Transport for NSW

M5 Westbound Upgrade

Addendum review of environmental factors

August 2025

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which we work and live.

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.

Prepared by bd infrastructure and Transport for NSW.

Executive summary

The proposed modification

Transport for NSW (Transport) proposes to modify the M5 Westbound Upgrade by including additional stockpiling and compound areas, utility adjustments, temporary use of an existing boat ramp and changes to construction access (proposed modification). Key features of the proposed modification would include:

- Inclusion of an additional compound / stockpiling area to the north of the M5 Motorway (accessed from Helles Avenue), including placement of hardstand material and removal of trees to accommodate heavy vehicle access
- Extension of the compound / stockpile site to the south of the M5 Motorway
- Extension of the project area to accommodate use of the existing boat ramp (adjacent to the southern compound site) and barge/crane pads if required
- Use of Woodbrook Road (on the western side of the Georges River) as a construction access route for light vehicles and an alternative route for local traffic where required
- Installation of a new conduit for NBN cabling along a section of Anzac Road near Yulong Close.

Need for the proposed modification

The proposed modification reflects further construction planning and is needed to provide additional compound / stockpiling area, an additional construction vehicle route and adequate area within the project boundary for communications infrastructure adjustments and barge access. Specifically:

- The additional compound areas provide sufficient areas for plant laydown and stockpiling while also allowing for two-way heavy vehicle access to the site from Helles Avenue
- Adjustments to the boat ramp are required to support barge access to the site and the possible construction of barge / crane pads
- The Woodbrook Road route provides flexibility for light construction vehicle access to the site, and local traffic access to Powerhouse Road should closures of Powerhouse Road north of Woodbrook Road be needed during construction
- Placement of a new fibre optic cale conduit on Anzac Road is required to address blockages in an existing conduit and facilitate NBN infrastructure adjustment for the project.

Proposal objectives

Section 2.3 of the project REF identifies the proposal objectives and development criteria that apply to the proposed modification. The proposed modification would assist in meeting these proposal objectives and development criteria.

Options considered

Transport investigated the ‘do nothing’ option and the option of proceeding with the proposed modification.

The do nothing option was discarded because it would not allow for the completion of essential fibre optic adjustments and would not provide sufficient compound / laydown and stockpiling space to support the efficient construction of the project. It would also not provide access flexibility for light construction vehicles and local traffic using Powerhouse Road.

Statutory and planning framework

The proposed modification is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under section 2.109 of SEPP (Transport and Infrastructure), the proposed modification is permissible without consent. The proposed modification is not State significant infrastructure

or State significant development. The proposed modification can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (NSW). Consent from Council is not required.

Community and stakeholder consultation

Community and stakeholder consultation for the project is documented in section 5.2 of the project REF and in the related submissions report. Ongoing consultation would be consistent with section 5.6 of the project REF and as outlined in the submissions report.

Environmental impacts

The main environmental impacts for the proposed modification are:

Biodiversity

The nature and extent of the proposed modification is limited to disturbed areas adjoining industrial land and Anzac Road. The proposed modification would impact a small area (up to 0.12 hectares) of low condition Plant Community Type (PCT) 4025: Cumberland Red Gum Riverflat Forest. PCT 4025 is associated with the BC Act listed EEC, River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. Impacts on this community were assessed as not significant.

Threatened flora and fauna are not expected to be impacted by the proposed modification.

Noise and vibration

For additional compound operation, the noise assessment found that residential receivers are unlikely to be affected during standard hours. During night-time operation receivers in Casula on the western side of the Georges River could experience clearly audible construction noise. While within the affected distance (460 metre) noise contour, it is unlikely that receivers in Moorebank, east of Moorebank Avenue, would experience constriction noise due to shielding from industrial buildings.

For NBN conduit works, the assessment shows that residential receivers are unlikely to be affected by construction noise above management levels during the night (and therefore also during standard hours).

Non-residential receivers near the additional compound could experience noise above noise management levels, relevantly:

- Within 75 metres for active recreation (affecting the nearby archery club and raceway)
- Within 25 metres for industrial premises (potentially affecting adjacent industrial premises on Helles Avenue)

Non-residential receivers near the NBN conduit works are not expected to experience noise above noise management levels.

The minimum working distances from sensitive receivers for typical items of vibration intensive plant provided in Section 6.1 of the Construction Noise and Vibration Guideline (Transport for NSW, 2024) can be complied with. Exceedance of cosmetic damage (refer British Standard 7385) and human comfort (refer Assessing Vibration: a technical guideline (EPA 2006)) is therefore unlikely for the elements of the proposed modification.

Aboriginal heritage

The proposed modification would occur primarily in areas that have been subject to extensive ground disturbance (former landfill site and Anzac Road corridor) and are therefore likely to have low archaeological potential. Further, the additional and extended compound areas would be capped with hardstand material and would involve minimal ground disturbance.

Less disturbance has occurred within the Georges River riparian zone, and the proposed modification boundary has been amended to exclude areas of higher archaeological potential.

The proposed modification includes the use of Woodbrook Road by light construction vehicles. While Woodbrook Road is located near 45-5-4281, there would be no excavation of the road formation associated

with this change. Existing safeguard AH5 requires site 45-5-4281 to be protected through the installation of temporary fencing.

Justification and conclusion

The proposed modification reflects construction planning and is needed to ensure adequate area for compound, stockpiling and plant laydown, and necessary NBN infrastructure adjustments.

While there are some environmental impacts associated with the proposed modification (larger and additional compound areas and vegetation clearing), they are minor, temporary (except for vegetation clearing) and are adequately addressed through the proposed safeguards. Impacts on biodiversity were found not to be significant with reference to BC Act and EPBC Act considerations.

The benefits of the proposed modification are considered to outweigh the adverse impacts and risks.

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1. Introduction

1.1 Proposed modification overview

Transport for NSW (Transport) proposes to modify the M5 Westbound Upgrade by including additional stockpiling and compound areas, utility adjustments, temporary use of an existing boat ramp and changes to construction access (proposed modification). Key features of the proposed modification would include:

- Inclusion of an additional compound / stockpiling area to the north of the M5 Motorway (accessed from Helles Avenue), including placement of hardstand material and removal of trees to accommodate heavy vehicle access
- Extension of the compound / stockpile site to the south of the M5 Motorway
- Extension of the project area to accommodate use of the existing boat ramp (adjacent to the southern compound site) and barge/crane pads if required
- Use of Woodbrook Road (on the western side of the Georges River) as a construction access route for light vehicles and an alternative route for local traffic where required
- Installation of a new conduit for NBN cabling along a section of Anzac Road near Yulong Close.

The location of the proposed modification is shown in Figure 1-1 and the proposed modification is shown in Figure 1-2. Section 3 describes the proposed modification in more detail.

A review of environmental factors (REF) was prepared for the M5 Westbound Upgrade in August 2022 (referred to in this addendum REF as the project REF). The project REF was placed on public display for 32 days between Monday 29 August 2022 and Thursday 29 September 2022 for community and stakeholder comment. A submissions report dated March 2024 was prepared to respond to issues raised.

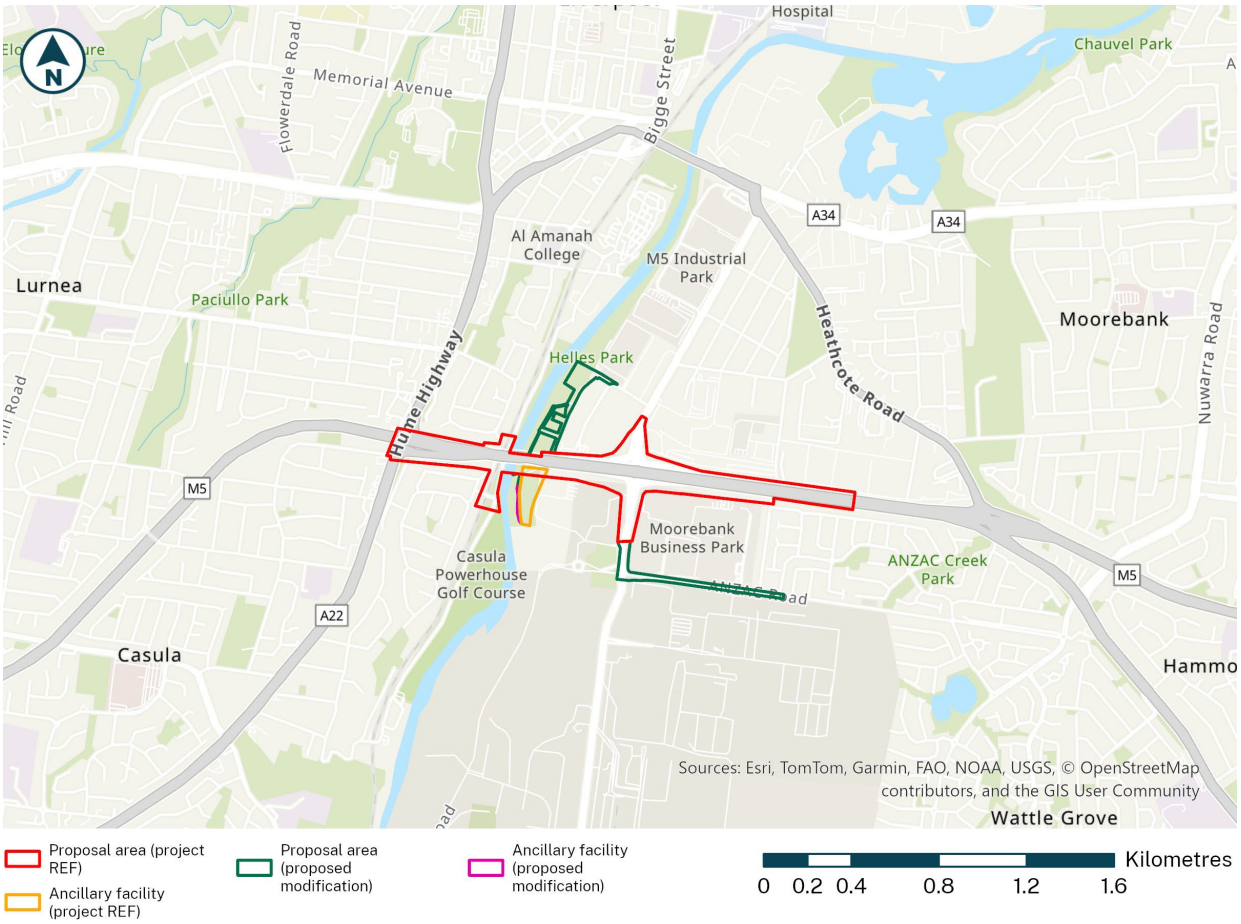

Figure 1-1: Location of the proposed modification

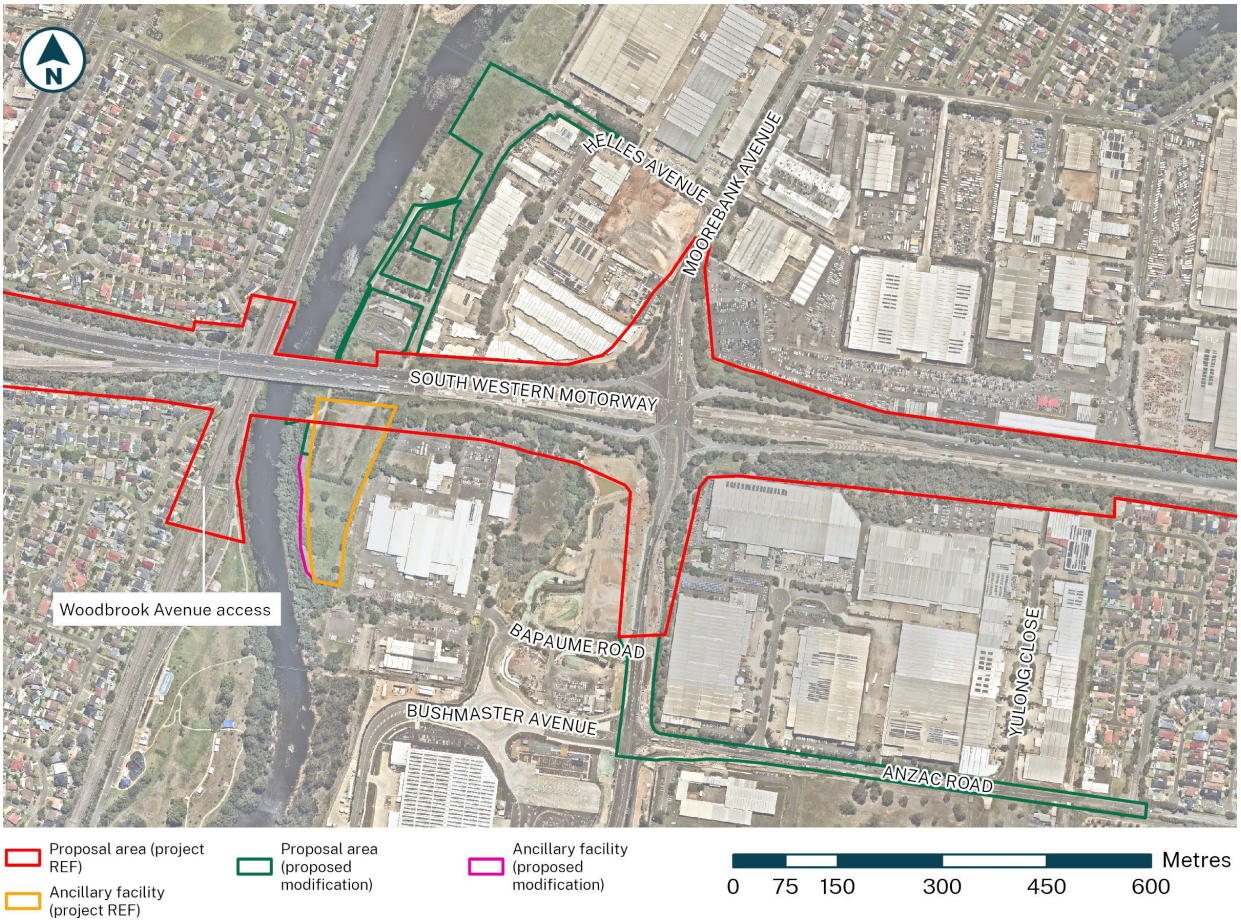

Figure 1-2: The proposed modification

1.2 Purpose of the report

This addendum REF has been prepared by bd infrastructure on behalf of Transport. For the purposes of these works, Transport is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This addendum REF is to be read in conjunction with the project REF and submissions report. The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely impacts of the proposed modification on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of section 171 of the Environmental Planning and Assessment Regulation 2021, the factors in Guidelines for Division 5.1 assessments (Department of Planning and Environment, 2020), Roads and Related Facilities EIS Guideline (Department of Urban Affairs and Planning, 1998), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the addendum 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 strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport's road activities on nationally listed threatened species, ecological communities and migratory species.

The findings of the addendum REF would be considered when assessing:

- Whether the proposed modification is likely to result in 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 significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Australian Government Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

2.1 Strategic need for the proposed modification

Section 2 of the project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

The proposed modification reflects further construction planning and is needed to provide additional compound / stockpiling area, and additional construction vehicle route and adequate area within the project boundary for communications infrastructure adjustments and barge access. Specifically:

- The additional compound areas provide sufficient areas for plant laydown and stockpiling while also allowing for two-way heavy vehicle access to the site from Helles Avenue
- Adjustments to the boat ramp are required to support barge access to the site and the possible construction of barge / crane pads
- The Woodbrook Road route provides flexibility for light construction vehicle access to the site, and local traffic access to Powerhouse Road should closures of Powerhouse Road north of Woodbrook Road be needed during construction
- Placement of a new fibre optic cable conduit on Anzac Road is required to address blockages in an existing conduit and facilitate NBN infrastructure adjustment for the project.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies the proposal objectives and development criteria that apply to the proposed modification. The proposed modification would assist in meeting these proposal objectives and development criteria.

2.3 Alternatives and options considered

2.3.1 Methodology for selection of preferred option

The proposed modification involves adjusting the project boundary and ancillary site boundary at several specific locations to accommodate construction activities (including NBN infrastructure adjustments). In this context the number of available options was limited. The process of option evaluation had two broad stages:

- A consideration of whether the proposed changes can be justified. This is an evaluation of the 'do nothing' option
- An evaluation of a proposed modification by reference to the project objectives and its respective impacts and benefits.

2.3.2 Identified options

Transport investigated the 'do nothing' option and the option of proceeding with the proposed modification.

2.3.3 Analysis of options

The do nothing option was discarded because it would not allow for the completion of essential fibre optic adjustments and would not provide sufficient compound / laydown and stockpiling space to support the efficient construction of the project. It would also not provide access flexibility for light construction vehicles and local traffic using Powerhouse Road.

2.4 Preferred option

The preferred option is to proceed with the proposed modification as evaluated in Section 2.3.3. The preferred option addresses the identified need. The proposed modification is based on the preferred option and is described in detail in Chapter 3.

3. Description of the proposed modification

3.1 The proposed modification

Transport proposes to modify the M5 Westbound Upgrade by including additional stockpiling and compound areas, utility adjustments, temporary use of an existing boat ramp and changes to construction access (proposed modification). The proposed modification is shown in Figure 1-2 (in Chapter 1) and in Figure 3-1 to Figure 3-4 in Section 3.2.3.

Key features of the proposed modification would include:

- Inclusion of an additional compound / stockpiling area to the north of the M5 Motorway (accessed from Helles Avenue), including placement of hardstand material and removal of trees to accommodate heavy vehicle access
- Extension of the compound / stockpile site (by about 0.2 hectares) to the south of the M5 Motorway
- Extension of the project area to accommodate use of the existing boat ramp (about 0.09 hectares) adjacent to the southern compound site) and barge/crane pads if required
- Use of Woodbrook Road (on the western side of the Georges River) as a construction access route for light vehicles and an alternative route for local traffic where required
- Installation of a new conduit for NBN cabling along a section of Anzac Road near Yulong Close.

3.2 Design

3.2.1 Design criteria

Design criteria for the project are identified in Section 3.2.1 of the project REF. There are no additional design criteria for the proposed modification.

3.2.2 Engineering constraints

Engineering constraints relevant to the project are identified in Section 3.2.2 of the project REF. There are no additional engineering constraints for the proposed modification.

3.2.3 Main features of the modification

Additional compound site

As part of the proposed modification Transport proposes an additional compound / stockpiling area (with an area of about 2.5 hectares) to the north of the M5 Motorway (accessed from Helles Avenue) (refer to Figure 3-1). Establishment of the compound would include placement of hardstand material and removal of trees at the following locations along to accommodate heavy vehicle access:

- Along the western side of the Helles Avenue track
- At the northern bend of the Helles Avenue track (eastern side) to allow for heavy vehicle turning paths
- Within the car park for the John Grant International Raceway to facilitate access for raceway users.

The site would be accessed via Moorebank Avenue and Helles Avenue, with some adjustments to the Helles Avenue track potentially being required. Noting that the site forms part of the Helles Park former landfill, no excavation in this area is proposed during compound site establishment or use.

