		E	Species	Restricted to the central coast and Hunter regions of NSW where it is currently known from the Port Stephens, Bulahdelah, Lake Macquarie and Freemans Waterhole areas. It is known from the LGAs of Cessnock, Great Lakes, Lake Macquarie and Port Stephens. Occurs in sheltered areas such as gullies and southerly slopes in tall open forest on well-drained gravelly soil at elevations of 10-200 m. Associated with PCT 3150	1661 (DPE)	Low. Although associated with PCT 3150, habitat is substantially degraded. Not found during targeted surveys.
Leafless Tongue Orchid *Cryptostylis hunteriana*	V	V	Species	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. Not associated with PCT 3150.	4 (DPE) PMST	Unlikely.
White-flowered Waxplant *Cynanchum elegans*	E	E	Species	Usually occurs on the edge of dry rainforest vegetation but also in littoral rainforest, coastal scrub and aligned open forest and woodland. Not associated with PCT 3150.	PMST	Unlikely.
Newcastle Doubletail *Diuris praecox*	V	V	Species	Known from between Bateau Bay and Smiths Lake. Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. Not associated with PCT 3150.	PMST	Unlikely.
Camfield's Stringybark *Eucalyptus camfieldii*	V	V	Species	Localised and scattered distribution includes sites at Menai, Wattamolla and a few other sites in RNP (among others). Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small, scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Not associated with PCT 3150.	PMST	Unlikely.
Slaty Red Gum *Eucalyptus glaucina*	V	V	Species	Grows in grassy woodland and dry eucalypt forest on deep, moderately fertile and well-watered soil between Taree and Broke to west of Maitland. Also in the Casino area. Not associated with PCT 3150.	PMST	Unlikely.
Earp's Gum *Eucalyptus parramattensis* subsp. *decadens*	V	V	Species	Generally, occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. Not associated with PCT 3150.	1 (DPE) PMST	Unlikely.
Euphrasia arguta	CE	CE	Species	*Euphrasia arguta* was rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Prior to this, it had not been collected for 100 years. Historically, *Euphrasia arguta* has only been recorded from relatively few places within an area extending from Sydney	PMST	Unlikely.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
				to Bathurst and north to Walcha. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Not associated with PCT 3150.		
Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora*	V	V	Species	Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Not associated with PCT 3150.	95 (DPE) PMST	Unlikely.
Spreading Guinea Flower *Hibbertia procumbens*		E	Species	Restricted to several locations in the Central Coast LGA. Majority of known populations occur within *Banksia ericifolia–Angophora hispida–Allocasuarina distyla* scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits. Not associated with PCT 3150.	1 (DPE)	Unlikely.
Maundia triglochinoides		V	Species	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong. Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Not associated with PCT 3150.	2 (DPE)	Unlikely.
Biconvex Paperbark *Melaleuca biconvexa*	V	V	Species	Scattered and dispersed populations of this species are found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally, grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Not associated with PCT 3150.	PMST	Unlikely.
Tall Knotweed *Persicaria elatior*	V	V	Species	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Not associated with PCT 3150.	PMST	Unlikely.
Brown Pomaderris *Pomaderris brunnea*	V	E	Species	Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Not associated with PCT 3150.	PMST	Unlikely.
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	CE		Species	Known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Occurs in open eucalypt woodland and grassland. Not associated with PCT 3150.	PMST	Unlikely.
Illawarra Greenhood *Pterostylis gibbosa*	E	E	Species	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. Near Nowra, the species grows in an open forest of Spotted Gum	PMST	Unlikely.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
				Corymbia maculata, Forest Red Gum and Grey Ironbark *E. paniculata*. Not associated with PCT 3150.		
Eastern Underground Orchid *Rhizanthella slateri*	E	V	Species	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Associated with PCT 3150.	PMST	Low. Although the species is associated with PCT 3150 there are no previous records in the locality (predicted occurrence only).
Scrub Turpentine *Rhodamnia rubescens*	CE	CE	Species	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. Associated with PCT 3150.	58 (DPE) PMST	Low. Although associated with PCT 3150, not recorded during targeted surveys.
Native Guava *Rhodomyrtus psidioides*	CE	CE	Species	Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. Associated with PCT 3150.	4 (DPE) PMST	Low. Although associated with PCT 3150, not recorded during targeted surveys.
Heath Wrinklewort *Rutidosis heterogama*	V	V	Species	Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides. Not associated with PCT 3150.	1 (DPE) PMST	Unlikely.
Magenta Lilly Pilly *Syzygium paniculatum*	V	E	Species	Found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. Not associated with PCT 3150.	PMST	Unlikely.
Black-eyed Susan *Tetratheca juncea*	V	V	Species	Usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. Not associated with PCT 3150.	1578 (DPE) PMST	Unlikely.
Austral Toadflax *Thesium australe*	V	V	Species	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Not associated with PCT 3150.	PMST	Unlikely.
MAMMALS						
Spotted-tailed Quoll *Dasyurus maculatus*	E	V	Ecosystem	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	19 (DPE) PMST	Low. May occur within surrounding bushland but would not significantly rely on the landslip site for its lifecycle requirements.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
Long-nosed Potoroo *Potorous tridactylus*	V	V	Species	Inhabits coastal heath and dry and wet sclerophyll forests with dense cover which provides diurnal sheltering sites and protection from predators, while foraging in adjacent, open areas.	PMST	Low. No suitable habitat present.
Eastern Pygmy-possum *Cercartetus nanus*		V	Species	A wide range of habitats from rainforest through to woodlands and heathlands in which it is solitary. Feeds mostly on the pollen and nectar from banksias, eucalypts and understorey plants and will also eat insects, seeds and fruit.	1 (DPE)	Low. No suitable habitat present.
Koala *Phascolarctos cinereus*	E	V	Species	Open eucalypt forest and woodland, containing a variety of 'preferred' food tree species.	63 (DPE) PMST	Low. May occur within surrounding bushland but would not significantly rely on the landslip site for its lifecycle requirements.
Parma Wallaby *Macropus parma*	V	V	Species	Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	2 (DPE) PMST	Low. No suitable habitat present.
Brush-tailed Rock-wallaby *Petrogale penicillata*	V	E	Species	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	6 (DPE) PMST	Low. No suitable habitat present.
Red-legged Pademelon *Thylogale stigmatica*		V	Species	Forest with a dense understorey and ground cover, including rainforest, moist eucalypt forest and vine scrub.	2 (DPE)	Low. No suitable habitat present.
Yellow-bellied Glider *Petaurus australis*		V	Ecosystem	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	34 (DPE) PMST	Low. May occur within surrounding bushland but would not significantly rely on the landslip site for its lifecycle requirements. Considering the observed cavity diameters, the three hollow-bearing trees would not be suitable for this species.
Squirrel Glider *Petaurus norfolcensis*		V	Ecosystem	Inhabits woodlands and dry sclerophyll forests, usually in diverse stands of shrubs and trees. Shelters and breeds in tree hollows, and is primarily an insectivorous animal but, has also been known to ingest plant exudates.	6 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
Southern Greater Glider *Petauroides volans*	V		Species	Largely restricted to eucalypt forests and woodlands, utilising tree hollows.	7 (DPE) PMST	Low. May occur within surrounding bushland but would not significantly rely on the landslip site for its lifecycle requirements. Considering the observed cavity diameters, the three hollow-bearing trees would not be suitable for this species.
Grey-headed Flying-fox *Pteropus poliocephalus*	V	V	Dual	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	28 (DPE) PMST	Low. May fly over/forage within the site on occasion; however, would not be reliant on the site for its lifecycle requirements. No active or historic flying-fox camps occur within or in the vicinity of the surveyed site.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*		V	Ecosystem	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	1 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
Large-eared Pied Bat *Chalinolobus dwyeri*	V	V	Species	Cave-roosting bat that forages in timbered woodland and dry sclerophyll forest.	19 (DPE) PMST	Low. No suitable caves or cave-substitutes present, May fly over/forage within the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Eastern False Pipistrelle *Falsistrellus tasmaniensis*		V	Ecosystem	Prefers moist habitats, with trees taller than 20 m. Generally, roosts in hollow-bearing trees (eucalypts), but has also been found under loose bark on trees or in buildings.	4 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
						of Significance conducted (Appendix F).
Southern Myotis *Myotis macropus*		V	Ecosystem	Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	4 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
Golden-tipped Bat *Phoniscus papuensis*		V	Ecosystem	Rainforest and adjacent wet and dry sclerophyll forest up to 1000 m. Also recorded in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests. Forage in rainforest and sclerophyll forest on mid and upper-slopes. Roost mainly in rainforest gullies on small first- and second-order streams in usually abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests; may also roost under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes	10 (DPE)	Low. No suitable habitat present.
Greater Broad-nosed Bat *Scoteanax rueppellii*		V	Ecosystem	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Usually roosts in tree hollows but also in buildings.	4 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
Little Bent-winged Bat *Miniopterus australis*		V	Dual	Generally found in well-timbered areas. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day.	67 (DPE)	Low. No suitable caves or cave-substitutes present, May fly over/forage within the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Large Bent-winged Bat *Miniopterus orianae oceanensis*		V	Dual	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	20 (DPE)	Low. No suitable caves or cave-substitutes present, May fly over/forage within the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*		V	Ecosystem	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	18 (DPE)	Moderate. May occupy hollow-bearing trees and forage within area.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
				Roost mainly in tree hollows but will also roost under bark or in man-made structures.		Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
New Holland Mouse *Pseudomys novaehollandiae*	V		Ecosystem	Open heathland, open woodland with a heathland understorey and vegetated sand dunes.	PMST	Low. No suitable habitat present.
BIRDS						
Superb Fruit-Dove *Ptilinopus superbus*		V	Ecosystem	Occurs in rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	1 (DPE)	Low. No suitable habitat present.
Australasian Bittern *Botaurus poiciloptilus*	E	E	Species	Occupies shallow, vegetated freshwater or brackish swamps, usually dominated by tall, dense reed beds of *Typha* sp., *Juncus* sp. and *Phragmites* sp. Nests on platforms of reeds and rushes, usually built over water in dense cover.	PMST	Low. No suitable habitat present.
White-throated Needletail *Hirundapus caudacutus*	V, M		Ecosystem	Almost exclusively aerial. Takes insects on wing over a range of habitat types. Recorded most often above wooded areas, including open forest and rainforest.	13 (DPE) PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Fork-tailed Swift *Apus pacificus*	M		Ecosystem	Almost exclusively aerial. Takes insects on wing over a range of habitat types, but also less than 1 m above open areas or over water. Mostly occur over inland plains but sometimes above foothills or in coastal areas.	1 (DPE) PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Eastern Osprey *Pandion cristatus*	M	V	Ecosystem	Occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands.	8 (DPE)	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Red Goshawk *Erythrotriorchis radiatus*	V	CE	Species	Very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. In NSW, preferred habitats include mixed subtropical rainforest, *Melaleuca*	1 (DPE) PMST	Low. No suitable habitat present.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
				swamp forest and riparian *Eucalyptus* forest of coastal rivers.		
White-bellied Sea-eagle *Haliaeetus leucogaster*		V	Dual	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia.	18 (DPE)	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Little Eagle *Hieraaetus morphnoides*		V	Dual	Inhabits open woodlands, open eucalypt forests, grasslands and arid regions that are rich in prey species, shunning dense forest.	3 (OEH)	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Square-tailed Kite *Lophoictinia isura*		V	Dual	Specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100 square km. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	3 (OEH)	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Australian Painted Snipe *Rostratula australis*	E	E	Ecosystem	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	PMST	Low. No suitable habitat present.
Latham's Snipe *Gallinago hardwickii*	M		N/A	Wet, treeless, tussocky grasslands, short grasses and/or marshes along freshwater streams and channels, though it can also be found in any vegetation around freshwater wetlands, in sedges, grasses, lignum, reeds and rushes, saltmarshes, creek edges, crops and pastures.	PMST	Low. No suitable habitat present.
Gang-gang Cockatoo *Callocephalon fimbriatum*		V	Dual	Prefers tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests during summer, these being at higher altitudes. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, or in dry forest in coastal areas.	34 (DPE) PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements. Considering the observed cavity diameters, the three hollow-bearing trees would not be suitable for this species.
Glossy Black-cockatoo *Calyptorhynchus lathami*	V	V	Dual	Inhabits eucalypt woodland and feeds almost exclusively on Casuarina fruits.	75 (DPE) PMST	Low. May fly over the site on occasion; however,