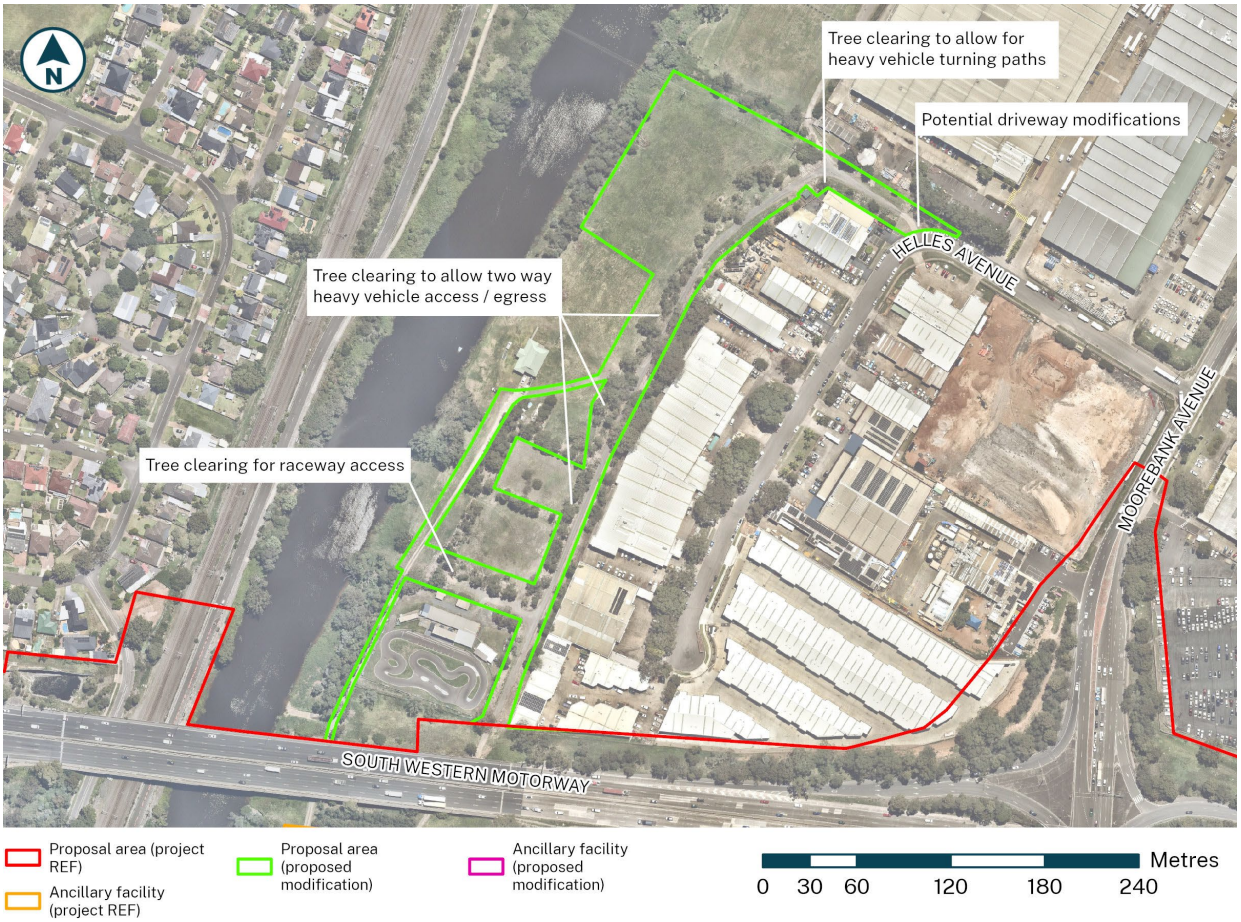

Figure 3-1: Key features of the proposed modification – additional ancillary facility

Extension of compound site and boat ramp use

The project REF (in Section 3.4) described the main ancillary facility as located on vacant land (Lot 11 DP 881265) on the eastern side of the Georges River, south of the M5 Motorway corridor. As part of the proposed modification Transport proposes extending this 1.95-hectare compound / stockpile site by about 0.2 hectares, making use of cleared land to the immediate west (refer to Figure 3-2).

Temporary use of the nearby boat ramp is also proposed, including potential vegetation clearing for barge/crane pads if required.

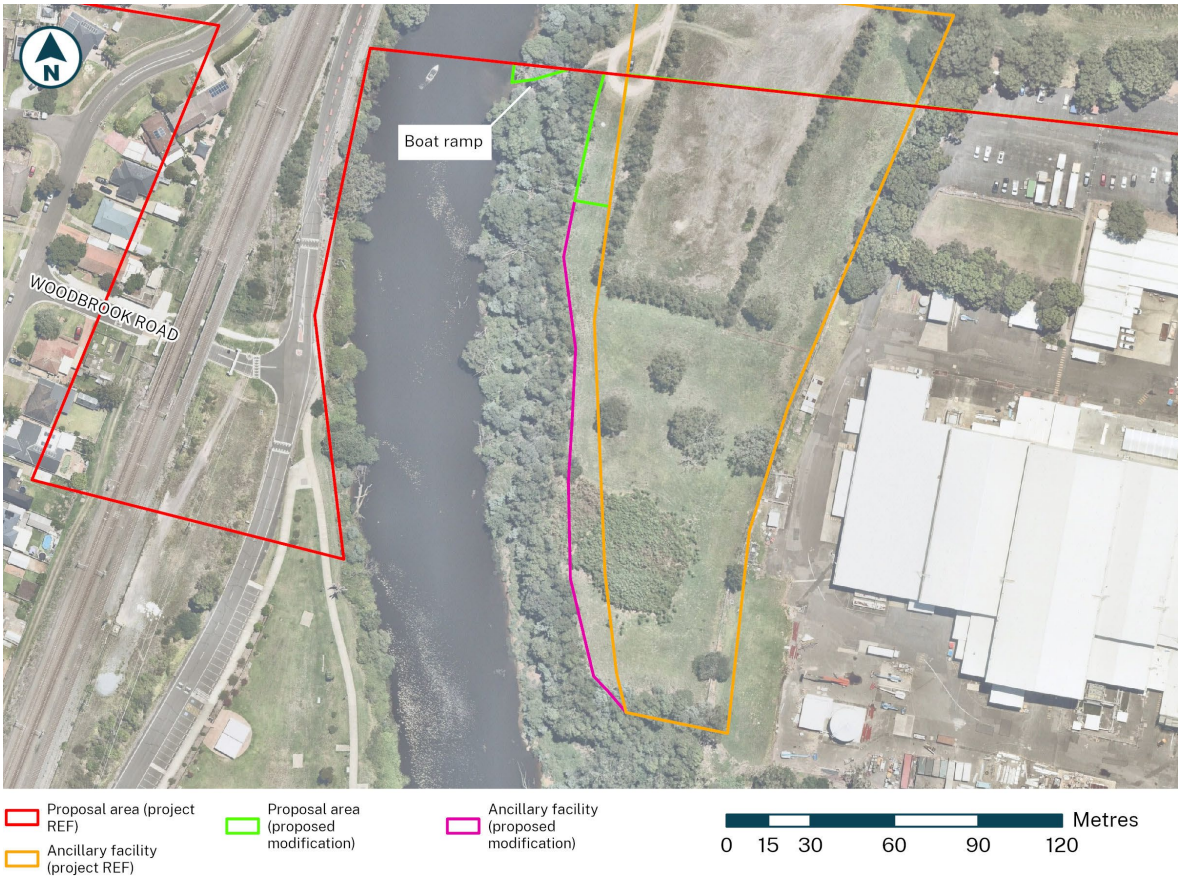

Figure 3-2: Key features of the proposed modification – modified ancillary facility and boat ramp use

Use of Woodbrook Road

The project REF identified that the construction of the new bridge may require temporarily partial closures of Powerhouse Road and Lakewood Crescent restricting north/south access for all road users. The project REF noted that light vehicles and pedestrians would be able to access Powerhouse Road south of the M5 Motorway via Woodbrook Road as an alternate route, however Figure 3-12 in the project REF did not show Woodbrook Road as a construction vehicle route.

As part of the proposed modification Transport is confirming the proposed use of Woodbrook Road as a construction vehicle route for light vehicles (up to five tonne) and an alternative route for local traffic where required. Changes to the road or railway overbridge are not proposed.

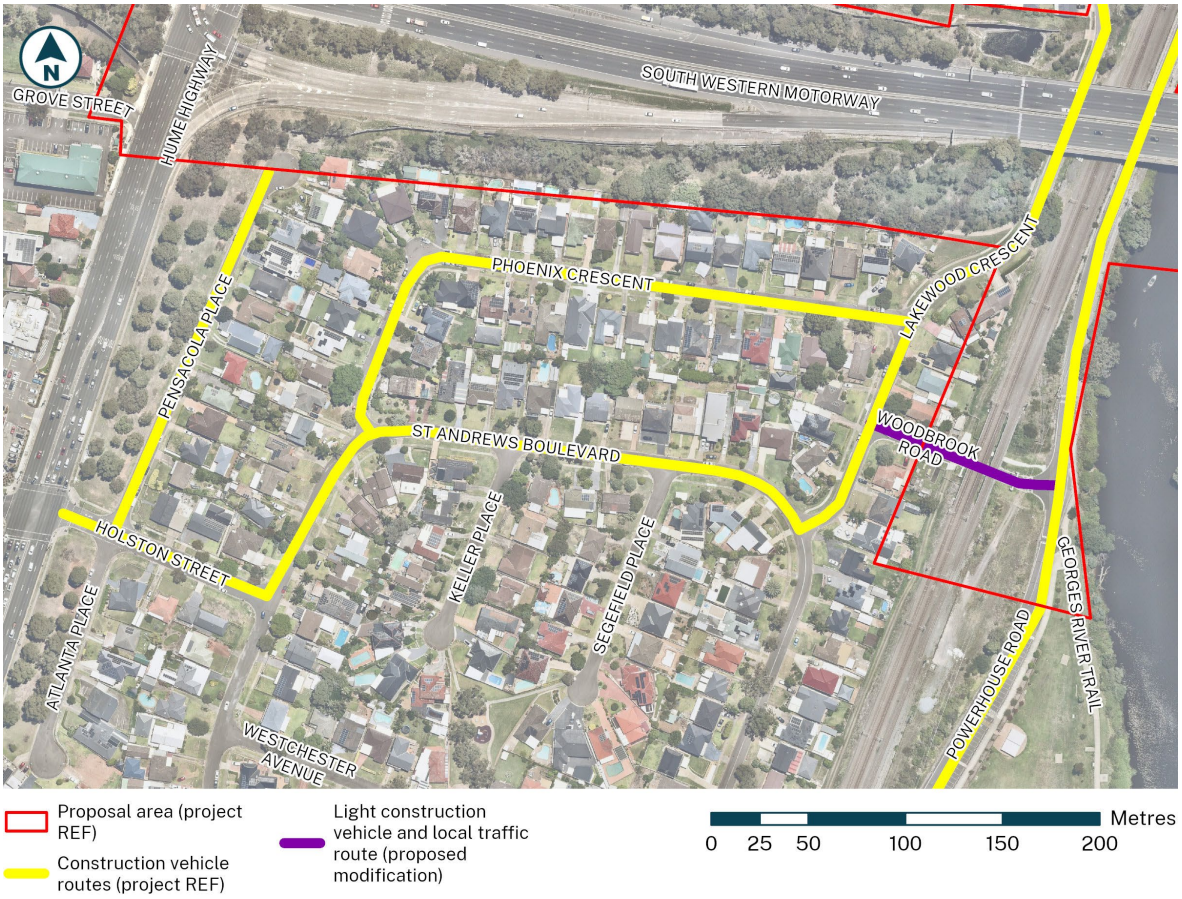

Figure 3-3: Key features of the proposed modification – light construction and local traffic route

NBN infrastructure adjustments

Subsequent to the project REF, the need for NBN infrastructure adjustments along Anzac Road were identified in consultation with NBN Co. A section of new conduit is required to address blockages in the existing conduit and allow new cables to be pulled through the conduit. The new conduit would require trenching along the southern verge of Anzac Road over a distance of about 200 metres.

Figure 3-4: Key features of the proposed modification – NBN infrastructure adjustments

3.3 Construction activities

3.3.1 Work methodology

The work methodology is generally consistent with that described in Section 3.3.1 of the project REF.

The proposed trenching along Anzac Road would be between 450 millimetres deep and would involve the cutting of existing pavement, breaking up the pavement surface with a hydraulic hammer and excavating the trench using a five tonne excavator. Once the new conduit is placed new cables would be pulled and connections finished. The trench would be backfilled with suitable material and the pavement restored.

3.3.2 Construction hours and duration

The construction hours and duration for the project remain as described in Section 3.3.3 of the project REF.

3.3.3 Plant and equipment

Proposed plant and equipment remain as described in Section 3.3.4 of the project REF.

3.3.4 Earthworks

Changes to earthworks are limited to additional trenching for the new NBN conduit along Anzac Road as described above in Section 3.2.3..

3.3.5 Source and quantity of materials

Source and quantity of materials remains as described in Section 3.3.6 of the project REF.

3.3.6 Traffic management and access

Traffic management and access would be consistent with Section 3.3.7 of the project REF except that the use of Woodbrook Road for light vehicles is now proposed as described in Section 3.2.3.

Use of the boat ramp to the adjacent to the southern compound would support barge use (which was described in Section 3.3 of the project REF).

3.4 Ancillary facilities

The proposed modification includes an additional ancillary facility as described in Section 3.2.3.

3.5 Public utility adjustment

Public utility adjustments would be consistent with Section 3.5 of the project REF except that new NBN conduit is required (outside the project REF proposal area) along Anzac Road near Yulong Close (refer to Section 3.2.3).

3.6 Property acquisition

The proposed modification does not require additional property acquisition. Use of the additional compound area and boat ramp would be by agreement with Liverpool City Council and other relevant stakeholders (including the NSW Barefoot Water Ski Club).

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 (Infrastructure) of SEPP (Transport and Infrastructure) aims to facilitate the effective delivery of infrastructure across the State.

Section 2.109 of 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 proposed modification is for a road 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 (Planning Systems) 2021
- State Environmental Planning Policy (Precincts – Central River City)
- State Environmental Planning Policy (Precincts – Eastern Harbour City)
- State Environmental Planning Policy (Precincts – Regional) 2021
- State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

Section 2.10 to 2.15 of 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.

Consultation, including consultation as required by SEPP (Transport and Infrastructure) is documented Chapter 5 of the project REF. Further statutory consultation is not proposed, however Transport will continue to liaise with Liverpool City Council regarding use of Council managed land and works along Anzac Road.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 4 Koala habitat protection

The City of Liverpool Local Government Area (LGA) is listed in Schedule 2 of the Biodiversity and Conservation SEPP.

While the requirements of Chapter 4 of the Biodiversity and Conservation SEPP do not apply to project approval under Division 5.1 of the EP&A Act, the requirements have nevertheless been previously considered.

The biodiversity assessment for the proposed modification (Appendix C) notes that there is foraging habitat within the proposed modification areas, but this occurs within a disturbed landscape and is unlikely to support koalas. A targeted survey for the project REF did not detect this species and no evidence of koalas was detected during the site assessment for the proposed modification. As such, it is considered unlikely that the proposed modification would have a significant impact on koalas.

Chapter 6 water catchments

The proposed modification is located on land to which Chapter 6 of the Biodiversity Conservation SEPP applies.

Under section 171A of the Environmental Planning and Assessment Regulation 2021 a determining authority must consider certain matters identified in Part 6.2 of the Biodiversity Conservation SEPP. These matters are considered in Table 4-1.

Table 4-1: Applicable planning considerations

Consideration	Comment
Clause 6.6 water quality and quantity	
(1) In deciding whether to grant development consent to development on land in a regulated catchment, the consent authority must consider the following —	
(a) whether the development will have a neutral or beneficial effect on the quality of water entering a waterway,	The proposed modification would not substantially change ground disturbance identified in the project REF and would be subject to safeguards and management measures to address water quality (refer to Section 7.2). The proposed modification is expected to have a neutral effect on water quality.
(b) whether the development will have an adverse impact on water flow in a natural waterbody,	The proposed modification would involve an additional temporary hardstand area for the compound north of the M5 Motorway corridor. In the context of whole of catchment flows to the Georges River, additional flows to the river would not be substantial.
(c) whether the development will increase the amount of stormwater run-off from a site,	The proposed modification would involve an additional temporary hardstand area for the compound north of the M5 Motorway corridor. In the context of whole of catchment flows to the Georges River, additional flows to the river would not be substantial.
(d) whether the development will incorporate on-site stormwater retention, infiltration or reuse,	No stormwater retention, infiltration or reuse is proposed.
(e) the impact of the development on the level and quality of the water table,	The proposed modification is not expected to intercept groundwater and would not involve groundwater drawdown.
(f) the cumulative environmental impact of the development on the regulated catchment,	The proposed modification would have negligible impacts on the catchment and therefore the potential for cumulative impacts would be limited.
(g) whether the development makes adequate provision to protect the quality and quantity of ground water.	The proposed modification is not expected to impact groundwater.
(2) Development consent must not be granted to development on land in a regulated catchment unless the consent authority is satisfied the development ensures —	
(a) the effect on the quality of water entering a natural waterbody will be as close as possible to neutral or beneficial, and	The proposed modification does not substantially change ground disturbance and would be subject to safeguards and management measures to address water quality (refer to Section 7.2). The proposed modification is expected to have a neutral effect on water quality.
(b) the impact on water flow in a natural waterbody will be minimised.	The proposed modification would involve an additional temporary hardstand area for the compound north of the M5 Motorway corridor. In the context of whole of catchment flows to the Georges River, additional flows to the river would not be substantial.
6.7 Aquatic ecology	
(1) In deciding whether to grant development consent to development on land in a regulated catchment, the consent authority must consider the following —	
(a) whether the development will have a direct, indirect or cumulative adverse impact	Potential impacts of the proposed modification are discussed in Chapter 6. The biodiversity assessment

on terrestrial, aquatic or migratory animals or vegetation,	concluded that a significant impact to a threatened species, population or community would be unlikely (refer to Section 6.1).
(b) whether the development involves the clearing of riparian vegetation and, if so, whether the development will require — (i) a controlled activity approval under the *Water Management Act 2000*, or (ii) a permit under the Fisheries Management Act 1994,	The proposed modification does not require any permits under the *Water Management Act 2000* or the *Fisheries Management Act 1994*.
(c) whether the development will minimise or avoid — (i) the erosion of land abutting a natural waterbody, or (ii) the sedimentation of a natural waterbody,	Erosion and sedimentation would be managed through existing site-specific erosion and sediment control plans implemented as part of the CEMP (refer to Section 7.2).
(d) whether the development will have an adverse impact on wetlands that are not in the coastal wetlands and littoral rainforests area,	The proposed modification would not impact wetlands.
(e) whether the development includes adequate safeguards and rehabilitation measures to protect aquatic ecology,	The proposed modification would not impact aquatic habitats.
(f) if the development site adjoins a natural waterbody — whether additional measures are required to ensure a neutral or beneficial effect on the water quality of the waterbody. Example — Additional measures may include the incorporation of a vegetated buffer between the waterbody and the site.	The proposed modification does involve work within the Georges River and would be subject to safeguards and management measures to address water quality (refer to Section 7.2). The proposed modification is expected to have a neutral effect on water quality.
(2) Development consent must not be granted to development on land in a regulated catchment unless the consent authority is satisfied of the following —	
(a) the direct, indirect or cumulative adverse impact on terrestrial, aquatic or migratory animals or vegetation will be kept to the minimum necessary for the carrying out of the development,	Potential impacts of the proposed modification are discussed in Chapter 6. The biodiversity assessment concluded that a significant impact to a threatened species, population or community would be unlikely (refer to Section 6.1).
(b) the development will not have a direct, indirect or cumulative adverse impact on aquatic reserves,	The proposed modification would not impact upon any aquatic reserves.
(c) if a controlled activity approval under the Water Management Act 2000 or a permit under the Fisheries Management Act 1994 is required in relation to the clearing of riparian vegetation — the approval or permit has been obtained,	The proposed modification does not require any permits under the *Water Management Act 2000* or the *Fisheries Management Act 1994*.
(d) the erosion of land abutting a natural waterbody or the sedimentation of a natural waterbody will be minimised,	Erosion and sedimentation would be managed through existing site-specific erosion and sediment control plans implemented as part of the CEMP (refer to Section 7.2).
(e) the adverse impact on wetlands that are not in the coastal wetlands and littoral rainforests area will be minimised.	The proposed modification would not impact wetlands.

6.8 Flooding	
(1) In deciding whether to grant development consent to development on land in a regulated catchment, the consent authority must consider the likely impact of the development on periodic flooding that benefits wetlands and other riverine ecosystems.	The proposed modification would not affect periodic flooding of wetlands or riverine systems.
(2) Development consent must not be granted to development on flood liable land in a regulated catchment unless the consent authority is satisfied the development will not —	
(a) if there is a flood, result in a release of pollutants that may have an adverse impact on the water quality of a natural waterbody, or	The proposed modification (including the additional compound area) is on land that is subject to flooding. Safeguards have been proposed so that pollutants are not released to the Georges River during flood events.
(b) have an adverse impact on the natural recession of floodwaters into wetlands and other riverine ecosystems.	The proposed modification would not have any impact on the recession of floodwaters into wetlands and riverine ecosystems.
6.9 Recreation and public access	
(1) In deciding whether to grant development consent to development on land in a regulated catchment, the consent authority must consider —	
(a) the likely impact of the development on recreational land uses in the regulated catchment, and	The proposed modification would occupy part of Helles Park, but recreational activities (water skiing, archery, etc) would be able to continue.
(b) whether the development will maintain or improve public access to and around foreshores without adverse impact on natural waterbodies, watercourses, wetlands or riparian vegetation.	The proposed modification would have a temporary impact on public access to and around foreshores. Access for recreational users (water skiing, etc) would be maintained at key times.
(2) Development consent must not be granted to development on land in a regulated catchment unless the consent authority is satisfied of the following —	
(a) the development will maintain or improve public access to and from natural waterbodies for recreational purposes, including fishing, swimming and boating, without adverse impact on natural waterbodies, watercourses, wetlands or riparian vegetation,	The proposed modification would have a temporary impact on public access to and around foreshores. Access for recreational users (water skiing, etc) would be maintained at key times.
(b) new or existing points of public access between natural waterbodies and the site of the development will be stable and safe,	No new points of public access are proposed.
(c) if land forming part of the foreshore of a natural waterbody will be made available for public access as a result of the development but is not in public ownership — public access to and use of the land will be safeguarded.	No new points of public access are proposed.

4.1.2 Local Environmental Plans

The discussion of Liverpool Local Environmental Plan (LEP) 2008 in Section 4.1.3 of the project REF remains applicable to the proposed modification.

4.2 Other relevant NSW legislation

The discussion of other relevant legislation in section 4.2 of the project REF is applicable to the project inclusive of the proposed modification. No additional NSW legislation relevant to the proposed modification has been identified.

4.3 Commonwealth legislation

4.3.1 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 Appendix A and section 6 of the addendum REF.

A referral is not required for proposed road actions 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.

Potential impacts to these biodiversity matters are also considered as part of section 6 of the addendum REF and Appendix C.

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposed modification's impact on matters of national environmental significance and the environment of Commonwealth land found that there would be no change to the findings of the determined activity and would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of Climate Change, Energy, the Environment and Water is not required.

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of road and is being carried out by or on behalf of a public authority. Under clause 2.109 of SEPP (Transport and Infrastructure) the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Transport is the determining authority for the proposal. This addendum REF fulfils Transport's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

A referral to Australian Government Department of Climate Change, Energy, the Environment and Water under the EPBC Act is not required.

5. Consultation

5.1 Consultation strategy

The consultation strategy relevant to the proposed modification remains consistent with Section 5.1 of the project REF.

5.2 Consultation outcomes

Consultation for the project to date is outlined in Chapter 5 of the project REF and in the submissions report.

Consultation with Liverpool City Council is continuing regarding the use of public spaces within Helles Park.

Consultation with NBN Co has occurred and the proposed new conduit along Anzac Road is an outcome of that consultation.

5.3 Ongoing or future consultation

Ongoing consultation is proposed (either in person or via email/phone) and a 1800 number (1800 684 490) and email address (projects@transport.nsw.gov.au) have been set up for enquiries and complaints.

6. Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification of the M5 Motorway Westbound Traffic Upgrade. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the Roads and Related Facilities EIS Guideline (Department of Urban Affairs and Planning, 1998), the Guidelines for Division 5.1 assessments (Department of Planning and Environment, 2020), the factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021. The factors specified in section 171(2) of the Environmental Planning and Assessment Regulation 2021 are also considered in Appendix A.

Site-specific safeguards and management measures are provided to ameliorate the identified potential impacts.

6.1 Biodiversity

A biodiversity assessment for the proposed modification has been prepared by East Coast Ecology. The main findings of that assessment are summarised in this section, and the full assessment is included in Appendix C.

6.1.1 Methodology

The methodology for the biodiversity assessment included:

- Search of NSW Wildlife Atlas (BioNet) and the Commonwealth Protected Matters Search Tool (May 2025)
- Identification of threatened flora and fauna with a moderate or higher likelihood of occurrence based on nearby records and known habitat/ geographic constraints
- Targeted flora surveys (20 May 2025) (for seven species identified as having a moderate or higher likelihood of occurrence) using parallel field traverses in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (Department of Planning, Industry and Environment, 2020)
- A field survey of fauna habitat (e.g. waterbodies, rocky areas, tree hollows).

6.1.2 Existing environment

Plant community types

A small section of the proposed modification area along the Georges River consists of riparian vegetation dominated by *Eucalyptus tereticornis*, *Angophora floribunda* and *Acacia binervia*. and weeds such as *Olea europaea* subsp. *cuspidata, Lantana camara* and *Cardiospermum grandiflorum* were widespread throughout the riparian zone.

Most of the proposed modification area consists of cleared grassland which is dominated by weeds such as *Cenchrus clandestinus*, *Ehrharta erecta*, *Chloris gayana*, *Urochloa panicoides*, *Eragrostis curvula*, *Setaria parviflora* and *Plantago lanceolata*. A large dense stand of Bamboo (Bambusa spp.) is also present in the southern compound site. The remainder of the area contains a range of planted native canopy species including *Casuarina glauca*, *Eucalyptus tereticornis*, *Eucalyptus moluccana*, *Eucalyptus amplifolia* and *Corymbia citriodora* and lacked a native understorey.

Reference to the soil mapping (i.e. Wianamatta shale), location in the landscape (alluvial flats) and presence of characteristic eucalypts, areas of native riparian vegetation were identified as conforming to Plant community Type (PCT) 4025 Cumberland Red Gum Riverflat Forest.

PCT 4025 is associated with the BC Act listed endangered ecological community (EEC), River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions and the EPBC Act Listed Critically endangered ecological community (CEEC), River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. The vegetation within the proposed modification area represents a severely degraded form of the BC Act EEC. Although PCT 4025 is also

associated with the EPBC Act listed CEEC, the vegetation consists of an exotic dominated understorey and does not meet the eligibility criteria for listing as the EPBC Act CEEC.

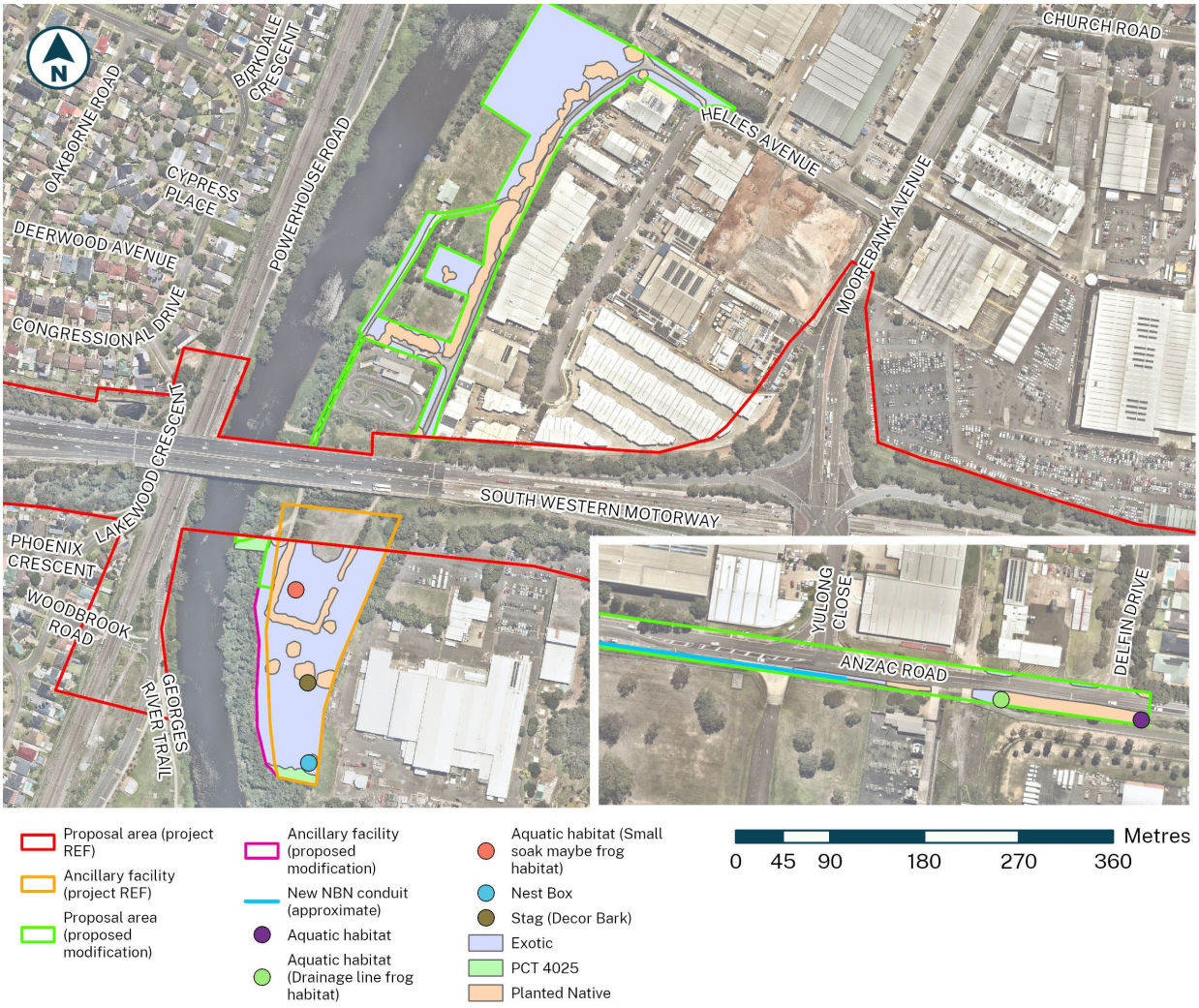

Figure 6-1: PCTs and habitat features

Threatened flora

Targeted flora surveys and a habitat assessment identified no threatened flora species within the proposed modification area.

Threatened fauna

Habitat surveys identified six species with a moderate likelihood of occurring within the proposed modification area as follows:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) (BC Act vulnerable)
- *Lathamus discolor* (Swift Parrot) (BC Act endangered, EPBC Act critically endangered)
- *Parvipsitta pusilla* (Little Lorikeet) BC Act vulnerable
- *Myotis macropus* (Southern Myotis) (BC Act vulnerable)
- *Pteropus poliocephalus* (Grey-headed Flying-fox) (BC Act and EPBC Act vulnerable)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat) (BC Act vulnerable)

The degraded vegetation, lack of breeding habitat and location within a highly disturbed, industrial landscape indicates that although threatened birds and mammals could potentially be occasional visitors to the site (e.g. flying over), it is unlikely to be used regularly or for any important life cycle events (e.g. breeding, roosting). As a result, any potential impacts to threatened birds and mammals are likely to be minor.

Habitat connectivity

The surrounding areas consist of industrial land and support little habitat connectivity. Minor habitat connectivity exists through riparian vegetation along the Georges River.

6.1.3 Potential impacts

The nature and extent of the proposed modification is limited to disturbed areas adjoining industrial land and Anzac Road. The proposed modification would impact a small area (up to 0.12 hectares) of low condition PCT 4025: Cumberland Red Gum Riverflat Forest. With the proposed modification the total clearing of PCT 4025 for the project is estimated to be 0.47 hectares. PCT 4025 is associated with the BC Act listed EEC, River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

Threatened flora and fauna are not expected to be impacted by the proposed modification.

Conclusion on significance of impacts

The modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Biodiversity Development Assessment Report or Species Impact Statement is not required.

The modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act.

6.1.4 Safeguards and management measures

Safeguards B1 through B21 as documented in the submissions report will apply to the project including the proposed modification. No additional safeguards are proposed.

6.1.5 Biodiversity offsets

Native vegetation clearing required for the proposed modification will be addressed in the project Biodiversity Offset Strategy required by safeguard / management measure B21.

6.2 Noise and vibration

6.2.1 Methodology

The proposed modification would not result in any substantive changes to noise, and vibration as set out in section 6.1 of the project REF. Further construction noise assessment has, however, been carried out to address potential impacts associated with the additional compound site and trenching for the new NBN conduit outside the approved project boundary.

Construction noise has been assessed in accordance with the Construction Noise and Vibration Guideline (Transport for NSW, 2024) and associated Construction and Maintenance Noise Estimator tool.

For the additional compound, the ‘distance-based construction scenario’ worksheet was used with the ‘compound operation’ scenario and developed settlements (urban and suburban) landscape type selected. A line of sight between noise source and receiver was assumed.

For the NBN works along Anzac Road, the ‘distance based noisiest plant’ worksheet (assuming use of a small excavator for most works) was used with the developed settlements (urban and suburban) landscape type selected and a line of sight between noise source and receiver was assumed. A hammer attachment may be used but was not assumed in the assessment as it would only be used to break up asphalt and rather than concrete or rock.

Noise management levels (NMLs) were established for the proposed modification locations using the Rating Background Level (RBL) for the R3 representative environment defined in the noise estimator. This level best reflects the location of these sites near the M5 Motorway, Moorebank Avenue and the Moorebank Intermodal Precinct.

6.2.2 Existing environment

The existing environment relevant to noise and vibration is consistent with Section 6.2.2 of the project REF.

The nearest residential receivers to the proposed additional compound are new high rise residential buildings at a distance of about 170 metres. There is a line of sight to these receivers.

The nearest residential receivers to the NBN works are in Moorebank along Delfin Drive and the associated local road network at a distance of about 150 metres. Many of the nearest receivers are screened by nearby industrial buildings.

The following representative noise environments and noise management levels from the Transport for NSW Construction and Maintenance Noise Estimator have been adopted as provided in Table 6-1.

Table 6-1: Noise management levels – residential receivers

Period	RBL (dBA)	NML
Standard hours: 7am-6pm, Monday to Friday, 8am-1pm Saturday	50	60
Out of hours day: 7am-8am and 1pm-6pm Saturday	50	55
Out of hours evening: 6pm-10pm Monday to Sunday	45	50
Out of hours night: 10pm-7am Sunday to Friday, 10pm-8am Saturday	40	45

6.2.3 Potential impacts

The results of the construction noise assessment for residential receivers are provided in Table 6-2 to Table 6-4, and in Figure 6-2 to Figure 6-4.

The actual noise impact would depend on several factors such as the specific location of the trenching work, equipment, duration, shielding (which has not been assumed in calculations), distance from equipment to receiver, etc.

Construction noise – additional compound operation

For additional compound operation, the assessment shows that residential receivers are unlikely to be affected during standard hours. During night-time operation receivers in Casula on the western side of the Georges River could experience clearly audible construction noise. While within the affected distance (460 metre) noise contour, it is unlikely that receivers in Moorebank, east of Moorebank Avenue, would experience construction noise due to shielding from industrial buildings.

Table 6-2: Construction noise – additional compound - residential receivers (standard hours)

Noise impact extent (developed urban settlements)	Distance
Affected distance	130m (residential receivers unlikely to be affected)
Noticeable (5 -10 dBA > background)	-
Clearly audible (10-20 dBA > background)	-
Moderately intrusive (20-30 dBA > background)	40m (residential receivers unlikely to be affected)

Highly intrusive (>30 dBA > background)	25m (residential receivers unlikely to be affected)
Highly noise affected (> 75 dBA > background)	25m (residential receivers unlikely to be affected)

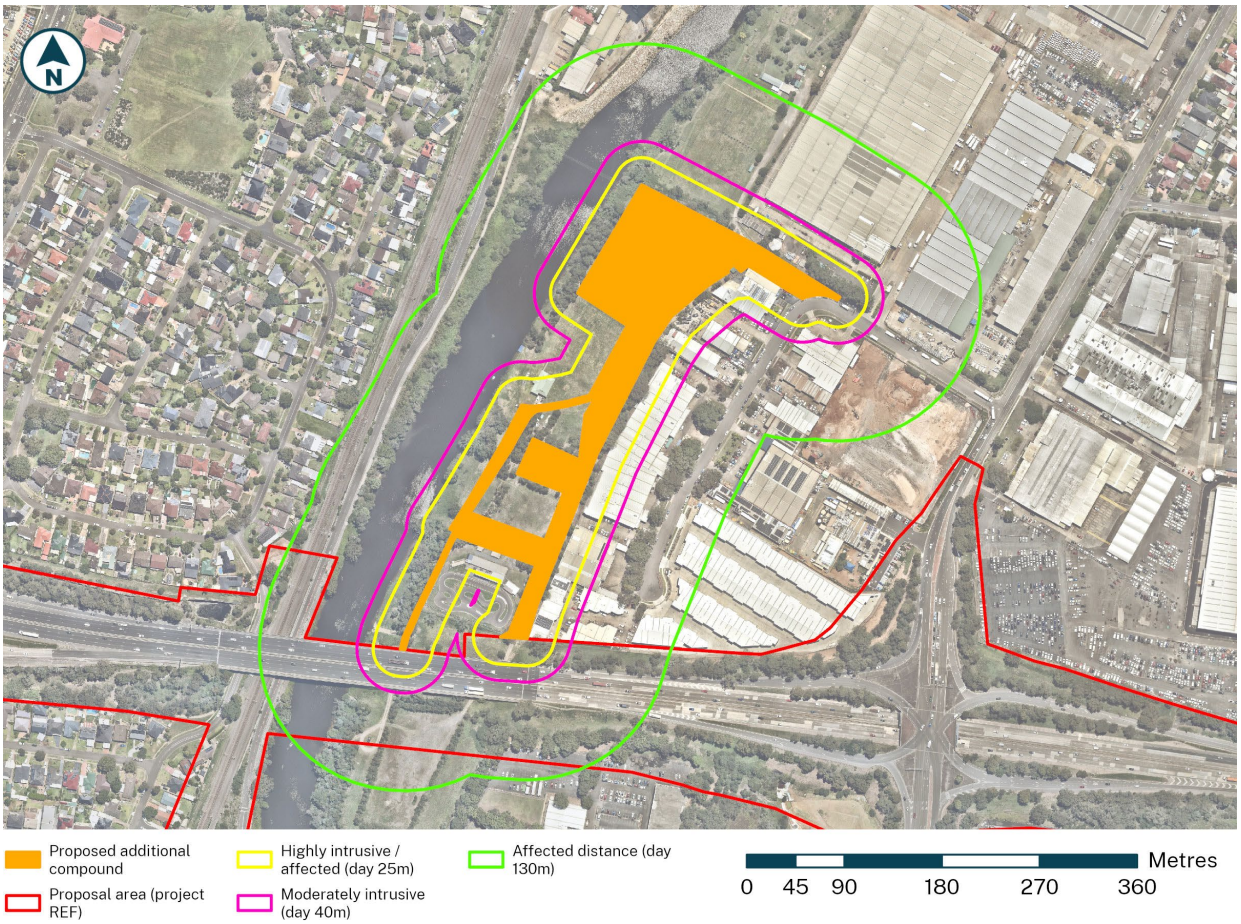

Figure 6-2: Construction noise – additional compound - residential receivers (standard hours)

Table 6-3: Construction noise – additional compound - residential receivers (night)

Noise impact extent Developed urban settlements	Distance
Affected distance	460m (residential receivers in Casula)
Noticeable (5 -10 dBA > background)	460m (residential receivers in Casula)
Clearly audible (10-20 dBA > background)	305m (residential receivers in Casula)
Moderately intrusive (20-30 dBA > background)	130m (residential receivers unlikely to be affected)
Highly intrusive (>30 dBA > background)	40m (residential receivers unlikely to be affected)
Highly noise affected (> 75 dBA > background)	25m (residential receivers unlikely to be affected)