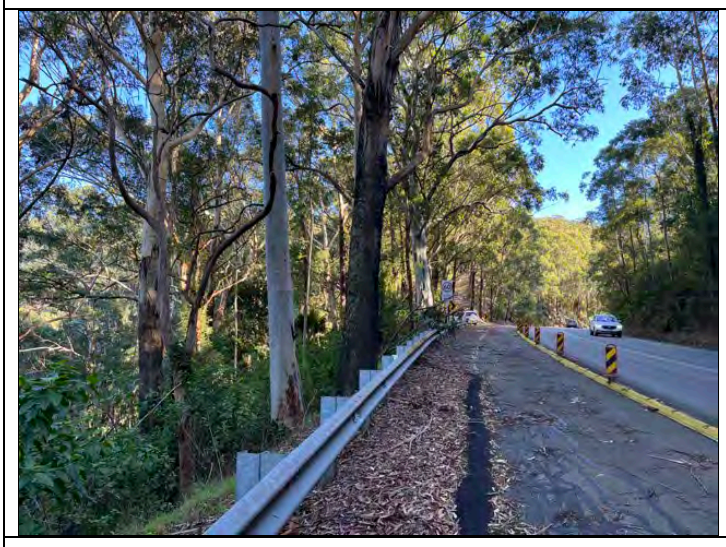
Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
						would not be reliant on the site for its lifecycle requirements.
Little Lorikeet *Glossopsitta pusilla*		V	Ecosystem	Forages primarily in the open Eucalypt forest and woodland canopies, particularly along water courses; occasionally in Angophoras, Melaleucas and other tree species, also riparian habitats are used.	45 (DPE)	Moderate. May occupy the hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
Turquoise Parrot *Neophema pulchella*		V	Ecosystem	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	1 (DPE)	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Blue-winged Parrot *Neophema chrysostoma*	V		N/A	Breeds on mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and sometimes in the far south-east of South Australia, and the north-western, central and eastern parts of Tasmania. A partial migrant, variable numbers of birds migrate across Bass Strait in winter. Occurs in a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones.	PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Swift Parrot *Lathamus discolor*	CE	E	Dual	Eucalypt forests. When over-wintering on the mainland (from Tasmania), this species is dependent on winter-flowering eucalypt species.	50 (DPE) PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Oriental Cuckoo *Cuculus optatus*	M		N/A	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland.	1 (DPE) PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Powerful Owl *Ninox strenua*		V	Dual	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.	36 (DPE)	Moderate. May fly over the site on occasion; however, would not be