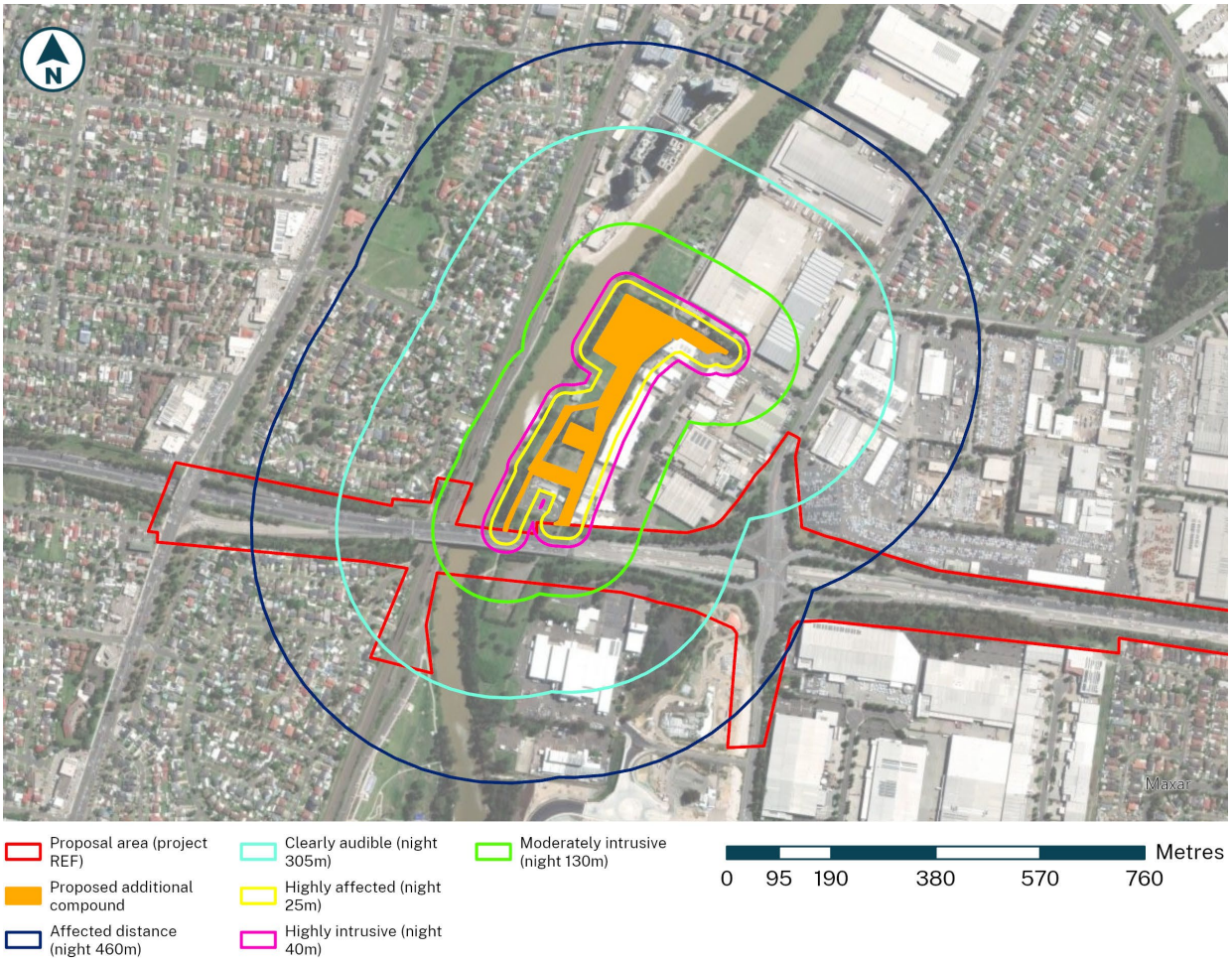

Figure 6-3: Construction noise – additional compound - residential receivers (night)

Non-residential receivers could also experience noise above noise management levels:

- Within 75 metres for active recreation (affecting the nearby archery club and raceway)
- Within 25 metres for industrial premises (potentially affecting adjacent industrial premises on Helles Avenue).

Construction noise – NBN works

For NBN conduit works, the assessment shows that residential receivers are unlikely to be affected by construction noise above management levels during the night (and therefore also during standard hours). Non-residential receivers are not expected to experience noise above noise management levels for these works.

Table 6-4: Construction noise –NBN works - residential receivers (night)

Noise impact extent Developed urban settlements	Distance
Affected distance	145m (residential receivers unlikely to be affected)
Noticeable (5-10 dBA > background)	145m (residential receivers unlikely to be affected)
Clearly audible (10-20 dBA > background)	95m (residential receivers unlikely to be affected)

Noise impact extent Developed urban settlements	Distance
Moderately intrusive (20-30 dBA > background)	35m (residential receivers unlikely to be affected)
Highly intrusive (>30 dBA > background)	15m (residential receivers unlikely to be affected)
Highly noise affected (> 75 dBA > background)	10m (residential receivers unlikely to be affected)

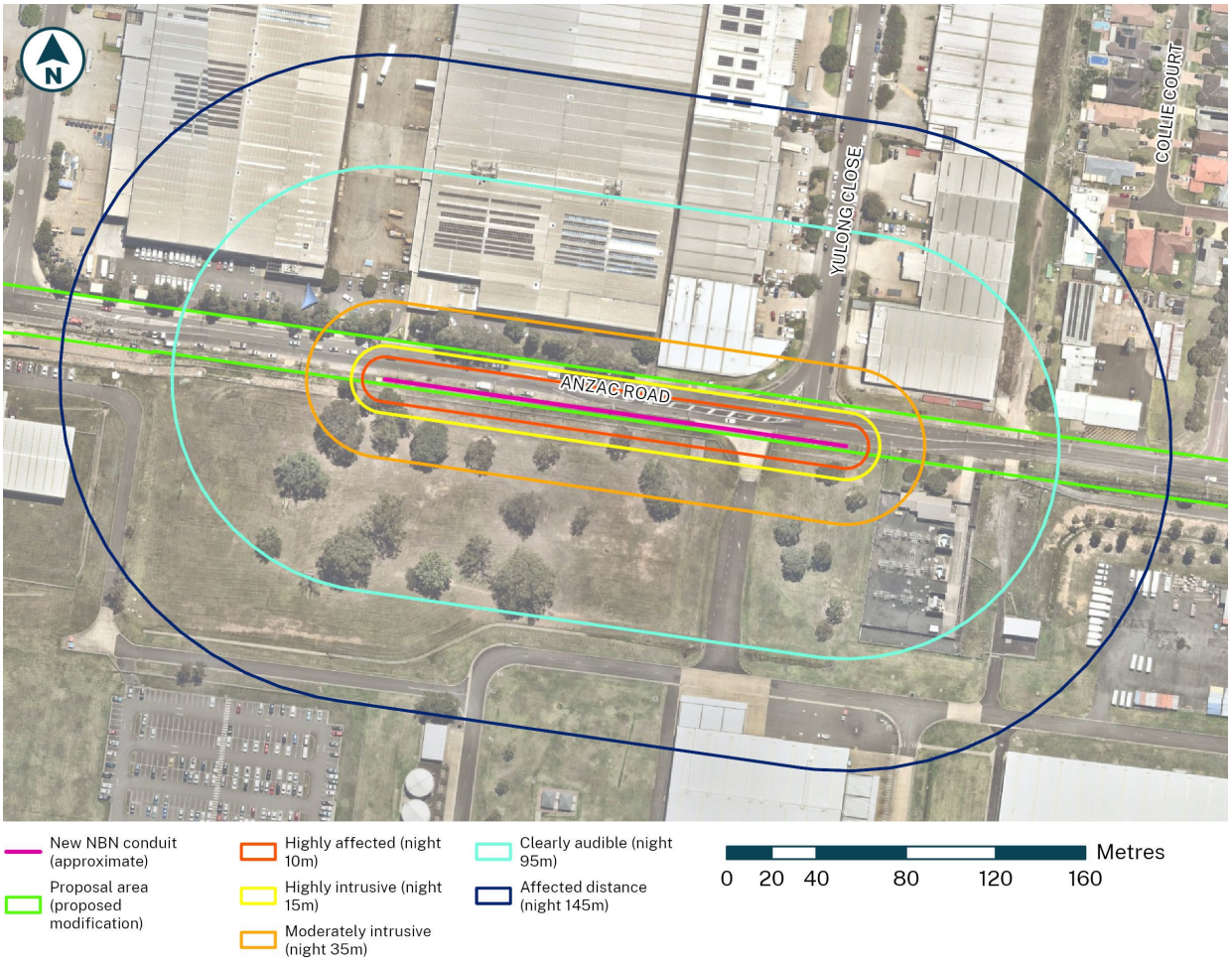

Figure 6-4: Construction noise –NBN works - residential receivers (night)

Construction traffic

When construction related traffic moves onto the public road network, vehicle movements are regarded as additional road traffic and are assessed under the Road Noise Policy (Department of Environment, Climate Change and Water, 2011). An initial screening test is applied by evaluating if noise levels would increase by more than 2 dB (an increase in the number of vehicles of about 60 per cent) due to construction traffic or a temporary detour due to a road closure.

For the additional compound, overall construction traffic generation would not substantially change but more traffic would use Helles Avenue. This area supports only industrial land uses with no residential receivers.

The proposed use of Woodbrook Avenue for light construction vehicles would see up to 50 light vehicles using this route per day. This is a negligible incremental impact noting use of other local roads in Casula during construction (such as Lakewood Crescent) was identified and assessed in the project REF.

There would be a very small increase in construction traffic on Anzac Road associated with the new NBN conduit. This would not result in a traffic noise increase of more than 2 dB.

Vibration

The minimum working distances from sensitive receivers for typical items of vibration intensive plant provided in Section 6.1 of the Construction Noise and Vibration Guideline (Transport for NSW, 2024) can be complied with. Exceedance of cosmetic damage (refer British Standard 7385) and human comfort (refer Assessing Vibration: a technical guideline (EPA 2006)) is therefore unlikely for the elements of the proposed modification.

Operation

The proposed modification would not alter traffic volumes, change the traffic mix or change the road geometry so as to bring traffic closer to receivers. Operational road traffic noise traffic noise impacts are therefore expected to be consistent with those described in the project REF and the submissions report.

6.2.4 Safeguards and management measures

Safeguards NV1 through NV12 as documented in the submissions report will apply to the project including the proposed modification. No additional safeguards are proposed.

6.3 Aboriginal heritage

6.3.1 Methodology

The assessment of Aboriginal heritage involved:

- A review of the M5 Motorway Westbound Traffic Upgrade, Moorebank Aboriginal and Non-Aboriginal Heritage Impact Assessment (Appendix I to the project REF) in the context of the proposed modification
- An updated Aboriginal Heritage Information Management System (AHIMS) search conducted 4 June 2025
- Further site investigations by Navin Officer Heritage Consultants Pty Ltd and preparation of a Stage 2 Addendum report (refer to Appendix D) in accordance with Transport's Procedure for Aboriginal Cultural Heritage Consultation and Investigation.

6.3.2 Existing environment

Most parts of the proposed modification are on areas that have been extensively disturbed. The additional compound and the proposed extension to the existing (southern compound) are on a former landfill site and therefore archaeological potential is low. The PACHCI Stage 2 Addendum found that due to this level of disturbance in this area any heritage items will have been destroyed. It also noted that a gravel cap will be placed at the compound area to ensure that impacts to the fill are avoided.

The NBN works site is within the Anzac Road formation and has also been extensive distributed by road construction and underground utilities.

A small area of the Georges River riparian zone, near the boat ramp, has been subject to less disturbance. This area categorised as follows in the PACHCI Stage 2 Addendum (refer specifically to Figure 3-8 in the addendum):

- No disturbance area – the riverbank south of the boat ramp which represents the natural bank of the Georges River with mature trees and deep undisturbed sediment with heritage potential. The proposed modification boundary avoids the no disturbance area south of the boat ramp.
- Caution area – part of the riverbank which is immediately north of the no disturbance area. Implementation of an unexpected finds protocol has been recommended for this area.

The updated AHIMS search returned 10 sites within the locality, none of which are likely to be affected by the proposed modification. The nearest site is on the western side of the Georges River near Woodbrook Road (45-5-4281, potential archaeological deposit).

6.3.3 Potential impacts

The proposed modification would occur primarily in areas that have been subject to extensive ground disturbance (former landfill site and Anzac Road corridor) and are therefore likely to have low archaeological potential. Further, the additional and extended compound areas would be capped with hardstand material and would involve minimal ground disturbance.

Less disturbance has occurred within the Georges River riparian zone and the proposed modification boundary has been amended to exclude areas of higher archaeological potential.

The proposed modification includes the use of Woodbrook Road by light construction vehicles. While Woodbrook Road is located near 45-5-4281, there would be no excavation of the road formation associated with this change. Existing safeguard AH5 requires site 45-5-4281 to be protected through the installation of temporary fencing.

6.3.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	The no disturbance and caution areas identified in the PACHCI Stage 2 Addendum will be identified on site drawings and covered during site inductions.	Construction Contractor	Construction	Additional safeguards

6.4 Other impacts

6.4.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Traffic and transport	Refer to Section 6.2.2 of the project REF. Local roads in Casula (Holston Street, Phoenix Crescent, St Andrews Boulevard, Lakewood Crescent, Woodbrook Road) all carry low traffic volumes. Traffic on Powerhouse Road is influenced by events and activities at the Liverpool Powerhouse. Anzac Road is an east-west local road that connects Moorebank Avenue and Heathcote Road. It provides access to Moorebank Business Park and the residential area of Wattle Grove. Anzac Road is generally a two-lane undivided road that is managed by Liverpool City Council.	The proposed modification would result in more construction traffic accessing compound areas from Moorebank Avenue and Helles Road. This would be managed through the Traffic Management Plan required by safeguard TT1. The proposed use of Woodbrook Avenue for light construction vehicles would see up to 50 light vehicles using this route per day. This is a negligible incremental impact noting use of other local roads in Casula (such as Lakewood Crescent) during construction was identified in the project REF. This change would improve access for local traffic to the Liverpool Powerhouse in circumstances where Powerhouse Road, north of Woodbrook Crescent is temporarily closed. The proposed NBN conduit installation along Anzac Road may require traffic control and this could result in short delays for road users. This work may be done at night to minimise impacts to traffic.
Hydrology and flooding	Refer to Section 6.3.2 of the project REF.	No additional impacts. Existing safeguards are adequate.
Surface water and groundwater	Refer to Section 6.4.2 of the project REF.	No additional impacts. Existing safeguards are adequate.
Soils and contamination	Refer to Section 6.5.2 of the project REF.	No additional impacts. No excavation within the former landfill site is proposed. Existing safeguards are adequate.
Non-Aboriginal heritage	Refer to Section 6.8.2 of the project REF.	No additional impacts. No modifications to the locally significant railway viaduct over Woodbrook Road are proposed. Existing safeguards are adequate.

Environmental factor	Existing environment	Potential impacts
Landscape character and visual impacts	Refer to Section 6.9.2 of the project REF.	The additional and extended compounds are located within landscape character zones (LCZ) 4 (moderate sensitivity) while the NBN conduit works are located in LCZ 7 (low sensitivity). Impacts on landscape character in LCZ 4 associated with the proposed modification (compound uses and tree removal) would be consistent with the Low-Moderate rating provided in the project REF, with most of the impact limited to the construction phase. Impacts on landscape character in LCZ 7 (temporary trenching) would be consistent with the low impact rating included in the project REF. Assessed viewpoints in the project REF most likely to be affected by the proposed modification would be viewpoints 1-4 on the western side of the Georges River looking north east. Impacts on these viewpoints associated with the proposed modification would not alter the impact ratings in the project REF (V1 – moderate; V2 – negligible; V3 – moderate-high, V4 – negligible). Some screening of the additional and extended compounds is provided by vegetation within the Georges River riparian zone. Visual impacts associated with the trenching on Anzac Road would be minor and temporary.
Socio-economic, property and land use	Refer to Section 6.10.2 of the project REF.	No additional impacts. Existing safeguards would apply to the proposed modification. Existing safeguard SC4, which requires consultation with John Grant International Raceway, Liverpool City Council (Casula Parklands) and the Barefoot Water Ski Club, has been amended to also reference the Liverpool City Archers.
Air quality	Refer to Section 6.11.1 of the project REF.	No additional impacts. Existing safeguards are adequate.
Waste and resource use	Refer to Section 6.11.1 of the project REF.	No additional impacts. Existing safeguards are adequate.

6.4.2 Safeguards and management measures

No additional safeguards are required. Existing safeguard SC4 has been amended to also reference the Liverpool City Archers (refer to Section 7.2).

6.5 Cumulative impacts

6.5.1 Potential impacts

Cumulative impacts associated with the proposed modification are not expected given the limited scope of the changes and the minimal incremental impacts identified.

Minimising impacts of the proposed modification is the best way to address any potential cumulative effects. Various measures have been proposed as part of the approved project to address impacts and an additional measure has been identified in this addendum REF to address potential Aboriginal heritage impacts.

6.5.2 Safeguards and management measures

Various measures have been proposed as part of the approved project to address impacts (refer to Table 7-1). This includes measures C1 and C2, which are specifically directed towards addressing any cumulative impacts associated with other developments in the area.

7. Environmental management

7.1 Environmental management plans

A number of safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these management measures would be addressed if required during detailed design and incorporated into the Project Environmental Management Plan (PEMP) and Construction Environmental Management Plan (CEMP) and applied during the construction and operation of the proposed modification.

7.2 Summary of environmental safeguards and management measures

Environmental safeguards and management measures for the project are summarised in Table 7-1. Additional safeguards and management measures identified in this addendum REF are included in bold and italicised font. The safeguards and management measures will be incorporated into the CEMP and the PEMP and be implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
GEN1	General – minimise environmental impacts during construction	A Project Environmental Management Plan (PEMP) would be prepared to outline and describe the key environmental issues associated with the proposal. The PEMP would be the overarching document in the environmental management system for the proposal that includes a number of management documents. It is applicable to all staff and contractors associated with the development, design and construction of the proposal. The PEMP would be prepared and implemented with the Environmental Management System (EMS) which has been prepared in accordance ISO14001:2016.	Construction Contractor	Pre-construction / Detailed design	Core standard safeguard
GEN2	General – minimise environmental impacts during construction	A CEMP would be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. As a minimum, the CEMP would address the following: • Any requirements associated with statutory approvals • Details of how the proposal would implement the identified safeguards outlined in the REF • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action • Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. The endorsed CEMP would be implemented during the undertaking of the activity.	Construction Contractor	Pre-construction / Detailed design	Core standard safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
GEN3	General – notification	All businesses, residential properties and other key stakeholders (e.g., schools, local councils) affected by the activity would be notified at least five days prior to commencement of the activity.	Construction Contractor / Transport for NSW	Pre-construction	Core standard safeguard
GEN4	General – environmental awareness	All personnel working on site would receive training to ensure awareness of environment protection requirements to be implemented during the proposal. This would include up-front site induction and regular 'toolbox' style briefings. Site-specific training would be provided to personnel engaged in activities or areas of higher risk. These include: • Areas of Aboriginal heritage sensitivity • Threatened species habitat.	Construction Contractor / Transport for NSW	Pre-construction/ Detailed design	Additional safeguard
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • Nearby sensitive receivers • All potential significant noise and vibration generating activities associated with the activity • Description of work, construction equipment and hours the work would be completed • Feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, process and principles* (Transport for NSW, 2014) • Criteria for the proposal and relevant licence and approval conditions • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Details on how respite would be applied where ongoing high impacts are seen at certain receivers • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Construction Contractor	Detailed design / Pre-construction	Section 4.6 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV2	Noise and vibration	All sensitive receivers (e.g., residential properties and schools) likely to be affected by construction noise and vibration would be notified at least seven days prior to the commencement of noise and vibration intensive activities. The notification would provide details of: • The project • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information	Construction Contractor	Detailed design / pre-construction	Additional safeguard
NV3	Construction noise and vibration assessments	Location and activity specific noise and vibration impact assessments would be carried out prior to (as a minimum) activities: • With the potential to result in noise levels above 75 dBA at any receiver • Required outside standard construction hours and likely to result in noise levels greater than the relevant Noise Management Levels • With the potential to exceed relevant criteria for vibration. The assessments would confirm the predicted impacts at the relevant receivers in the vicinity of the activities to aid the selection of appropriate management measures, consistent with the requirements of the CNVG.	Construction Contractor	Pre-construction/ construction	Additional safeguard
NV4	Construction noise exceedances	Where noise intensive equipment is to be used near sensitive receivers, the work would be scheduled during standard construction hours, where possible. If it is not possible to restrict the work to the daytime, then they would be completed as early as possible in each work shift, where possible. Appropriate respite would also be provided to affected receivers in accordance with the CNVG.	Construction Contractor	Construction	Additional safeguard
NV5	Compounds with long term work	Hoarding, or other shielding structures, would be used where receivers are impacted near compounds or fixed work areas with long durations. To provide effective noise mitigation, the barriers would break line-of-sight from the nearest receivers to the work and be of solid construction with minimal gaps.	Construction Contractor	Construction	Additional safeguard
NV6	Monitoring	Monitoring would be carried out at the start of noise and/or vibration intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented.	Construction Contractor	Construction	Additional safeguard
NV7	Construction traffic	The potential impacts from construction traffic would be reviewed at a later stage when more information is available.	Construction Contractor	Pre-construction / Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV8	Vibration work within minimum working distance	Where work is within the minimum working distances and considered likely to exceed the cosmetic damage criteria: • Different construction methods with lower source vibration levels would be investigated and implemented, where feasible • Attended vibration measurements would be carried out at the start of the work to determine actual vibration levels at the item.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
NV9	Vibration work within minimum working distance	The potential human comfort impacts and requirement for vibration intensive work would be reviewed as the proposal progresses.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
NV10	Vibration work within minimum working distance	Building condition surveys would be completed before and after the work where buildings or structures are within the minimum working distances and considered likely to exceed the cosmetic damage criteria during the use of vibration intensive equipment.	Construction Contractor	Pre-construction / Construction	Additional safeguard
NV11	Vibration work around 2-8 Secombe Place, Moorebank	Transport and its Construction Contractor will continue to consult with businesses at 2-8 Secombe Place, Moorebank during detailed design and throughout construction to manage potential impacts to vibration sensitive equipment. Management measures that would be developed in consultation with businesses will include: • Identification of applicable vibration limits for sensitive equipment being operated at these premises • Review potential construction vibration impacts around these premises to confirm whether vibration levels are likely to exceed the applicable vibration limits for sensitive equipment • Where vibration limits are predicted to be exceeded, construction methods would be reviewed and may include the consideration of alternative construction plant and equipment with lower source vibration levels • Attended vibration measurements would be carried out at the start of the work to determine actual vibration levels at these premises. Different construction methods would be considered where possible if the monitoring indicates vibration levels are likely to, or do, exceed the relevant criteria (refer to mitigation measure NV8).	Transport and Construction Contractor	Pre-construction / Construction	Additional safeguard
NV12	Operational traffic noise	A post-construction noise assessment will be carried out within 12 months of opening of the proposal to verify the predicted noise levels, in accordance with Transport's *Road Noise Mitigation Guideline*.	Transport	Operation	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
TT1	Traffic and transport	A Traffic Management Plan (TMP) would be prepared and implemented as part of the CEMP. The TMP would be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP would include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Construction traffic control plans outlining site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network including between Campbelltown and Liverpool LGAs • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms.	Construction Contractor	Detailed design/pre-construction	Section 4.8 of QA G36 Environment Protection
TT2	Construction site access	Construction site access would be designed and implemented in consideration of: • Road design guidelines and turning paths for heavy vehicles • Appropriate sight distances to allow traffic to safely enter and exit • Conspicuous temporary regulatory, warning and guide signs • Use of accredited traffic controllers, where appropriate and/or other controls to separate, slow down or temporarily stop traffic for safe entry/exit • Minimising use of local roads, where practical • Provision of deceleration lanes at accesses next to highly trafficked roads • Minimising the size of heavy vehicles that would use local roads to access construction zones (particularly at Area 5).	Construction Contractor	Detailed design/ construction	Additional safeguard
TT3	Traffic impacts	Consultation would be carried out with the NSW Barefoot Water Ski Club to confirm temporary closures of the Georges River during construction.	Transport for NSW / Construction Contractor	Pre-construction / construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
TT4	Traffic impacts	For construction area 6, during stage 2 work further traffic assessment would be carried out during detailed design (if required) following confirmation of the construction methodology and traffic staging to confirm the potential for traffic impacts and identify whether any additional mitigation measures or traffic control measures would be required.	Construction Contractor	Detailed design	Additional safeguard
TT5	Impact on rail operations	If any potential impact on rail operations is identified, Transport for NSW would consult with Sydney Trains and ARTC, as required, and obtain any necessary permits or licences.	Transport for NSW / Construction Contractor	Pre-construction	Additional safeguard
TT6	Impact on bus stops or routes	If any potential direct impacts on bus stops or routes are identified, Transport for NSW would consult with the relevant bus operator (Interline Bus Services or Transdev) to identify alternate arrangements.	Transport for NSW / Construction Contractor	Pre-construction	Additional safeguard
TT7	Damage to local roads	A Road Dilapidation Report would be prepared by a suitably qualified person for local roads proposed to be used by heavy vehicles, before the commencement of use of the roads during construction. Any damage to the local road network identified to be caused by construction vehicles for the proposal would be remediated / rectified by the Construction Contractor to be similar to the existing road condition or compensation would be paid to the relevant road authority.	Construction Contractor	Pre-construction / Construction	Additional safeguard
TT8	Impacts on cycling	Community consultation would be carried out to understand the travel patterns of cyclists and inform the cyclists of any alternate access arrangements.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
TT9	Temporary access changes	Detours during temporary access changes would be implemented with directional signage along alternate routes. Signage along the M5 Motorway and the associated on-ramps would be provided to advise pedestrians and cyclists of any path closures.	Construction Contractor	Construction	Additional safeguard
TT10	Traffic management measures	Any temporary traffic diversions, clearways and road closures would be implemented in accordance with Transport Management Centre (TMC) requirements.	Construction Contractor	Construction	Additional safeguard
TT11	Property access	Property access would be maintained where feasible and reasonable and property owners (including ABB Australia) would be consulted before starting any work that may temporarily restrict or control access.	Construction Contractor	Construction	Additional safeguard
T12	Local road or shared path closures	Liverpool City Council would be consulted prior to any local road or shared path closures to identify suitable mitigation measures such as detour routes.	Construction Contractor	Construction	Additional safeguard
TT13	Parking	Off-road parking for construction vehicles would be provided within the ancillary facility and construction areas.	Construction Contractor	Parking	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
TT14	Cumulative traffic impacts	Transport for NSW and the Construction Contractor would coordinate with the project team for nearby road projects (including the Moorebank Avenue Realignment) and the Transport Management Centre with regard to the proposed timing of any road and lane closures and identify alternate routes or additional safeguards and management measures, as required.	Transport for NSW / Construction Contractor	Cumulative traffic impacts	Additional safeguard
F1	Flooding	A building floor level survey would be conducted for properties around Woodbrook Road impacted by up to 20 millimetre increase in flood level peak to allow a more detailed assessment during detailed design. This additional assessment will consider Council's maximum permissible increase in flood level to private properties of 10 millimetres. Council, and any impacted landowner, will continue to be consulted about the proposal's flooding impact during detailed design.	Transport for NSW	Detailed design	Additional safeguard
F2	Flooding	A survey of a limited section of the Powerhouse Road and rail corridor (where the precited flood overtopping in one per cent AEP design event occurs) would be conducted during detailed design. This would allow more detailed assessment of the flooding impacts in these areas.	Transport for NSW	Detailed design	Additional Safeguard
F3	Flooding	A flood warning and evacuation plan would be developed as part of the Construction Environmental Management Plan. This would include details on the prediction of floods of five per cent AEP or greater severity and provide safeguards to allow the safe evacuation of personnel during flood events.	Construction Contractor	Pre-construction / Construction	Additional safeguard
F4	Flooding	Facilities used by personnel during working hours such as semi-permanent offices may be positioned ~~outside~~ inside the five per cent AEP flood extent, with appropriate mitigation measures applied, dependent on the Detailed Design.	Construction Contractor	Pre-construction / Construction	Additional safeguard
F5	Flooding	During flood events, the barge used for bridge construction would be moved to a safer location along the river.	Contractor	Construction	Additional safeguard
W1	Soil erosion and water pollution	A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP. The SWMP would identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks would be addressed during construction.	Construction Contractor	Detailed design / pre-construction	Section 2.1 of QA G38 Soil and Water Management
W2	Soil erosion and water pollution	A site-specific Erosion and Sediment Control Plan/s would be prepared and implemented as part of the Soil and Water Management Plan. The Plan would include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Construction Contractor	Detailed design / Pre-construction	Section 2.1 of QA G38 Soil and Water Management
W3	Accidental spill	A site-specific emergency spill plan would be developed and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Construction Contractor	Detailed design / Pre-construction	Standard safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
W4	Soil erosion and water pollution	An assessment of the requirement for a temporary construction sediment basin would be conducted to inform the ESCP as part of the SWMP and CEMP. Investigation of alternative erosion and sedimentation control measures would be carried out in the event that spatial constraints restrict the implementation of basins.	Construction Contractor	Detailed design	Additional safeguard
W5	Construction water quality assessment	A construction water quality monitoring plan would be prepared and implemented as part of the SWMP. The plan would be prepared in accordance with the Transport for NSW *Guideline for Construction Water Quality* and EPA publication *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.*	Construction Contractor	Construction	Additional safeguard
W6	Construction within the waterway	Control measures and mitigation measures that relate to working within the waterways would be outlined in the SWMP and in particular an Environmental Work Method Statement (EWMS) would be completed. This includes measures to reduce potential for spills into the river. Construction work should take into consideration the *Guidelines for instream works on waterfront land* (DPI, 2012). Instream erosion and sedimentation controls would be considered in line with *Code of Practice – Minor work in NSW waterways* (RMS, 2014) to keep sedimentation within the work area. Water quality monitoring to be conducted during construction would include visual monitoring and monitoring of turbidity.	Construction Contractor	Detailed design / pre-construction / construction	Additional safeguard
W7	Piling work of the bridge footings and excavation work to impact groundwater flow patterns	A Groundwater Management Plan (GMP) would be prepared to outline measures for interaction, dewatering and treatment of groundwater. The piling methodology should be chosen to reduce groundwater interface with groundwater flow. Piling activities should be closely monitored to ensure that contamination through leaks, spills or ambient groundwater does not accumulate within pile borings resulting in point source pollution with the potential to impact Groundwater Dependent Ecosystems (GDEs). Monitoring may include regular inspections of pile borings to monitor for any light non-aqueous phase liquids (LNAPL), oils, staining, or odours. Groundwater monitoring would be carried out. Groundwater impacts as a result of piling would be included in the GMP.	Construction Contractor	Detailed design / pre-construction	Additional safeguard
W8	Discharges	The discharges from any sediment basins would be assessed in line with the Guideline for Assessing the Impacts of Treated Water Discharge from Water Quality Treatment Controls (Transport for NSW, 2020). The results of such assessment would inform design of sediment basins to adhere to EPL discharge requirements.	Construction Contractor	Detailed design / pre-construction	Additional safeguard
W9	Construction across waterways leading to erosion or disturbance of the bed and banks	NSW DPE-Water Guidelines for watercourse crossings on waterfront land and NSW DPE-Water Guidelines for instream works on waterfront land guidelines would be adhered to for constructions across the Georges River.	Construction Contractor	Enabling work – Earthworks – Construction	Additional safeguard
W10	Flooding of ancillary facilities	Ancillary facilities would be designed to accommodate ~~local~~ relevant flood risk.	Construction Contractor	Detailed design / Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
W11	Disturbance of historical legacy contamination leading to water pollution	A contamination management plan would be prepared prior to the commencement of construction and implemented during construction by the Construction Contractor. Measures would be put in place to monitor the risk of contaminated water within the landfill site escaping into the underlying aquifer.	Construction Contractor	Detailed design / Pre-construction	Additional safeguard
W12	Aquifer interference from bridge footings	Design should consider impacts to groundwater during operation and piles be chosen to have the least amount of impact as possible on the aquifer.	Transport for NSW	Detailed design / Pre-construction	Additional safeguard
W13	Discharge associated with wet weather stormflows leading to water pollution	Design suitable stormwater infrastructure including pipes, culverts, pits, grass swales and appropriately sized water quality basin (sediment basin) to manage stormwater runoff from the site during operation and reduce loads of suspended solids entering waterways.	Transport for NSW	Detailed design / Pre-construction	Additional safeguard
CL1	Contaminated land	A Contaminated Land Management Plan would be prepared in accordance with the Guideline for the Management of Contamination (Transport for NSW, 2013) and implemented as part of the CEMP. The plan would include, but not be limited to: • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Further investigations required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • Management of the remediation and subsequent validation of the contaminated land, including any certification required • Measures to ensure the safety of site personnel and local communities during construction.	Construction Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
CL2	Contaminated land	An Unexpected Find Protocol (UFP) would be prepared and implemented to manage the potential for soil or water quality contamination during construction of the proposal. If contaminated areas are encountered during construction, appropriate control measures would be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area would cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Environment Manager and/or EPA.	Construction Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
CL3	Accidental spill	A site specific emergency spill plan would be developed and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport for NSW and EPA officers).	Construction Contractor	Detailed design / Pre-construction	Section 4.3 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
CL4	Gas monitoring	An Environmental Management Plan (EMP) would be prepared to manage the risks from methane and CO_2 during construction. The EMP would form a part of the overall Construction and Environmental Management Plan and focus on potential risks from the identified methane and carbon dioxide. The EMP would be reviewed by Transport for NSW to ensure it is adequate to address the potential risks. Active removal of methane and carbon dioxide could be considered prior to commencing construction activities. Demountable designs would consider the presence of these gases.	Construction Contractor	Pre-construction / construction	Additional safeguard
CL5	Contaminated land	If not already remediated by Council, ACM identified in the southern portion of Helles Park would be remediated prior to establishing the ancillary facilities on this property.	Construction Contractor	Pre-construction	Additional safeguard
CL6	Ancillary facility	The design of temporary offices would consider the presence of LFG in the southern portion of Helles Park if it is not addressed prior to establishing the site offices. In accordance with Appendix 5 of the NSW EPA's Assessment and Management of Hazardous Ground Gases: Contaminated Land Guidelines 2020, (NSW EPA, 2020), these design measures may include an installation of a gas membrane, allowing passive ventilation below the temporary offices, installation of active ventilation below the buildings, application of a positive pressure in the structures and / or internal gas monitoring. The exact mitigation approaches would be further evaluated when the nature and design of the ancillary facilities is finalised.	Construction Contractor	Pre-construction	Additional safeguard
CL7	Contaminated land	The EPA would be notified in writing at least two days before work commences that would exhume waste from a landfill site or former landfill site (located on the eastern side of the Georges River), in accordance with the requirements of Clause 110A of the Protection of the Environment Operations (Waste) Regulation 2014.	Transport for NSW / Construction Contractor	Pre-construction / construction	Additional safeguard
CL8	Contaminated land	If the Helles Park former landfill site were to become an EPA regulated site, work at the site would need to adhere to the sites Voluntary Management Proposal (VMP) as developed by the responsible party.	Construction Contractor	Construction	Additional safeguard
CL9	Contaminated land	Additional sampling would be carried out in the proposal area prior to construction to further characterise wastes likely to be encountered on site and the potential hazards and risks associated with handling and disposing of these materials.	Construction Contractor	Pre-construction / construction	Additional safeguard
CL10	Acid Sulfate Soils	An Acid Sulfate Soils Management Plan (ASSMP) would be prepared with reference to "*Guidelines for the Management of Acid Sulphate Materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze*" (RTA, 2005).	Construction Contractor	Pre-construction / construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B1	Biodiversity	A Flora and Fauna Management Plan would be prepared in accordance with Transport for NSW 's *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA, 2011) and implemented as part of the CEMP. It would include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Requirements set out in the Landscape Guideline (RTA, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) • Protocols to manage weeds and pathogens.	Construction Contractor	Detailed design / Pre-construction	Section 4.8 of QA *G36 Environment Protection*
B2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal would be investigated during detailed design and implemented where practicable and feasible.	Construction Contractor	Detailed design / Pre-construction	Additional safeguard
B3	Removal of native vegetation and habitat	Opportunities to further minimise native vegetation and threatened species habitat removal would be considered during detailed design.	Transport for NSW	Detailed design	Additional safeguard
B4	Removal of native vegetation and habitat	Pre-clearing surveys would be carried out in accordance with Guide 1: Pre-clearing process of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Pre-construction	Additional safeguard
B5	Removal of native vegetation and habitat	Vegetation and habitat 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).	Construction Contractor	Construction	Additional safeguard
B6	Removal of native vegetation	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).	Construction Contractor	Construction	Additional safeguard
B7	Removal of native vegetation	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 or species, not assessed in the biodiversity assessment, are identified in the proposal site.	Construction Contractor	Construction	Additional safeguard
B8	Removal of threatened species habitat and habitat features	Targeted surveys would be carried out prior to construction for microbat species considered likely to occur within the study area. It is recommended these be carried out during the warmer nights (October to February). If species are found to occur, appropriate measures to minimise impacts would be developed. Including preparing a microbat management plan and incorporated into construction management plans.	Transport for NSW	Pre-construction	Additional safeguard
B9	Removal of threatened species habitat and habitat features	Habitat would be replaced or re-instated in accordance with *Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B10	Aquatic impacts	Aquatic habitat would be protected in accordance with *Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW) 2013).	Construction Contractor	Construction	Additional safeguard
B11	GDE	Interruptions to water flows associated with groundwater dependent ecosystems would be minimised through detailed design.	Transport for NSW	Detailed design	Additional safeguard
B12	Changes to hydrology	Changes to existing surface water flows would be minimised through detailed design.	Transport for NSW	Detailed design	Additional safeguard
B13	Edge effects on adjacent native vegetation and habitat	Exclusion zones would be set up at the limit of clearing in accordance with *Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Additional safeguard
B14	Injury and mortality of fauna	Fauna would be managed in accordance with *Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Additional safeguard
B15	Invasion and spread of weeds	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).	Construction Contractor	Construction	Additional safeguard
B16	Invasions and spread of pests	Pest species would be managed within the proposal site.	Construction Contractor	Construction	Additional safeguard
B17	Invasion and spread of pathogens and disease	Pathogens would be managed in accordance with *Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).	Construction Contractor	Construction	Additional safeguard
B18	Noise, light and vibration	Opportunities to reduce shading and artificial light impacts would be considered during detailed design. Microbat survey at the bridge location would identify if further vibration mitigation measures are required at specific locations of the bridge.	Transport for NSW	Detailed design	Additional safeguard
B19	Biodiversity offsets	Transport will offset the biodiversity impacts of the proposal, including impacts to Biobanking Agreement No. 341, in accordance with: • Transport's No Net Loss Guidelines (Transport for NSW, 2022) • Transport's obligations under the NSW Biodiversity Conservation Act 2016 (BC Act), including as part of its application for consent from the NSW Minister for Environment to carry out the proposal on land subject to Biobanking Agreement No. 341 under Section 5.16 of the BC Act. Transport will continue to consult with the owner of the land subject to Biobanking Agreement No. 341 and the proponent of Moorebank Precinct West Stage 2 (SSD 7709) regarding the proposal's impact on this site, any variations required to be made to the biodiversity stewardship agreement, any administrative modifications that may be required to the Moorebank Precinct West Stage 2 Consent (SSD7709) and the timing of any such variations / modifications.	Transport for NSW	Detailed design/construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B20	Impact to Biobanking Agreement No. 341	Transport for NSW would comply with the following requirements before commencing work on the biodiversity stewardship site in accordance with its obligations under the BC Act: • Provide written notice of the proposed development to the NSW Minister for Environment and the owner of the biodiversity stewardship site (Commonwealth of Australia – Department of Infrastructure, Regional Development and Cities) • Receive consent from the NSW Minister for Environment prior to commencing work on the biodiversity stewardship site • Comply with any conditions of consent that may be imposed by the NSW Minister for Environment, including as part of any variation to the biodiversity stewardship agreement (Biobanking Agreement No. 341).	Transport for NSW	Detailed design/-construction	Additional safeguard
B21	Biodiversity offsets	A Biodiversity Offset Strategy would be prepared to: • Confirm which offsetting thresholds have been exceeded based on the final clearing boundary. • Calculate the offset and/or conservation requirement in accordance with these guidelines. • Establish what feasible and reasonable steps can be taken to meet this requirement including timing and delivery partners.	Contractor	Detailed design/pre-construction	Additional safeguard
AH1	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) would be prepared in accordance with the *Procedure for Aboriginal cultural heritage consultation and investigation* (Roads and Maritime, 2012) and *Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) and implemented as part of the CEMP. It would provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP would be prepared in consultation with all relevant Aboriginal groups.	Construction Contractor	Detailed design/pre-construction	Section 4.9 of QA *G36 Environment Protection*
AH2	Aboriginal heritage	*The Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) would be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work would only re-commence once the requirements of that Procedure have been satisfied.	Construction Contractor	Detailed design / pre-construction	Section 4.9 of QA *G36 Environment Protection*
AH3	Aboriginal heritage	In the event of the discovery of Aboriginal objects, Heritage NSW should be notified in accordance with section 89(A) of the NPW Act.	Construction Contractor	Construction	Additional safeguards
AH4	Aboriginal heritage	If suspected Aboriginal object(s) outside the boundary of the destroyed Aboriginal site MA PAD1 (MA9) (AHIMS #45-5-4280) are encountered during the proposed works, any further excavation or ground disturbance in the area should cease and the find(s) managed in accordance with the Roads & Maritime Services' *Unexpected Heritage Items Procedure.*	Construction Contractor	Construction	Additional safeguards
AH5	Aboriginal heritage	AHIMS site #45-5-4281 should be protected through the installation of temporary fencing. The location of the site should be identified in the CEMP for the proposal.	Construction Contractor	Construction	Additional safeguards