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
						reliant on the site for its lifecycle requirements.
Sooty Owl *Tyto tenebricosa*		V	Dual	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	38 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Masked Owl *Tyto novaehollandiae*		V	Dual	Lives in dry eucalypt forests and woodlands from sea level to 1100 m.	46 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Brown Treecreeper *Climacteris picumnus victoriae*	V	V	Ecosystem	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey.	7 (DPE) PMST	Low. No suitable habitat present.
Speckled Warbler *Chthonicola sagittata*		V	Ecosystem	Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	1 (DPE)	Low. No suitable habitat present.
Pilotbird *Pycnoptilus floccosus*	V		N/A	Found in wet forested areas and heathland in eastern Victoria and south-eastern New South Wales. Forages on the ground, turning over leaf litter using strong legs.	PMST	Low. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Regent Honeyeater *Anthochaera phrygia*	CE	CE	Dual	Inhabits dry open forest and woodland. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	51 (DPE) PMST	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*		V	Ecosystem	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*).	3 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Painted Honeyeater *Grantiella picta*	V	V	Ecosystem	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*.	PMST	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
Grey-crowned Babbler *Pomatostomus temporalis temporalis*		V	Ecosystem	Inhabits open Box-Gum Woodlands on the slopes and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	12 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Varied Sittella *Daphoenositta chrysoptera*		V	Ecosystem	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.	40 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Dusky Woodswallow *Artamus cyanopterus cyanopterus*		V	Ecosystem	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris.	9 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Scarlet Robin *Petroica boodang*		V	Ecosystem	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	3 (DPE)	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Yellow Wagtail *Motacilla flava*	M		N/A	Open country near swamps, salt marshes and sewage ponds.	PMST	Low. No suitable habitat present.
Rufous Fantail *Rhipidura rufifrons*	M		N/A	Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts.	PMST	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Satin Flycatcher *Myiagra cyanoleuca*	M		N/A	Mainly inhabit eucalypt forests, often near wetlands or watercourses.	PMST	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
Black-faced Monarch *Monarcha melanopsis*	M		N/A	Rainforest and wet eucalypt forest.	PMST	Low. No suitable habitat present.
Spectacled Monarch *Monarcha trivirgatus*	M		N/A	Rainforest, mangroves and moist gloomy gullies of dense eucalypt forest.	PMST	Low. No suitable habitat present.
Diamond Firetail *Stagonopleura guttata*	V	V	N/A	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.	PMST	Moderate. May fly over the site on occasion; however, would not be reliant on the site for its lifecycle requirements.
REPTILES						
Broad-headed Snake *Hoplocephalus bungaroides*	V	E	Dual	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring.	PMST	Low. No suitable habitat present.