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
AH6	*Aboriginal heritage*	*The no disturbance and caution areas identified in the PACHCI Stage 2 Addendum will be identified on site drawings and covered during site inductions.*	Construction Contractor	*Construction*	*Additional safeguards*
NH1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared and implemented as part of the CEMP. It would provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage.	Construction Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*
NH2	Non-Aboriginal heritage	*The Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work would only re-commence once the requirements of that Procedure have been satisfied.	Construction Contractor	Detailed design/pre-construction	Section 4.10 of QA *G36 Environment Protection*
NH3	Non-Aboriginal heritage	Temporary fencing should be installed in front of the "Yulong" playing field entrance gates for the duration of the work to protect the physical curtilage and prevent accidental impacts from vehicles of mobile plant.	Construction Contractor	Construction	Additional safeguard
NH4	Non-Aboriginal heritage	Ground disturbance work would not commence in the area associated with former earthworks (training of practice trenches) until an Exception Notification under section 139(4) of the *Heritage Act 1977* or Excavation Permit under section 140 of the *Heritage Act 1977* is endorsed/issued by the Heritage Council.	Construction Contractor	Construction	Additional safeguard
NH5	Non-Aboriginal heritage	In the event of the discovery of relics of State significant, the Heritage Council of New South Wales should be notified in accordance with section 146 of the *Heritage Act 1977*.	Construction Contractor	Construction	Additional safeguard
NH6	Non-Aboriginal heritage	The location of the railway viaducts (Woodbrook Road item 12 LEP 2008) should be identified in the CEMP and include information relating to significance and ensure the need for care to avoid vehicle damage is included in site inductions.	Construction Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
LCVI A1	Landscape character and visual impact	A Landscape and Urban Design Plan would be prepared to support the final detailed proposal design and implemented as part of the CEMP. The Landscape and Urban Design Plan would present an integrated urban design for the proposal, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan would include design treatments for: • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls, bridges and noise walls • Pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped or rehabilitated areas. The Landscape and Urban Design Plan would be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014) • Landscape Guideline (RTA, 2008) • *Bridge Aesthetics* (Roads and Maritime 2012) • Noise Wall Design Guidelines (RTA, 2006) • Shotcrete Design Guideline (RTA, 2005).	Construction Contractor	Detailed design / Pre-construction	Standard safeguard
LCVI A2	Landscape character and visual impact	Consider using safety screen elements that are of a light colour to limit contrast with the sky backdrop.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
LCVI A3	Landscape character and visual impact	Consider opportunities to establish large scale vegetation intermittently situated in front of the bridge to visually settle the structure in its setting.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
LCVI A4	Landscape character and visual impact	Consider opportunities to establish dense vegetation including shrubs and stands of trees to provide for effective screening.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
LCVI A5	Landscape character and visual impact	Consider establishing stands of trees and dense shrubs along batters.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard
LCVI A6	Landscape character and visual impact	Maximise large scale tree planting along the south eastern verge to provide for visual screening and re-establish the green character that the current interchange has.	Construction Contractor	Detailed design / Pre-construction / Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
LCVI A7	Privacy screening around 2-8 Secombe Place, Moorebank	Transport and its Construction Contractor will develop site specific measures to limit opportunities for views into sensitive areas of 2-8 Secombe Place, Moorebank in consultation with property owner / occupiers.	Transport for NSW / Construction Contactor	Detailed design / Pre-construction / Construction	Additional safeguard
SC1	Community consultation	A Communication Plan (CP) would be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP would include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. Transport would establish a Construction Communication Coordination Group as part of the Communication and Stakeholder Engagement Plan to manage communications interfaces with other locally occurring developments. The Construction Communication Coordination Group would involve Council, LOGOS (as the representative for tenants within the Moorebank Logistics Park), Bicycle User Group and construction contractors of surrounding developments.	Transport for NSW / Construction Contractor	Pre-construction	Standard safeguard
SC2	Property impacts	Transport for NSW would continue to consult with affected property owners and land occupiers until the completion of the proposal. Discussions, including the nature and timing of construction work, would be required to identify relevant mitigation measures for noise, traffic and visual impacts.	Transport for NSW	Pre-construction / Construction	Additional safeguard
SC3	Changes in access	Temporary and permanent changes in access would be discussed with impacted land occupiers prior to commencement of construction and during construction activities should arrangements change. Temporary changes in access to social infrastructure facilities including the Casula Parklands and Georges River foreshore areas would be notified via signage and notification. Transport for NSW would confirm any realignment of street access or inter-property access under the proposal, in consultation with property owners.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
SC4	Social infrastructure	Access to social infrastructure facilities including parks and reserves would be maintained during construction, with safety measures in place for noise and amenity impacts. Key facilities that would be consulted include the John Grant International Raceway, Liverpool City Council (Casula Parklands), ***the Liverpool City Archers*** and the Barefoot Water Ski Club. Should any active pathways or routes require closure during construction, Transport for NSW would consult with Council and the community.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
SC5	Planning for construction pressures due to cumulative impacts	Transport for NSW and their contractor would consult with the Liverpool City Council, LOGOS (as the representative for tenants within the Moorebank Logistics Park), other project teams and the community throughout the construction period to reduce cumulative impacts during construction.	Transport for NSW / Construction Contractor	Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
SC6	Planning for construction pressures – events	Transport for NSW would work with the Liverpool City Council through the construction period to minimise impacts during events, such as the Barefoot Water Ski Club Championships to minimise any adverse impacts on the road network and surrounding areas.	Transport for NSW	Pre-construction	Additional safeguard
SC7	Visual impacts – lighting	During periods that require nightwork, lighting would be focused on the construction areas to avoid light spill and disturbance to surrounding properties and road users.	Construction Contractor	Construction	Additional safeguard
SC8	Cumulative impacts	Consultation with other projects including MLP and Moorebank Avenue Realignment would be carried out to reduce cumulative impacts to the community including traffic and amenity impacts.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
AQ1	Air quality	An Air Quality Management Plan (AQMP) would be prepared and implemented as part of the CEMP. The AQMP would include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • Mitigation and suppression measures to be implemented • Methods to manage work during strong winds or other adverse weather conditions A progressive rehabilitation strategy for exposed surfaces.	Construction Contractor	Detailed design / Pre-construction	Section 4.4 of QA *G36 Environment Protection*
AQ2	Air quality	Ongoing air quality monitoring would be carried out at the Helles Park former landfill site to detect any potential landfill gas leaks.	Construction Contractor	Construction / Operation	Additional safeguard
AQ3	Dust management around 2-8 Secombe Place, Moorebank	The Construction Contractor will develop, implement and maintain enhanced dust suppression measures around 2-8 Secombe Place, Moorebank for the duration of construction (or until such time that dust generating activities have been completed and the site has been adequately stabilised). Such measures could include the use of water misting systems, frequent use of soil binder and sealing haulage roads. The Construction Contractor will proactively monitor the effectiveness of any dust suppression measures implemented at this location and will implement additional controls if these measures are deemed to be ineffective. Measures to be implemented at this location are to be documented in the Air Quality Management Plan.	Construction Contractor	Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
W1	Waste	A Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP. The WMP would include but not be limited to: • Measures to avoid and minimise waste associated with the proposal • Classification of wastes and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off- site waste, or application of any relevant resource recovery exemptions • Procedures for storage, transport and disposal • Monitoring, record keeping and reporting. The WMP would be prepared taking into account the *Environmental Procedure – Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.	Construction Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
U1	Utilities	Prior to the commencement of work: • The location of existing utilities and relocation details would be confirmed following consultation with the affected utility owners If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment would be carried out.	Construction Contractor	Detailed design / Pre-construction	Additional safeguard
HR1	Hazards and risk management	A Hazard and Risk Management Plan (HRMP) would be prepared and implemented as part of the CEMP. The HRMP would include, but not be limited to: • Details of hazards and risks associated with the activity • Measures to be implemented during construction to minimise these risks • Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • A monitoring program to assess performance in managing the identified risks • Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. The HRMP would be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or DPIE publications.	Construction Contractor	Detailed design / Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
CI1	Cumulative construction impacts	Developers of the other projects would be consulted in accordance with the Community Stakeholder and Engagement Plan to: • Obtain information about project timeframes and impacts • Manage the interfaces of the proposal's staging and programming in combination with the other projects occurring in the area • Identify and implement appropriate safeguards and management measures to minimise cumulative impacts. • Coordinate community notifications about upcoming work to minimise the potential for consultation fatigue and confusion. Transport would establish a Construction Communication Coordination Group as part of the Communication Plan to manage communications interfaces with other locally occurring developments. The Construction Communication Coordination Group would involve Council, LOGOS, (as the representative for tenants within the Moorebank Logistics Park), Bicycle User Groups and construction contractors of surrounding developments.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
CI2	Cumulative construction impacts	The CEMP would consider potential cumulative construction impacts from known surrounding development activities as well as new planned development activities near the proposal, as they become known. This would include a process to regularly review and update mitigation measures as new work is identified that may lead to cumulative impacts or if complaints are received due to cumulative impacts.	Transport for NSW / Construction Contractor	Pre-construction / Construction	Additional safeguard
SUS1	Sustainability	The indicative project specific sustainability objectives and performance outcomes in Table 6-60 of the project REF would be reviewed and finalised during detailed design and would be used to direct and shape how the proposal will be sustainably developed, delivered and operated.	Transport for NSW / Construction Contractor	Pre-construction and construction	Additional safeguard
CR1	Climate risk	A more detailed climate risk assessment and climate adaptation plan would be prepared accordance with AS 5334. This assessment would be supported by an evaluation to characterise the likely impacts for 'high' risks (and potentially some 'moderate' risks where the consequence is 'major' or 'moderate').	Transport for NSW	Pre-construction	Additional safeguard

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for project and when they need to be obtained are listed in Table 7-2 (as per the submissions report). There are no additional or changed licenses and approval requirements associated with the proposed modification.

Table 7-2: Summary of licensing and approval required

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s43)	Environment protection licence (EPL) for scheduled activities [road construction] from the EPA	Prior to start of the activity.
Heritage Act 1977 (s139)	Excavation permit from the Heritage Council of NSW / the Minister to allow historical archaeological testing to be carried out.	Prior to start of the activity.
Heritage Act 1977 (s140)	Excavation permit from the Heritage Council of NSW / the Minister if historical archaeological testing identify any relics.	Prior to start of the activity.
Crown Land Management Act 2016 (Division 3.4, 5.5 and 5.6)	Lease or licence to occupy areas of Crown land.	Prior to start of the activity.
Roads Act 1993 (Section 138)	A road occupancy licence would be obtained	Prior to start of the activity.
Biodiversity Conservation Act 2016 (Clause 5.16(1))	Receive consent from the NSW Minister for Environment prior to commencing works on the biodiversity stewardship site	Prior to start of the activity.

8. Conclusion

8.1 Justification

The proposed modification reflects construction planning and is needed to ensure adequate area for compound, stockpiling and plant laydown, and necessary NBN infrastructure adjustments.

While there are some environmental impacts associated with the proposed modification (larger and additional compound areas and vegetation clearing), they are minor, temporary (except for vegetation clearing) and are adequately addressed through the safeguards listed in Table 7-1. Impacts on biodiversity were found not to be significant with reference to BC Act and EPBC Act considerations.

The benefits of the proposed modification are considered to outweigh the adverse impacts and risks.

8.2 Objects of the EP&A Act

Table 8-1 reviews the consistency of the proposal with the objects of the EP&A Act.

Table 8-1: Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	Not directly relevant to the proposed modification.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The principles of ecological sustainable development are considered in Section 8.2.1.
1.3(c) To promote the orderly and economic use and development of land.	Not directly relevant to the proposed modification.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The potential environmental impacts of the proposed modification have been assessed. Existing safeguards and management measures are considered adequate (with minor amendments and additions).
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification would have no heritage impacts.
1.3(g) To promote good design and amenity of the built environment.	The proposed modification relates to temporary facilities and works for the construction phase of the proposal. Measures have been proposed to minimise impacts on amenity during construction.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposal.

Object	Comment
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Broad community consultation was not considered necessary for the proposed modification. Pre-work notifications are proposed. Refer to Section 5.2.

8.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

8.3.1 The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during options development. The precautionary principle has guided the assessment of environmental impacts for this addendum REF and the development of mitigation measures.

Best available technical information, environmental standards and measures have been used to minimise environmental risks and conservative 'worst case' scenarios were considered while assessing environmental impact.

8.3.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Intergenerational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The impacts of the proposed modification have been identified as temporary and manageable. The proposed modification supports the approved project, which will support current and future traffic demands and expected growth in the area.

8.3.3 Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts. The proposed modification is not expected to have significant biodiversity impacts.

8.3.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources that may be affected by the carrying out of a project, including air, water, land and living things.

The value placed on environmental resources within and around the proposal footprint is evident in the extent of environmental investigations, planning and design of impact mitigation measures to prevent adverse environmental impacts.

8.4 Conclusion

This addendum REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Commonwealth EPBC Act.

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives but would still result in some impacts on biodiversity and noise. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also deliver benefis by supporting the approved project, which will support current and future traffic demands and expected growth in the area. On balance the proposed modification is considered justified, and the following conclusions are made.

8.4.1 Significance of impact under NSW legislation

The proposed modification would not result in a change to the findings of the project REF and submissions report and would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

8.4.2 Significance of impact under Australian legislation

The proposed modification would not likely cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of Climate Change, Energy, the Environment and Water is not required.

9. Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification 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 proposed modification.

Stuart Hill
Principal - environment
bd infrastructure

Date: 27 August 2025

I have examined this addendum review of environmental factors and accept it on behalf of Transport for NSW.

Name: Paul Nicholls
Position Project Manager TfNSW
Date: 28/8/2025

10. EP&A Regulation publication requirement

Respondent	Yes/No
Does this REF need to be published under section 171(4) of the EP&A Regulation?	No

11. Terms and acronyms used in this addendum REF

Term /acronym	Description
BC Act	*Biodiversity Conservation Act 2016 (NSW).*
CEMP	Construction / Contractor's environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NPW Act	National Parks and Wildlife Act 1974 (NSW)
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP (Biodiversity and Conservation)	State Environmental Planning Policy (Biodiversity and Conservation) 2021
SEPP (Planning Systems)	State Environmental Planning Policy (Planning Systems) 2021
SEPP (Precincts – Central River City)	State Environmental Planning Policy (Precincts – Central River City) 2021
SEPP (Precincts – Eastern Harbour City)	State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
SEPP (Precincts – Regional)	State Environmental Planning Policy (Precincts – Regional) 2021
SEPP (Precincts – Western Parkland City)	State Environmental Planning Policy (Precincts – Western Parkland City) 2021
SEPP (Resilience and Hazards)	State Environmental Planning Policy (Resilience and Hazards) 2021
SEPP (Transport and Infrastructure)	State Environmental Planning Policy (Transport and Infrastructure) 2021

12. References

Department of Environment, Climate Change and Water. (2011). *NSW Road Noise Policy.* Sydney: Department of Environment, Climate Change and Water.

Department of Planning and Environment. (2020). *Guidelines for Division 5.1 assessments.* Sydney: Department of Planning and Environment.

Department of Planning, Industry and Environment. (2020). *Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method .* Sydney: Department of Planning, Industry and Environment.

Department of Urban Affairs and Planning. (1998). *Roads and Related Facilities EIS Guideline.* Sydney: Department of Urban Affairs and Planning.

Transport for NSW. (2024). *Construction Noise and Vibration Guideline.* Sydney: Transport for NSW.

Appendix A

Consideration of section 171(2) factors and matters of National Environmental Significance and Commonwealth land

Section 171(2) checklist

In addition to the requirements of the Is an EIS required? (1995/1996) guideline and the *Roads and Related Facilities EIS Guideline* (Department of Urban Affairs and Planning, 1998) as detailed in the addendum REF, the following factors, listed in section 171(2) of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposed modification on the natural and built environment.

Factor	Impact
Any environmental impact on a community? There is some potential for noise, visual impacts and dust associated with the proposed modification that could impact on the community. Safeguards have been proposed (section 7.2) to address these potential impacts.	Short-term negative
Any transformation of a locality?	Nil
Any environmental impact on the ecosystems of the locality? The proposed modification would not affect habitats on which terrestrial native plants and animals (including threatened species) would be reliant. Biodiversity impacts have been assessed as not significant.	Not significant
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There is potential for noise and dust associated with the proposed modification that could impact on the environmental quality or value of the locality during construction. Safeguards have been proposed (section 7.2) to address these issues.	Short-term negative
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 proposed modification would not affect Aboriginal or non-Aboriginal heritage. The project includes safeguards to address any unexpected impacts.	Nil
Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposed modification would not affect habitats on which native animals (including threatened species) would be reliant. Biodiversity impacts have been assessed as not significant.	Not significant
Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposed modification would not affect habitats on which native plants and animals (including threatened species) would be reliant. Biodiversity impacts have been assessed as not significant. There would be no endangering of species.	Nil
Any long-term effects on the environment? Long-term negative effects on the environment would be limited to vegetation removal. This would be partly addressed through revegetation (refer to existing safeguards B6, B21, LCVIA4)	Minor long-term negative
Any degradation of the quality of the environment? The proposed modification has some potential to degrade the quality of the environment due to the increased extent of the compound site. Safeguards are adequate to address this risk.	Minor short-term negative

Factor	Impact
Any risk to the safety of the environment? The proposed modification does not represent a risk to the safety of the environment.	Nil
Any reduction in the range of beneficial uses of the environment? The proposed modification would not reduce the range of beneficial uses of the environment. Most of subject site is not being actively used.	Nil
Any pollution of the environment? There is a risk of pollution from accidental spills or erosion / sedimentation associated disturbed areas. The project safeguards (section 7.2) adequately address these risks.	Nil
Any environmental problems associated with the disposal of waste? No environmental problems are anticipated for the disposal of waste. The proposed modification would not substantially change waste volumes or types.	Nil
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? There would be no increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply.	Nil
Any cumulative environmental effect with other existing or likely future activities? The proposed modification is not expected to have cumulative impacts given the limited scope of the changes and the minimal incremental impacts identified.	Nil
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification would not affect coastal processes and hazards.	Nill
Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1. The relevant plans are: • Greater Sydney Region Plan • Western City District Plan • Liverpool Local Strategic Planning Statement	Consistent The minor nature of the proposed modification would not affect the priorities and action outlined in these plans.
Other relevant environmental factors	In considering the potential impacts of this proposed modification all relevant environmental factors have been considered. Refer to Chapter 6 of this assessment.

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposed modification should be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water.

Under the EPBC Act strategic assessment approval a referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are assessed in detail as part of this addendum REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
Any impact on a World Heritage property? The proposed modification would not have any impact on a World Heritage property.	Nil
Any impact on a National Heritage place? The proposed modification would not have any impact on a National Heritage Place.	Nil
Any impact on a wetland of international importance? The proposed modification would not affect a wetland of international importance.	Nil
Any impact on a listed threatened species or communities? Potential impacts on Commonwealth listed species and communities were assessed and found not to be significant. Refer to Section 6.1.	Not significant
Any impacts on listed migratory species? Some Commonwealth listed migratory species have the potential to occur in the local area. The proposed modification would have no impact on these species.	Nil
Any impact on a Commonwealth marine area? The proposed modification would not have any impact on a Commonwealth marine area.	Nil
Does the proposed modification involve a nuclear action (including uranium mining)? The proposed modification does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposed modification would not impact Commonwealth land.	Nil

Appendix B

Statutory consultation checklists

Matters of National Environmental Significance and Commonwealth land

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Car park	Does the project include a car park intended for the use by commuters using regular bus services?	No		Section 2.110
Bus depots	Does the project propose a bus depot?	No		Section 2.110
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No		Section 2.110

Development within the Coastal Zone

Issue	Description	Yes / No / N/A	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No		Section 2.14

Note: See interactive map 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.

Council related infrastructure or services

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Stormwater	Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	No		Section 2.10
Traffic	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?	No		Section 2.10
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of any part of the system?	No		Section 2.10
Water usage	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?	No		Section 2.10
Temporary structures	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?	No		Section 2.10
Road and footpath excavation	Will the works involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No		Section 2.10

Local heritage items

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	No		Section 2.11

Flood liable land

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a minor extent?	No		Section 2.12
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance	Yes	State Emergency Services Email: erm@ses.nsw.gov.au Consultation carried out during preparation of the project REF sufficient.	Section 2.13

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 manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

Public authorities other than councils

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No		Section 2.15
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No		Section 2.15
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No		Section 2.15
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	No		Section 2.15
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No		Section 2.15
Artificial light	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)	No		Section 2.15
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence	No		Section 2.15

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
	Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).			
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No		Section 2.15

SEPP (Precincts – Central River City) 2021 and SEPP (Precincts – Western Parkland City) 2021

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Clearing native vegetation	Do the works involve clearing native vegetation (as defined in the Local Land Services Act 2013) on land that is not subject land (as defined in cl 17 of schedule 7 of the *Threatened Species Conservation Act 1995*)?	No		Section 3.24

Appendix C

Biodiversity assessment

Stuart Hill
Director and Principal - Environment
BD Infrastructure

12th June 2025

Biodiversity Assessment Report Memo for the M5 Motorway Westbound Traffic Upgrade Addendum REF

Dear Stuart,

East Coast Ecology (ECE) was engaged by Transport for NSW (Transport) c/- BD Infrastructure to prepare a Biodiversity Assessment Report (BAR) memo to accompany an Addendum Review of Environmental Factors (AREF) for upgrades to the M5 Motorway westbound between Moorebank Avenue, Moorebank and the Hume Highway, Casula NSW (the proposal). The proposal aims to ease congestion by improving connectivity between the M5 Motorway and the Hume Highway. It is understood that Transport proposes a modification to the M5 Motorway westbound Project by extending the proposal area for the construction of additional compound areas, access tracks and utility works (the area of which is hereafter referred to as the Subject Land).

The scope of this assessment was to identify and assess impacts to species and ecological communities listed as threatened under the *Biodiversity Conservation Act 2016* (NSW) (BC Act), *Fisheries Management Act 1994* (FM Act) and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and where relevant, the requirements of the *Biosecurity Act 2015* (NSW), and relevant State Environmental Planning Policies (SEPPs).

The BC Act requires that the significance of the impact on threatened species, populations and threatened ecological communities is assessed using the test listed in Section 7.3 of the BC Act. Similarly, Part 7A of the FM Act requires that significance assessments are undertaken in accordance with Division 12 of the FM 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) (DPIE, 2020a).

Assessments of impact significance 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). This BAR memo, including BC Act 5-Part Tests and EPBC Act Assessment of Significance, was prepared to evaluate the ecological values that occur within the Subject Land and identify how the proposed activity satisfies the relevant planning framework.

The area that has been assessed as part of this BAR memo is referred to as the Subject Land (**Figure 1**) and has been defined using shapefiles provided by bd infrastructure. The Subject Land covers an area of approximately 6.72ha.

1. METHODS

A literature review of local information relevant to the Subject Land was undertaken. Searches using NSW Wildlife Atlas (BioNet) (NSW DCCEEW, 2025b) and the Commonwealth Protected Matters Search Tool (PMST) (DCCEEW,

2025) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records, within a 10km radius of the Subject Land.

1.1 Native Vegetation

A review of the State Vegetation Type Map (NSW DCCEEW, 2025b) and the validated vegetation mapping in the approved BDAR (Niche, 2022) was used to assist in the identification of Plant Community Types (PCTs) within and surrounding the Subject Land. ECE undertook vegetation mapping in May 2025. Vegetation mapping involved recording dominant species, particularly canopy species, at regular intervals and then assigning PCTs to like sections of vegetation. PCTs were further stratified into condition classes based on the diversity and cover of exotic species and assemblage of native species.

1.2 Threatened Flora Survey Methods

Threatened flora that are known or likely to occur within the Subject Land and immediate surrounds (i.e. within 10km) were identified following review of BioNet and the PMST. Soil mapping (NSW DCCEEW, 2025a) and topography (Google Earth) were also used to provide further context on habitat constraints for threatened flora. Thirty-nine threatened flora have been recorded (BioNet), with a further six known or likely to occur (PMST), within 10km of the Subject Land.

The desktop assessment resulted in seven species (out of the 45) having a moderate likelihood of occurrence based on nearby records and known habitat/ geographic constraints, and were the focus of the targeted surveys during the site assessment. Targeted surveys were undertaken by ecologist Jade Minto on the 20th May 2025, using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPIE, 2020b). For the remaining species, searches concentrated on habitat constraints and vegetation associations. All vegetated areas of the Subject Land were surveyed.

The seven species targeted during the field survey, as well as their survey dates, are presented below in **Table 1**.

Table 1. Threatened flora with a moderate or higher likelihood of occurrence (based on the desktop assessment) within the Subject Land.

Candidate Fauna Species	Survey Period											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Acacia bynoeana					✓							
Acacia pubescens					✓							
Callistemon linearifolius					✓							
Hibbertia fumana					✓							
Marsdenia viridiflora subsp. viridiflora					✓							
Persoonia nutans					✓							
Pimelea spicata					✓							
Key	✓ = Surveyed						= DCCEEW endorsed survey period					

A habitat suitability assessment for potentially occurring threatened flora is presented in **Appendix A** and was assessed based on recent and proximal records, target survey results from the approved BAR, as well as habitat constraints recorded during the site assessment.

1.3 Threatened Fauna Survey Methods

No targeted surveys for fauna were undertaken. However, a field survey was undertaken by ecologist Jade Minto on the 20th May 2025, to identify any habitat constraints (e.g. waterbodies, rocky areas, tree hollows), including microhabitat, present within the Subject Land and immediate surrounds. Potential habitat constraints within the broader area (500m buffer) were assessed using Google Earth, soil landscape mapping (NSW DCCEEW, 2025a) and recent vegetation mapping (NSW DCCEEW, 2025b).

Threatened fauna that are known or likely to occur within the Subject Land and immediate surrounds (i.e. within 10km) were identified following review of BioNet and the PMST. A habitat suitability assessment for potentially occurring threatened fauna is presented in **Appendix A** and was assessed based on recent and proximal records, as well as habitat constraints recorded during the site assessments.

1.4 Aquatic Surveys

No aquatic surveys were undertaken but areas of aquatic habitat were identified during the field survey.

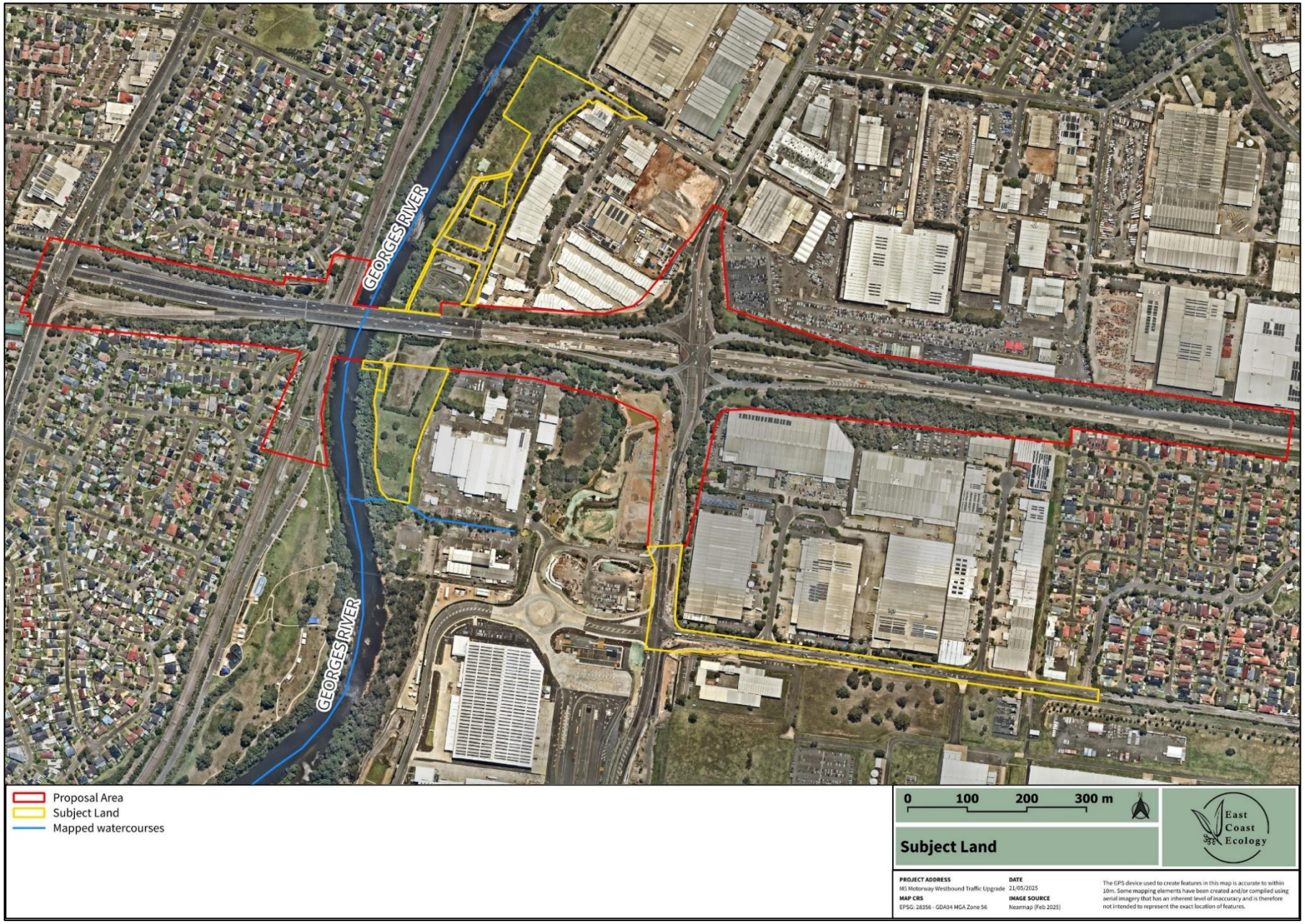

Figure 1. The Subject Land and mapped watercourses.

2. EXISTING ENVIRONMENT

2.1 Location

The Subject Land is located in the Cumberland Interim Biogeographic Regionalisation for Australia (IBRA) Subregion, within the Sydney Basin IBRA Bioregion. The Subject Land is situated within the Liverpool Local Government Area (LGA) and is located in the Suburb of Moorebank.

2.2 Rivers, streams, estuaries and wetlands

One mapped watercourse, a 1st order tributary of the Georges River, intersects the south of the Subject Land (**Figure 1**). The Georges River, a 7th order watercourse lies to the West of Subject Land. The Subject Land falls within the Georges River 40m riparian buffer zone.

2.3 Habitat Connectivity

The surrounding areas consist of industrial land and supports little, if any, habitat connectivity with the Subject Land. Minor habitat connectivity is provided to the Subject Land through riparian vegetation along the Georges River.

2.4 Karst, Caves, Crevices, Cliffs, Rocks or Other of Geological Features of Significance

The Subject Land did not contain any areas of geological significance (karsts, caves, cliffs and crevices). The Subject Land and surrounding area are mapped as having a low probability of occurring on acid sulfate soils.

2.5 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value occur on the Subject Land or surrounding area.

2.6 Topography, Geology and Soils

The Subject Land occurs on a gentle slope, starting at approximately 10m above sea level (asl) along the Georges River and grading to approximately 15m asl in the east along Anzac Road. The western portion of the Subject Land is mapped as occurring on the Blacktown soil landscape, which is characterised by gently undulating rises on Wianamatta Group shale. The eastern portion is mapped as occurring on the Berkshire Park soil landscape, which is characterised by gently undulating low rises on the Tertiary terraces of the Hawkesbury/ Nepean River system.

2.7 Mapped Native Vegetation Communities – NSW State Vegetation Type Map

The NSW State Vegetation Type Map (NSW DCCEEW, 2025b) indicated the presence of three Plant Community Types (PCT) within, or adjoining, the Subject Land (**Figure 2**):

- PCT 3145: Cumberland Bangalay x Blue Gum Riverflat Forest
- PCT 4024: Cumberland Blue Box Riverflat Forest, and
- PCT 3448: Castlereagh Ironbark Forest.

Majority of the Subject Land has been mapped as ‘Not classified’.

2.7.1 Mapped Vegetation Communities from the Approved BAR

The approved BAR (Niche, 2022) identified the following PCTs and novel community types within the proposal area:

- PCT 835 – Cumberland Riverflat Forest
- PCT 849 – Cumberland Shale Plains Woodland
- PCT 941 – Hinterland Riverflat Eucalypt Forest
- Planted Vegetation, and
- Not Native.

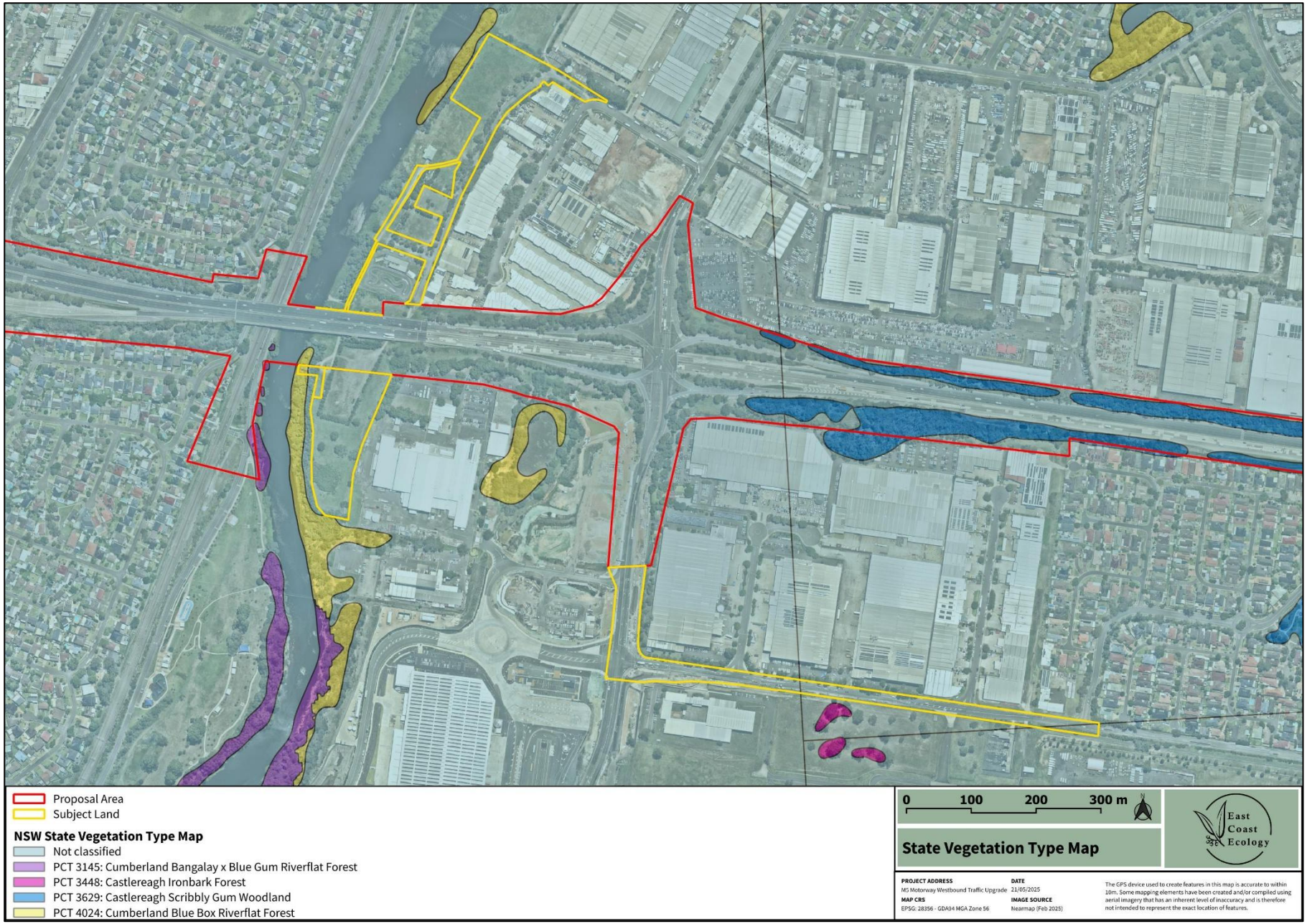

Figure 2. NSW State Vegetation Type Map.

3. RESULTS: FIELD-VALIDATED NATIVE VEGETATION

Historical imagery reveals that majority of the Subject Land has been historically cleared prior to 1943. A small section of the Subject Land along the Georges River has remained and consisted of riparian vegetation dominated by *Eucalyptus tereticornis*, *Angophora floribunda* and *Acacia binervia.* Priority and environmental weeds such as *Olea europaea subsp. cuspidata*, *Lantana camara* and *Cardiospermum grandiflorum* were widespread throughout the riparian zone. The majority of the Subject Land consisted of cleared grassland which was dominated by environmental and priority weeds such as *Cenchrus clandestinus*, *Ehrharta erecta*, *Chloris gayana*, *Urochloa panicoides*, *Eragrostis curvula*, *Setaria parviflora* and *Plantago lanceolata*. A large dense stand of Bamboo (*Bambusa spp.*) was also present in the southwest of the Subject Land. The remainder of the Subject Land contained a range of planted native canopy species including *Casuarina glauca*, *Eucalyptus tereticornis, Eucalyptus moluccana, Eucalyptus amplifolia and Corymbia citriodora* and lacked a native understorey.

Owing to the soil mapping (i.e. Wianamatta shale), location in the landscape (alluvial flats) and presence of characteristic eucalypts, the following PCT was assigned to the areas of native riparian vegetation within the Subject Land:

- PCT 4025: Cumberland Red Gum Riverflat Forest (**Photo 1**).

PCT 4025 is associated with the BC Act listed endangered ecological community (EEC), River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions and the EPBC Act Listed Critically endangered ecological community (CEEC), River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. The vegetation within the Subject Land represents a severely degraded form of the BC Act EEC. PCT 4025 within the Subject Land consisted of an exotic dominated understorey and does not meet the eligibility criteria for listing as the EPBC Act CEEC when considered in isolation. However, to be consistent with the approved BAR, the condition of the rest of the patch has been considered and the vegetation within the Subject Land has been treated as part of the EPBC Act listed CEEC (Niche, 2022).