Common Name	Status		BAM credit type	Primary habitat requirements	No. of sources	Likelihood of Occurrence
	EPBC Act	BC Act/ FM Act				
Stephen's Banded Snake *Hoplocephalus stephensii*		V	Species	Rainforest and eucalypt forests and rocky areas up to 950 m in altitude. Shelters between loose bark and tree trunks, amongst vines, or in hollow trunks limbs, rock crevices or under slabs during the day.	5 (DPE)	Moderate. May occupy the hollow-bearing trees and forage within area. Precautionary approach adopted and Assessment of Significance conducted (Appendix F).
Striped Legless Lizard *Delma impar*	V	V	Species	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component.	PMST	Low. No suitable habitat present.
AMPHIBIANS						
Giant Burrowing Frog *Heleioporus australiacus*	V	V	Species	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	PMST	Low. No suitable habitat present.
Green and Golden Bell Frog *Litoria aurea*	V	E	Species	Inhabits a variety of environments, including disturbed sites, ephemeral ponds, wetlands, marshes, dams and stream-sides, particularly those that contain one or more of the following aquatic plants: bullrush (*Typha* spp.), spikerush (*Eleocharis* spp.), *Juncus kraussii*, *Schoenoplectus littoralis* and *Sporobolus virginicus.*	99 (DPE) PMST	Low. No suitable habitat present.
Green-thighed Frog *Litoria brevipalmata*		V	Species	Occurs in isolated localities along the coast and ranges from just north of Wollongong to south-east Queensland. Found in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain.	3 (DPE)	Low. No suitable habitat present.
Littlejohn's Tree Frog *Litoria littlejohni*	V	V	Species	Breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath-based forests and woodlands where it shelters under leaf litter and low vegetation.	PMST	Low. No suitable habitat present.
Stuttering Frog *Mixophyes balbus*	V	E	Species	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	73 (DPE) PMST	Low. No suitable habitat present.
Giant Barred Frog *Mixophyes iteratus*	E	E	Species	Found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation.	47 (DPE) PMST	Low. No suitable habitat present.

Appendix D: Photographic record of area investigated

	Character of road corridor requiring remediation, with cracks in road surface visible.
	Character of vegetation at site, photo taken from guardrail, facing west.
	Character of vegetation present on slope and road corridor. Photo taken facing north.

	Character of vegetation in study area.
	Character of vegetation in study area, from bottom of slumped bank looking up towards road.
	Vegetated character of the downslope remediation area.

	Vegetated character of the downslope remediation area.
	Character of site, taken from southern extent of construction footprint.
	BAM Plot FD01.

Appendix E: Flora species recorded

Key

* - introduced species

Family	Scientific Name	Common Name
FILICOPSIDA - FERNS		
Adiantaceae	*Adiantum aethiopicum*	Maidenhair Fern
	Adiantum hispidulum	Rough Maidenhair Fern
Blechnaceae	*Blechnum ambiguum*	
	Blechnum cartilagineum	Gristle Fern
	Blechnum wattsii	Hard Water Fern
	Doodia aspera	Rasp Fern
Cyatheaceae	*Cyathea australis*	Harsh Tree Fern
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern
Magnoliopsida – Flowering PLANTS		
Magnoliidae - Dicotyledons		
Amaranthaceae	*Pseuderanthemum variabile*	Pastel Flower
Apocynaceae	*Parsonsia straminea*	Monkey Vine
Araliaceae	*Hydroctyle sp*	Pennywort
Asteraceae	*Ageratina adenophora**	Crofton Weed
	*Bidens pilosa**	Cobbler's Pegs
	*Cirsium vulgare **	Scotch Thistle
	*Conyza sp**	Fleabane
Bignoniaceae	*Pandorea pandorana*	Wonga-Wonga Vine
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cunoniaceae	*Callicoma serratifolia*	Black Wattle
Eupomatiaceae	*Eupomatia laurina*	Bolwarra
Euphorbiaceae	*Claoxylon australe*	Brittlewood
	Glochidion ferdinandi	Cheese Tree
Fabaceae: Mimosoideae	*Acacia longifolia*	Sydney Golden Wattle
Geraniaceae	*Geranium homeanum*	
	Geranium solanderi	
Lauraceae	*Cinnamomum camphorai**	Camphor Laurel
	Cryptocarya glaucescens	Jackwood
Malvaceae	*Adcalva fraseri*	Brush Kurrajong
Meliaceae	*Synoum glandulosum*	Bastard Rosewood
Menispermaceae	*Stephania japonica*	Snake Vine
Monimiaceae	*Wilkiea huegeliana*	Veiny Wilkiea
Myrtaceae	*Angophora costata*	Smooth-barked Apple
	Angophora floribunda	Rough-barked Apple
	Eucalyptus acmenioides	White Mahogany
	Eucalyptus pilularis	Blackbutt
	Eucalyptus saligna	Sydney Blue Gum
	Melaleuca styphelioides	Prickly-leaved Paperbark
	Syncarpia glomulifera	Turpentine
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Rosaceae	*Rubus moluccanus*	Molucca Bramble
Solanaceae	*Solanum mauritianumi**	Wild Tobacco
	*Solanum nigrum**	Blackberry Nightshade
Verbenaceae	*Lantana camara**	Lantana
Vitaceae	*Cayratia clematidea*	Slender Grape
	Cissus antarctica	Kangaroo Vine
	Cissus hypoglauca	Water Vine
	Tetrastigma nitens	
LILIIDAE - Monocotyledons		

Family	Scientific Name	Common Name
Araceae	*Gymnostachys anceps*	Settler's Flax
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Asparagaceae	*Cordyline stricta*	Narrow-leaved Palm Lily
	Lomandra longifolia	Spiny-headed Mat-rush
Asphodelaceae	*Geitonoplesium cymosum*	Scrambling Lily
Cyperaceae	*Carex appressa*	
	Gahnia melanocarpa	Saw Sedge
Dioscoreaceae	*Dioscorea transversa*	Native Yam
Phormiaceae	*Dianella caerulea*	Flax-lily
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass
	Entolasia stricta	Wiry Panic
	Microlaena stipoides	Weeping Meadow Grass
	Oplismenus aemulus	Basket Grass
	*Setaria sp**	Pigeon Grass
Smilacaceae	*Smilax australis*	Bush Lawyer

Appendix F: Tests of Significance (BC Act)

As the following threatened species have been previously recorded within 10 km of the study area, and, as both suitable habitat (3 x hollow-bearing trees with small to medium sized entrance diameters) is present and targeted nocturnal surveys were not conducted, it is considered appropriate to adopt a precautionary approach to the presence of the following species listed as Vulnerable under the BC Act:

- Yellow-bellied Sheathtail-bat – listed as Vulnerable
- Eastern False Pipistrelle – Vulnerable
- Southern Myotis – Vulnerable
- Greater Broad-nosed Bat – Vulnerable
- Eastern Coastal Free-tailed Bat – Vulnerable
- Squirrel Glider – Vulnerable
- Little Lorikeet – Vulnerable
- Stephen's Banded Snake – Vulnerable.

The potential impact associated with the proposal on these previously recorded and potentially occurring species and their local populations, is considered with reference to the assessment criteria provided under Section 7.3 of the BC Act (these commonly referred to as the 5-part test). These criteria are designed to determine whether there is likely to be a significant effect on these threatened species, or their habitats, and consequently whether a SIS [or BDAR if Transport pursues that option] is required.

In line with the guidelines provided by OEH (then DECC) on the Assessment of Significance, due to the similarity of their habitat requirements (i.e., all are hollow-dependent species that could occupy the three trees present due to the size of the entrance cavities and all forage within eucalypt woodland either on insects or plant exudates/nectar), the threatened hollow-dependent fauna have been grouped together as opposed to individual assessments being conducted on each animal.

Hollow-dependent species

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat, Squirrel Glider, Little Lorikeet and Stephen's Banded Snake have all been previously recorded within 10 km of the study area. Each of these is a hollow-dependent species, using tree cavities for either their breeding and/or sheltering requirements. In addition, each forage on those insects that are attracted to the flowering plants present within the eucalypt woodland, or the exudates/pollen/nectar produced by these species.

The slope remediation works proposed at Freemans Drive will clear an estimated area of 1.04 ha of vegetation, this including 224 trees, three of which are hollow-bearing (and due to the observed cavity entrance diameter, could be used by the animals listed above).

Post remediation, portions of the disturbance area will be permitted to naturally regenerate.

Consultation of aerial photography that encompasses the slope remediation area indicates that, either side of Freemans Drive, there is in excess of 7500 ha of similar vegetation present, a large percentage of this located in a conservation reserve or other protected lands.

At a local scale, vegetation is to be retained beyond the limits of the slope remediation site, this consistent with the character of the fauna habitats that would be further modified (acknowledging that a number of the trees being removed have already fallen due to the influence of the landslip that occurred at this site).

Given the extent of suitable habitat being retained within both the study area and surrounding bushland (including the proximate conservation reserve and other protected lands), the impact of the landslip (this resulting in a number of the trees that are present to have already fallen) and the fact that the majority of areas will naturally regenerate post slope remediation, it is not considered that the proposal would have an adverse effect on the lifecycle of these species such that viable local populations of these animals are likely to be placed at risk of extinction.

The proposed slope remediation works, these undertaken within a limited area that is in the order of 240 m long by 30 m wide, will not limit the number of hollow-bearing trees present or the diversity of insect attracting/pollen [etc] producing plants at either a local or regional scale.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable to threatened species.

(c) in relation to the habitat of a threatened species, population or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity,

The proposal will require the removal of about 1.04 ha of native vegetation, this including insect-attracting and pollen-producing plants and three hollow-bearing trees; however, similar habitat will be retained in the surrounding area.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity,

The stabilisation of the slope, within which natural forces have caused trees to fall, will not fragment or further isolate areas of habitat for those hollow-dependent species previously recorded in this locality.

The landslip has caused trees to fall and produced gaps in the tree canopy. Beyond the slip area, the woodland canopy is relatively continuous, with breaks due to existing infrastructure and land uses (e.g., fire trails and rural properties). The remediation of the slope will not have an adverse cumulative impact when associated with these existing influences. Beyond the slope area, canopy connectivity will be maintained, this permitting opportunities for the movement of species like the Squirrel Glider.

If present, the Stephen's Banded Snake is expected to be tolerant of, and adaptable to, the existing road network. The remediation of the landslip site will not further fragment or isolated this species habitat when combined with the existing road network and surrounding land use patterns. Post stabilisation, natural regeneration would occur, and this snake will be able to traverse and move unrestricted across the slope.

The Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat and Little Lorikeet can easily negotiate open areas and have been observed negotiating cleared land and urban infrastructure (author's field notes).

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

The proposal is not considered to remove, modify, fragment or isolate a significant amount of vegetation such that the long-term survival of those hollow-dependent species previously recorded in the study region would be jeopardised. While three hollow-bearing trees do require removal, the habitats within the study area extend well beyond the limits of the proposal, including within the adjacent conservation reserve and other protected lands, where similar resources are present. Given that no major components of these species' habitat are to be further isolated or fragmented, it is not considered that the proposal would have an impact on the Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat, Squirrel Glider, Little Lorikeet and Stephen's Banded Snake such that the long-term survival of these species in the locality would be adversely affected.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No declared areas of outstanding biodiversity value would be directly or indirectly affected by the proposal. The study area is not listed as a declared area of outstanding biodiversity value under Part 3 of the BC Regulation 2017.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

Currently 35 KTP for mainland NSW are listed under Schedule 4 of the BC Act. Of these, the 'clearing of native vegetation' and 'loss of hollow-bearing trees' would be applicable to the proposal. While it is acknowledged that the proposed work will result in the removal of some native vegetation, this including insect attracting plants and three hollow-bearing trees, it is not considered that this clearance would significantly contribute to this KTP such that the lifecycle requirements of the Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat, Squirrel Glider, Little Lorikeet and Stephen's Banded Snake would be compromised.

Expected impact on hollow-dependent fauna

The undertaking of the proposed slope remediation work, this affecting 1.04 ha of native vegetation (including three hollow-bearing trees) would not disturb, remove, modify or fragment any habitats critical to the lifecycle requirements of any species of hollow-dependent fauna. Given the extent of suitable habitat being retained within both the study area and the surrounding bushland (including the proximate conservation areas), the removal of some vegetation, this including insect attracting and pollen (etc) producing plants and three hollow-bearing trees, is not considered to have a significant impact on the Yellow-bellied Sheathtail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat, Squirrel Glider, Little Lorikeet and Stephen's Banded Snake, or their habitat. As such, the preparation of a SIS [or alternatively, a BDAR] that further considers the impact of the proposed work on hollow-dependent fauna is not triggered.

NSW GOVERNMENT

Appendix B: Database searches

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Freemans Drive

Client Service ID : 794547

bd infrastructure

Suite 7.03, Level 7 45 Clarence Street
Sydney New South Wales 2000

Attention: Stuart Hill

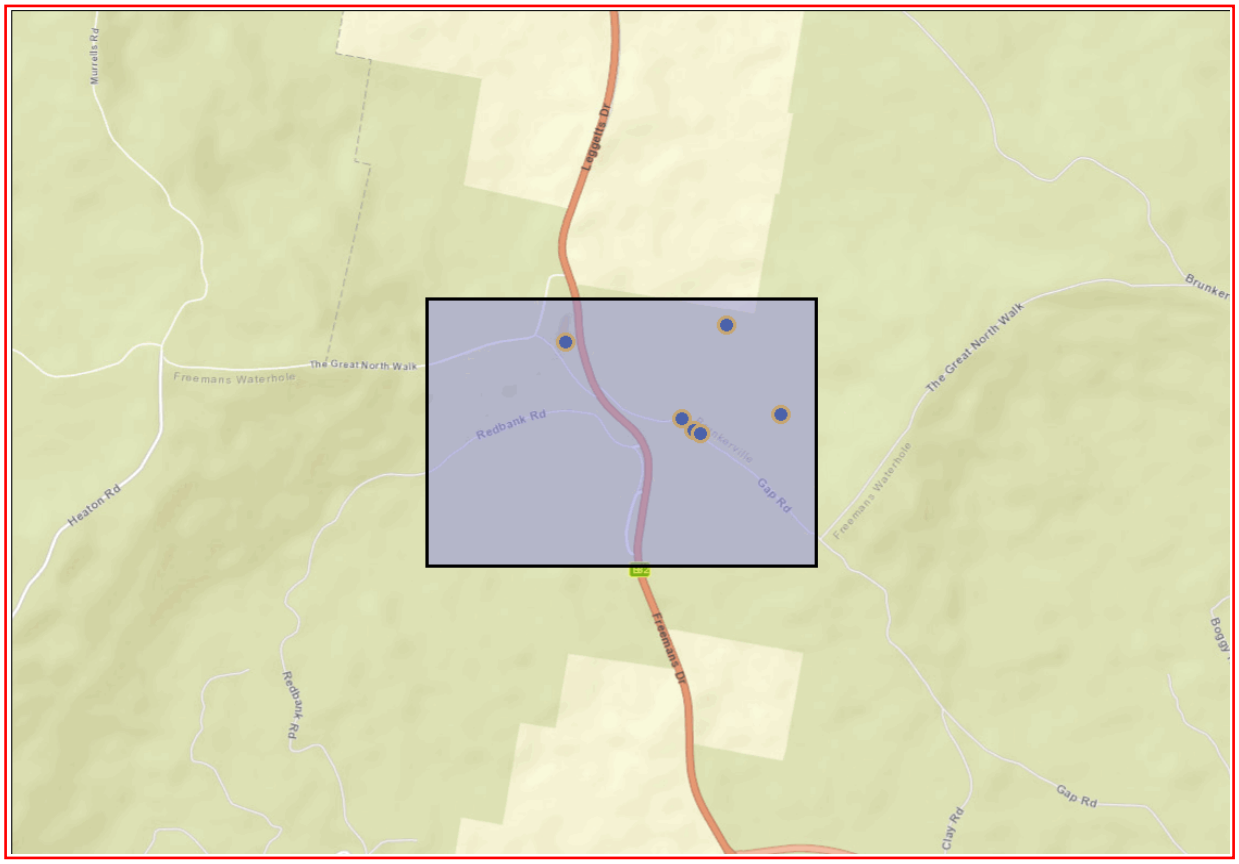
Email: stuart.hill@bdinfrastructure.com

Date: 25 June 2023

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -32.9744, 151.4735 - Lat, Long To : -32.9654, 151.4889, conducted by Stuart Hill on 25 June 2023.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

6	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

Appendix C: Correspondence

16 November 2023

Skye Ferguson
A / Area Manager
National Parks and Wildlife Service

Via email: npws.wollemiyengo@environment.nsw.gov.au

Consultation regarding proposed slope remediation, Freemans Drive, Freemans Waterhole

Transport for NSW (Transport) is proposing to carry out slope remediation works along Freemans Drive near Brunkerville Gap, Freemans Waterhole (the proposal). The remediation works are needed to address slope failures adjacent to the northbound lane which were the result of a storm event in July 2023. The subject section of Freemans Drive is currently restricted to one northbound lane with 24/7 lane closure in place on until remediation works are complete (Figure 1-2).

Under section 2.15 of State Environmental Planning Policy (Transport and Infrastructure) 2021, Transport is required to consult the National Parks and Wildlife Service (NPWS) in relation to works proposed on and land adjacent to reserved land under the *National Parks and Wildlife Act 1974*.

The proposal site is located adjacent to Sugarloaf State Conservation Area however it is noted there is no encroachment to cadastral boundaries or NPWS Estate according to the NSW Government database and project assessments (Figure 3). The proposed work site is down slope from confirmed boundary with Freemans Drive and the gabion rock wall delineating this boundary (Figure 2).

Transport for NSW has undertaken further site-based survey investigation with an external surveying organisation confirming the proposed works has no encroachment on NPWS Estate. External surveying organisation engaged to confirm boundaries provided confirmation no encroachment with the proposed works on Freemans Drive.

A description of the proposed slope remediation works is provided in Attachment A to this letter.

Any comments provided by NPWS will be considered in the Review of Environmental Factors (REF) that is currently being prepared to address the requirements of Part 5 of the *Environmental Planning and Assessment Act 1979*.It would be appreciated if you could provide any comments on this proposal by **15 December 2023.**

Transport for NSW would be pleased to provide further information if required. In this regard I may be contacted on 0491 800 128 or by email -

michael.coyte2@transport.nsw.gov.au .

Yours faithfully

Michael Coyte
Project/Contract Manager
Natural Disaster Recovery
Regional and Outer Metropolitan
Transport for NSW

M 0403 868 412
Level 6, 6 Stewart Avenue Newcastle West NSW 2302

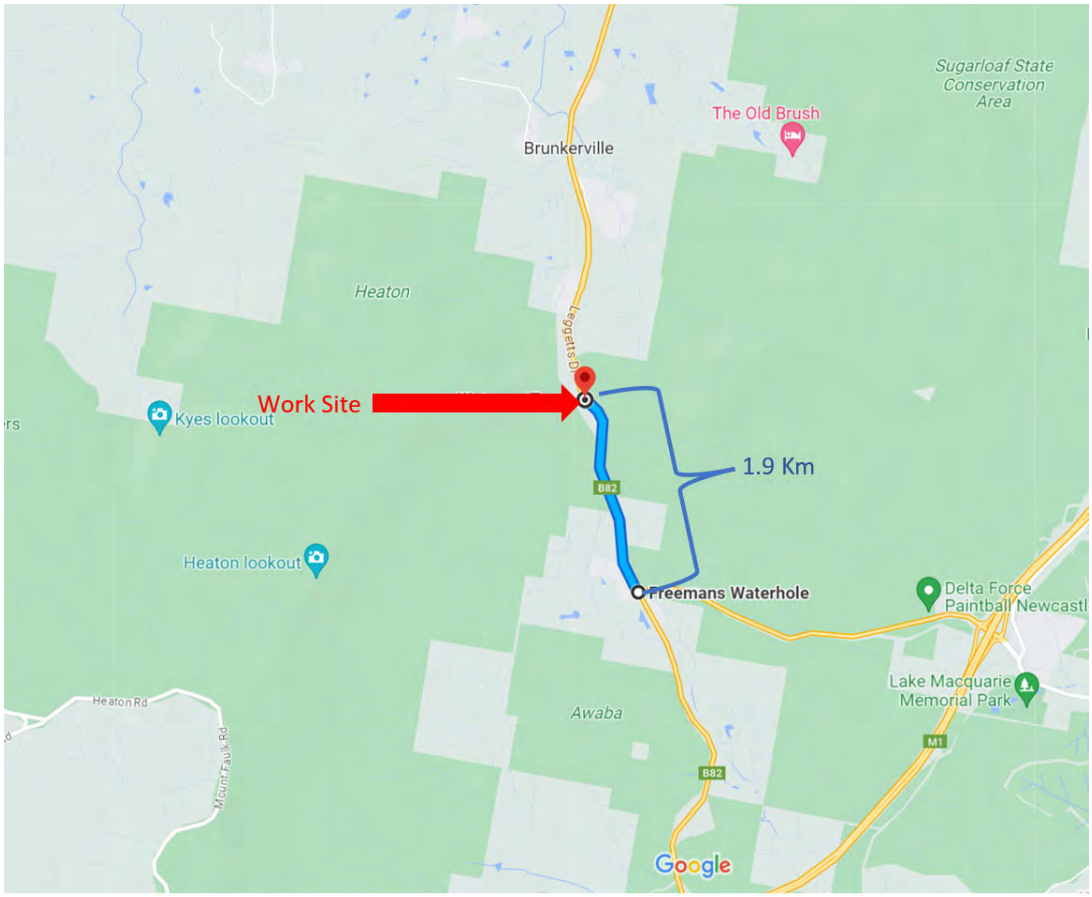


Figure 1 – Aerial location of work site

Figure 2 – Street view of work site showing

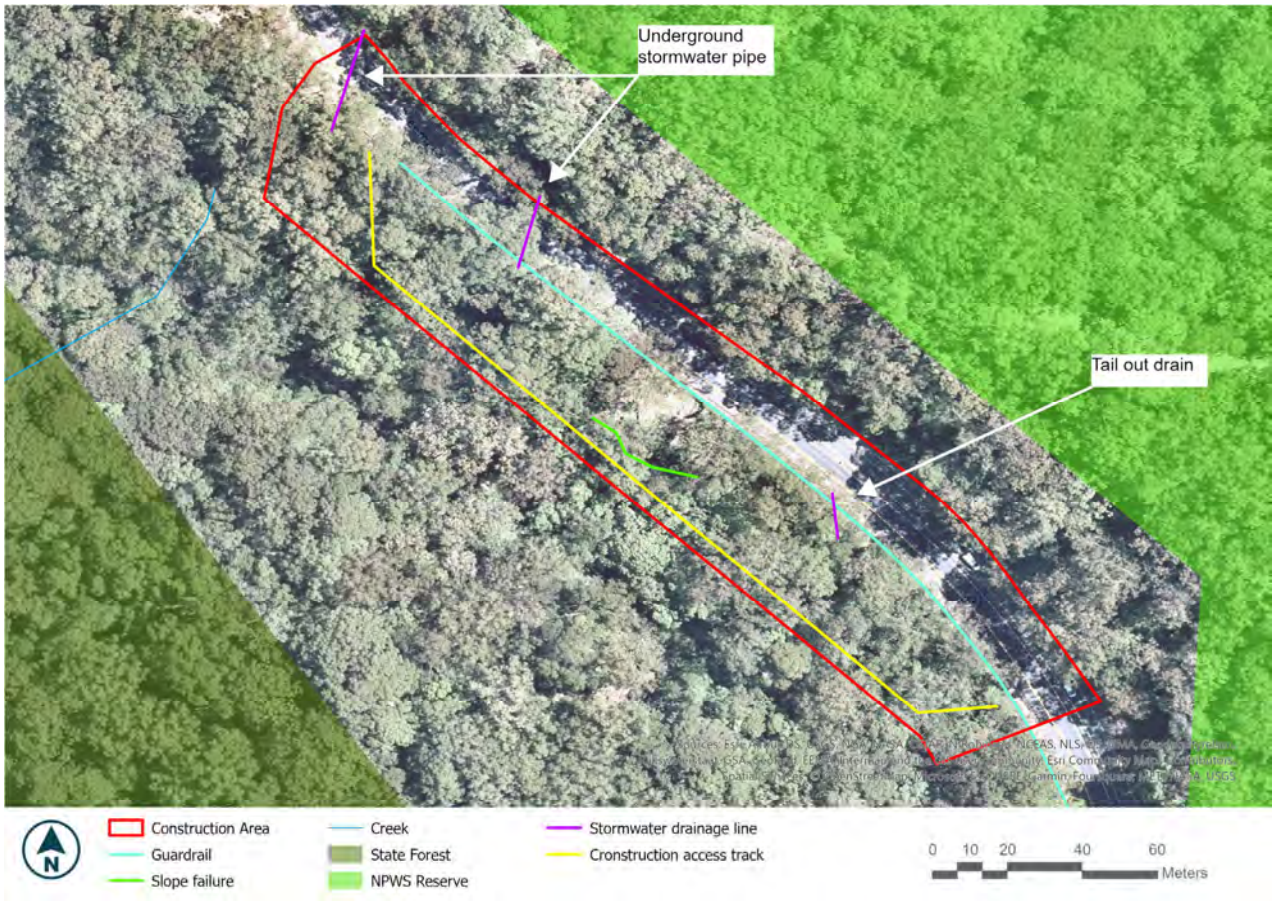


Figure 3 –Work site to NPWS boundary

Appendix D: Aboriginal cultural heritage advice

16/ 11/ 2022

Michael Coyte
Level 6, 6 Stewart Avenue
Newcastle West NSW 2302

Dear Michael,

Preliminary assessment results for P.0078832 – Freemans Drive, Freemans Waterhole based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation* (the procedure).

The project, as described in the Stage 1 assessment, was assessed as being unlikely to have an impact on Aboriginal cultural heritage.

The assessment is based on the following due diligence considerations:

- The project is unlikely to harm known Aboriginal objects or places.
- The AHIMS search did not indicate moderate to high concentrations of Aboriginal objects or places in the study area.
- The study area does not contain landscape features that indicate the presence of Aboriginal objects, based on the Heritage NSW's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Transport for NSW's procedure.
- The cultural heritage potential of the study area appears to be reduced due to past disturbance.
- There is an absence of sandstone rock outcrops likely to contain Aboriginal art.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff to reassess any potential impacts on Aboriginal cultural heritage.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the project, all works in the vicinity of the find must cease. Follow the steps outlined in the Transport for NSW's *Unexpected Archaeological Finds Procedure*.

For further assistance in this matter do not hesitate to contact me.

Yours sincerely

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Appendix E: NPWS guidelines review

The recommendations in Developments adjacent to NPWS lands: Guidelines for consent and planning authorities (as relevant to the proposal) are considered in the table below.

Category	Recommended approach	Response
Erosion and sediment control	Appropriate erosion and sedimentation control measures should be implemented before works commence, and maintained for the duration of construction and until soil is stabilised. As general erosion and sediment control measures, NPWS recommends that: • Clearance of native vegetation is kept to a minimum • Areas of retained vegetation are fenced off during construction • Areas of bare soil and stockpiles are managed to prevent erosion during the construction process • Disturbed areas are rehabilitated and appropriately stabilised as soon as possible following construction (this includes removal of control measures, such as sediment fences, when they are no longer required). To prevent sediment moving from an adjacent property onto NPWS land, and to avoid and minimise erosion risks, NPWS also recommends that appropriate controls should be applied in accordance with the following guidance documents: • Erosion and sediment control on unsealed roads (OEH 2012) • Managing Urban Stormwater – Soils and Construction, Volume I (Landcom 2004) • Managing Urban Stormwater – Soils and Construction, Volume II (DECC 2008) • A Resource Guide for Local Councils: Erosion and Sediment Control (DEC 2006)	Measures to address soil and water quality impacts have been included in Sections 3.1 and 3.2.
Stormwater runoff	Development proposals for areas adjacent to NPWS land should incorporate stormwater detention and water quality systems (with appropriately managed buffer areas) within the development site. Water sensitive urban design (WSUD) principles should be applied to developments in catchments upstream from wetlands. Stormwater should be diverted to council stormwater systems or to infiltration and subsurface discharge systems within the development site. The discharge of stormwater to NPWS land, where the quantity and quality of stormwater differs from natural levels, must be avoided.	Following the completion of works the quality of stormwater flows is expected to be the same as the existing situation. The NPWS land would is also upslope and would not receive stormwater from the construction footprint. No changes to the volume and velocity of road related runoff are anticipated (as there would be no changes to the impermeable surfaces within the catchment). Refer to Section 3.2 for further discussion of hydrology and water quality.
Wastewater	Requirements relating to wastewater infrastructure and discharge.	Not relevant to the proposal.

Pests, weeds and edge effects	During construction works adjoining parks, the boundary of the NPWS park and any buffer will require demarcation using a visually obvious barrier such as temporary fencing or flicker tape to reduce the risk of accidental encroachments.	The construction footprint would not encroach the Sugarloaf State Conservation Area. Areas outside the proposal footprint would be an exclusion zone and would be demarcated as per Guide 2: Biodiversity Guidelines Protecting and managing biodiversity on RTA projects (RTA, 2011). Access to works via NPWS land is not required.
Fire and the location of asset protection zones	Relates to bush fire hazard reduction works, including the establishment of asset protection zones.	Not relevant to the proposal.
Boundary encroachments and access through NPWS land	NPWS land is not to be used: • To access development sites • To store materials, equipment, workers' vehicles or machinery • For maintenance access after development. Measures, such as temporary fencing of 'no-go' areas during construction or installation of permanent, wildlife-compatible fencing should be considered, and will require NPWS approval if they are proposed to be located along the site boundary	Access to the construction footprint would be directly from MR220 Freemans Drive. Access through the Sugarloaf State Conservation Area is not required.
Visual, odour, noise, vibration, air quality and amenity impacts	Visual (including lighting), noise, odour and air quality impacts of development adjacent to NPWS land to ensure that they do not affect the amenity or public enjoyment of the land.	Visual impacts are considered in Section 3.11. Temporary site lighting would be required for night works. This lighting would be directed towards the western road embankment, away from the Sugarloaf State Conservation Area. Noise impacts are considered in Section 3.3. Air quality impacts are considered in Section 3.4.
Threats to ecological connectivity and groundwater-dependent ecosystems	Vegetation, waterways and water bodies close to NPWS land that exhibit ecological connectivity should be retained, protected and, where necessary, rehabilitated. For proposals involving the extraction of groundwater, NPWS recommends that consent authorities obtain and consider a comprehensive assessment of any potential impacts that may occur to groundwater-dependent ecosystems in NPWS lands.	Potential biodiversity impacts and suitable safeguards are discussed in Section 3.7. The proposal is not likely to intercept standing groundwater and no groundwater extraction is proposed.
Cultural heritage	Adequate consideration should be given to potential impacts of nearby development on the heritage values of NPWS land.	No impacts on Aboriginal heritage or non-Aboriginal heritage are expected. Refer to Section 3.5 and 3.6 respectively.
Access to parks	Any potential impacts on the accessibility to NPWS parks. Works should not block or in any way impede access to tactical fire trails.	The proposal would not affect access to the Sugarloaf State Conservation Area. The proposal would not affect tactical fire trails.

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