Areas of vegetation that were dominated by environmental and priority weeds could not be assigned to a PCT and were classified as 'Not Native' (**Photo 2**). Areas containing planted native canopy trees were classified as 'Planted Native Vegetation' (**Photo 3**). PCT 4025 (previously PCT 835) and these novel community types were also identified within the approved BAR as occurring nearby and within the proposal area (Niche, 2022). A summary of the vegetation to be impacted by the proposal is provided in **Table 2** and displayed in **Figure 3** and **Figure 4**.

Table 2. Summary of vegetation to be impacted by the proposal.

PCT	Vegetation Zone	BC Act	EPBC Act	Area (ha) within the Proposal Area	Area (ha) within the Subject Land	Total area of impact (ha)
PCT 835: Cumberland riverflat forest (PCT 4025: Cumberland	Low condition	River-Flat Eucalypt Forest	River-Flat Eucalypt Forest	0.35	0.12	0.47

PCT	Vegetation Zone	BC Act	EPBC Act	Area (ha) within the Proposal Area	Area (ha) within the Subject Land	Total area of impact (ha)
Red Gum Riverflat Forest)						
PCT 835 – Cumberland riverflat forest	High condition	River-Flat Eucalypt Forest	River-Flat Eucalypt Forest	0.61	0	0.61
PCT 849 – Cumberland shale plains woodland	Low condition	Cumberland Plain Woodland	Does not meet condition threshold	1.28	0	1.28
PCT 941 – Hinterland riverflat eucalypt forest	Low condition	River-Flat Eucalypt Forest	Does not meet condition threshold	0.96	0	0.96
PCT 941 – Hinterland riverflat eucalypt forest	Moderate condition	River-Flat Eucalypt Forest	River-Flat Eucalypt Forest	0.96	0	0.96
Planted Native Vegetation	-	-	-	4.66	0.92	5.58
Not Native	-	-	-	-	3.07	3.07

The proposed activity is likely to impact an additional 0.12ha of low condition PCT 4025 (i.e. PCT 835). A 5-part test and Assessment of Significance was prepared to assess whether the impacts to the BC Act threatened Ecological Community (TEC) and EPBC Act TEC could constitute a significant impact. The result of the 5-part test and Assessment of Significance was that a significant impact is not likely (**Appendix B**).

Photo 1. Representative photo of PCT 4025.

Photo 2. Representative photo of Not-native.

Photo 3. Representative photo of Planted Native Vegetation.

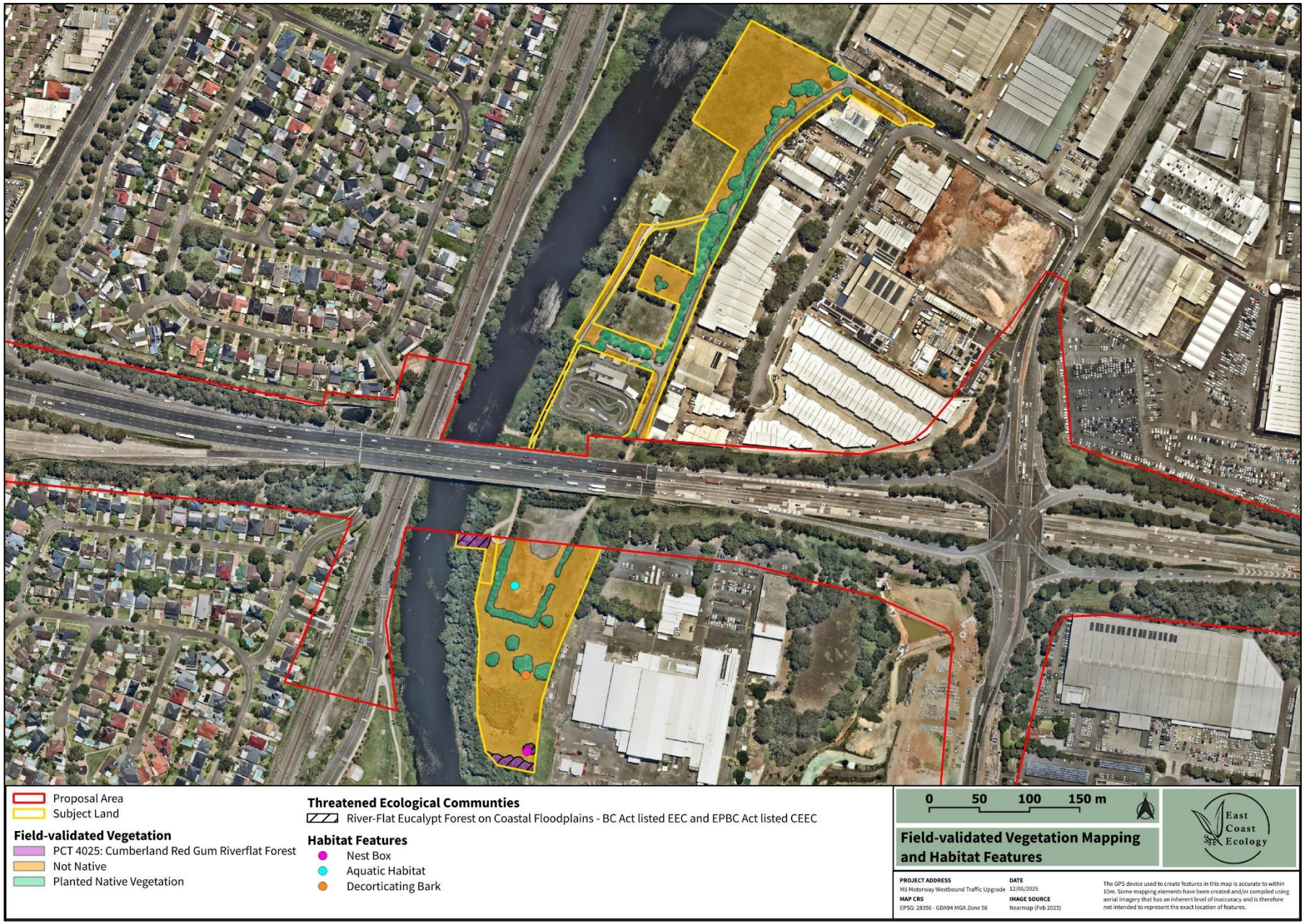

Figure 3. Field-validated vegetation communities and threatened species (Map 1 of 2).

Figure 4. Field-validated vegetation communities and threatened species (Map 2 of 2).

4. RESULTS: THREATENED FLORA

Database searches revealed 45 threatened flora have been recorded within a ~10km radius of the Subject Land. The results from the site assessment, including targeted flora surveys and habitat assessment, were used to assess each species' likelihood of occurrence within the Subject Land (**Appendix A**). No flora species were determined to have a moderate or higher likelihood of occurrence within the Subject Land and no further assessment is required.

5. RESULTS: THREATENED FAUNA

Database searches revealed 67 threatened fauna have been recorded within a ~10km radius of the Subject Land. The results from the site assessment, including targeted habitat surveys, were used to assess each species' likelihood of occurrence within the Subject Land (**Appendix A**). Six (6) species were determined to have a moderate likelihood of occurring within the Subject Land:

Threatened birds:

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Lathamus discolor* (Swift Parrot)
- *Parvipsitta pusilla* (Little Lorikeet)

Threatened mammals:

- *Myotis macropus* (Southern Myotis)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The degraded vegetation, lack of breeding habitat and location within a highly disturbed, industrial landscape indicates that although threatened birds and mammals could potentially be occasional visitors to the Subject Land (e.g. flying over), it is unlikely to be used regularly or for any important life cycle events (e.g. breeding, roosting). As a result, any potential impacts to threatened birds and mammals are likely to be minor.

5.1 Threatened Fauna Habitat Constraints

The degraded vegetation within the Subject Land is unlikely to provide habitat for threatened species. There was no breeding habitat identified (in the form of hollow-bearing trees, rocky outcrops/ caves, human-made structures). One nest box was identified within the Subject Land however it contained extra small hollows that are not suitable for any threatened fauna species likely to occur within the Subject Land. Small pools of water and the drainage line identified along Anzac Road could potentially support non-threatened amphibians.

5.2 Migratory Species

Database searches revealed three (3) migratory terrestrial species, or their habitat, are known to occur within the Subject Land (**Table 3**). These species do not breed in Australia.

Table 3. Migratory terrestrial species with potential to occur in the Subject Land.

Species	EPBC Act Status
Cuculus optatus (Oriental Cuckoo)	Migratory, CAMBA, JAMBA, ROKAMBA

Species	EPBC Act Status
Hirundapus caudacutus (White-throated Needletail)	Vulnerable, Migratory, CAMBA, JAMBA, ROKAMBA
Motacilla flava (Yellow Wagtail)	Migratory, CAMBA, JAMBA, ROKAMBA

6. LEGISLATION

6.1 State Environmental Planning Policies

6.1.1 State Environmental Planning Policy (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) commenced on the 1st of March 2022 and replaces the following former SEPPs:

- State Environmental Planning Policy (Coastal Management) 2018
- State Environmental Planning Policy 33 – Hazardous and Offensive Development, and
- State Environmental Planning Policy 55 – Remediation of Land.

The Subject Land is not situated within the 'Coastal Zone' therefore this SEPP does not apply.

6.2 *Fisheries Management Act 1994*

The FM Act aims to conserve, develop, and share the fishery resources of NSW for the benefit of present and future generations including conserving fish stocks and key fish habitats and promoting ecologically sustainable development.

The closest Key Fish Habitat (KFH) occurs adjacent to the west of the Subject Land, within the Georges River. The proposed activity may impact riparian vegetation adjacent to KFH, however no direct impacts to KFH is expected to occur. Additional measures to mitigate potential impacts from the works on KFH include standard erosion and sediment control measures for all construction and laydown areas, and within the final design. As such, the activity would not impact upon KFH, nor are there any legislative requirements or notifications required under this Act.

6.3 *Biosecurity Act 2015*

The *Biosecurity Act 2015* (NSW) provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by an activity as a matter of biosecurity. As defined in Part 3, section 23 of this Act, any non-conformance by an individual is defined as guilty of an offence.

Four priority weeds for the Greater Sydney region were identified within the Subject Land:

- *Olea europaea* subsp. *cuspidata* (African Olive)
- *Senecio madagascariensis* (Fireweed)
- *Rubus fruticosus species aggregate* (Blackberry), and
- *Lantana camara* (Lantana).

Priority weeds are to be appropriately managed in accordance with the *Biosecurity Act 2015*.

6.4 *Water Management Act 2000*

The main objective of the *Water Management Act 2000* (NSW) (WM Act) is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. Section 91E of the Act establishes an approval regime for

controlled activities within waterfront land. However, clause 41 of the Water Management (General) Regulation 2018 provides an exemption for public authorities in relation to all controlled activities on waterfront land. Therefore, approval under the WM Act is not required.

6.5 Matters of National Environmental Significance

Under the EPBC Act, a proponent must not take an action if that action will have, or is likely to have, a significant impact on matters protected under the EPBC Act, referred to as MNES. The EPBC Act identifies eight MNES:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (those listed under the Ramsar Convention)
- Listed threatened species and communities
- Migratory species listed under international agreements
- Great Barrier Reef Marine Park
- Commonwealth marine areas
- Nuclear actions

The PMST identified the following as potentially occurring within the Subject Land (or within 10km):

- 12 Threatened Ecological Communities
- 103 threatened species
- 37 Migratory species

No MNES were identified within or adjoining the Subject Land, or are likely to be significantly impacted by the proposed activity.

7. RECCOMENDED AVOID AND MINISE/ MITIGATION MEASURES

A key component of Transport's Biodiversity Policy commitment to no net loss of biodiversity requires the application of the 'avoid, minimise, mitigate and offset' hierarchy as follows:

- Avoid and minimise impacts.
- Mitigate unavoidable impacts.
- Offset residual impacts in accordance with Transport guidelines.

The proposed activity has avoided and minimised the clearing of native vegetation and habitat by:

- Locating ancillary facilities in areas where there are no or low biodiversity values
- Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition
- Avoid the clearing of any large hollow bearing trees.

Mitigation measures have been developed in the approved BAR (Niche, 2022) in accordance with Transport's Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024) and are applicable to the proposed activity. The measures have been structured to cover pre-works design, pre works construction, construction and maintenance. A summary of the mitigation measures to be undertaken during construction and post construction is provided in the approved BAR and includes:

- Fencing and signposting to delineate the boundary of vegetation clearing at the edge of the Subject Land
- Employee education and general environmental controls, and
- Vegetation clearance protocol in accordance with Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024) and with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (Transport, 2024).

8. TRANSPORT BIODIVERSITY OFFSETS

Combined offset thresholds for the approved BAR and this BAR memo are presented in **Table 4**. This assessment has described the biodiversity values present in the Subject Land and the impact of the project on these values. Further to this, the assessment has identified all reasonable measures and strategies proposed to avoid and minimise impacts to biodiversity associated with the project. Any residual impacts would need to be offset. Ecosystem Credit offsets provided in the BAR (Niche, 2022) will need to be revised based on the additional 0.12ha of PCT 4025 (PCT 835) being impacted. The revised offset obligations will be detailed in the Biodiversity Offset Strategy.

Table 4. Offset thresholds (Transport, 2023a).

Impact	Threshold	Applicable to the Proposal?
A. Threatened ecological communities		
Works involving clearing of an EPBC Act or BC Act listed critically endangered ecological communities (CEEC).	Where there is any clearing of an CEEC in 'moderate to good' condition	Yes. Works involve clearing of an EPBC Act listed CEEC.
Works involving clearing of an EPBC Act or BC Act listed endangered ecological community (EEC).	Where clearing of a EEC ≥ 2 ha in 'moderate to good' condition	Yes. Works involve clearing of >2ha of an EEC.
Works involving clearing of a BC Act listed vulnerable ecological community (VEC).	Where clearing of VEC ≥ 5 ha in 'moderate to good' condition	No. No VEC will be cleared.
B. Threatened fauna habitat		
Works involving clearing of threatened fauna habitat for ecosystem-credit species that is also a TEC identified in Category A.	No – covered by Category A TEC thresholds.	No. Threatened fauna habitat is offset as per Category A.
Works involving clearing of any habitat (that is not a TEC) for a known species credit fauna species or clearing of breeding habitat (as defined by the TBDC) for dual-credit fauna species	Where clearing ≥ 1 hectare in moderate to good condition.	No. Impacts (that are not to a TEC) will be to exotic or planted vegetation.

Impact	Threshold	Applicable to the Proposal?
(excluding exotic and planted vegetation that cannot be assigned to a plant community type).		
C. Threatened flora and habitat		
Works involving removal of known threatened flora species and their habitat.	Where loss of individuals is ≥ 10 (species that have a 'count of individuals' as the unit of measure) or where clearing of habitat (calculated by a species polygon in accordance with the BAM) is ≥ 1 hectare.	No. No threatened flora species will be removed.
D. Key fish habitat		
Type 1 or Type 2 key fish habitats (KFH)	Where there is a net loss of habitat	No. No Type 1 or 2 KFH will be impacted.
Additional requirements exist in relation to the replacement of trees and hollows, for any impacts that do not trigger these area thresholds.		Yes.

9. CONCLUSION

The nature and extent of the proposed works is limited to disturbed areas adjoining Industrial Land and Anzac Road. The proposed activity will impact an additional 0.12ha of low condition PCT 4025: Cumberland Red Gum Riverflat Forest. PCT 4025 is associated with the BC Act listed EEC, River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions and the EPBC Act listed CEEC, River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. The conclusion of the BC Act assessment and EPBC assessment as to whether the EEC and CEEC is likely to experience a significant impact as a result of the proposed activity found that a significant impact was not likely to occur. A Tree and Hollow Replacement Plan will need to be prepared to address impacts prior to the commencement of works.

If you have any queries, please feel free to contact me.

Sincerely,

Dr Jack Tatler
Director/ Principal Ecologist - Accredited Biodiversity Assessor (BAAS21006)
E: jack.tatler@ececology.com.au

REFERENCES

Department of Agriculture, Water and the Environment (2020) Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Department of the Environment (DoE) (2013) Matters of National Environmental Significance Significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*

Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2025). Protected Matters Search Tool

Department of Planning, Industry and Environment (DPIE) (2020a) Biodiversity Assessment Method

Department of Planning, Industry and Environment (DPIE) (2020b) Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method

Niche (2022) Biodiversity Assessment Report M5 Motorway Westbound Traffic Upgrade

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (2025). BioNet Vegetation Classification

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (2025a). eSPADE

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (2025b). NSW State Vegetation Type Map

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (2025c). NSW BioNet Atlas

Office of Environment and Heritage (OEH) (2018). Threatened Species Test of Significance Guidelines

Scientific Committee (2011) River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act

Appendix A. Habitat suitability assessment.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Plants							
Acacia bynoeana	E	V	Species	-	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	161	Low. This species has been recorded from within the locality in the last 10 years on BioNet. A targeted survey during the NSW DCCEEW endorsed survey period did not detect this species.
Acacia pubescens	V	V	Species	-	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Grows in open woodland and forest, in a variety of plant communities, including Cooks River-Castlereagh Ironbark forest, Shale-Gravel Transition forest and Cumberland Plain woodland.	4582	Low. This species has been recorded from within the locality in the last 10 years on BioNet. A targeted survey during the NSW DCCEEW endorsed survey period did not detect this species.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Allocasuarina diminuta subsp. mimica	E	-	Species	-	The endangered population occurs along sandstone ridges and upper hillsides in the region northwest from Heathcote, towards Menai and Holsworthy, in heathy and low open woodland communities. It is restricted to the Local Government Areas listed in this instance (Sutherland and Liverpool). Habitat and ecology includes heathy woodland, heathlands and low open woodlands.	3	Unlikely. There is no suitable habitat for this species within the Subject Land.
Allocasuarina glareicola	E	E	Species	-	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora. Common associated understorey species include *Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis* and *Xanthorrhoea minor*.	1	Low. There are no recent or nearby records of this species and there is no suitable habitat for this species within the Subject Land.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Caesia parviflora var. minor	E	-	Species	-	Found in damp places in open forest on sandstone.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Callistemon linearifolius	V	-	Species	-	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Grows in dry sclerophyll forest on the coast and adjacent ranges.	37	Low. This species has been recorded from within the locality in the last 10 years on BioNet. A targeted survey did not detect this species.
Caladenia tessellata	V	V	Species	-	The Tessellated Spider Orchid is found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct.	Modelled only	Unlikely. There is no suitable habitat for this species within the Subject Land.
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	Modelled only	Low. There are no recent or nearby records of this species and there is

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	BC Act	EPBC Act					
					woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).		no suitable habitat for this species within the Subject Land.
Cynanchum elegans	E	E	Species	-	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	1	Low. There are no recent or nearby records of this species and there is no suitable habitat for this species within the Subject Land.
Deyeuxia appressa	E	E	Species	-	A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area (Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown and Killara, near Hornsby). Almost nothing is known about the species' habitat and ecology. Flowers spring to summer and is mesophytic (grows in moist conditions).	Modelled only	Low. This species has not been recorded in the locality at any time on BioNet and is presumed extinct.

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Dillwynia tenuifolia	V	-	Species	-	The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include: the Bulga Mountains at Yengo in the north, Kurrajong Heights and Woodford in the Lower Blue Mountains. In western Sydney, may be locally abundant particularly within scrubby-dry heath areas within Castlereagh Ironbark forest and Shale Gravel Transition forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.	1	Low. This species has not been recorded from within the locality in the last 10 years on BioNet. The habitat within the Subject Land was disturbed and unlikely to support this species.
Diuris aequalis	E	E	Species	-	Recorded in Kanangra-Boyd National Park, Gurnang State forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago and Bungendore. Grows in forest, low open woodland with grassy understorey and	1	Low. This species has not been recorded from within the locality in the last 10 years on BioNet. The habitat within the Subject Land was

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					secondary grassland on the higher parts of the Southern and Central Tablelands.		disturbed and unlikely to support this species.
Epacris purpurascens var. purpurascens	V	-	Species	-	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	5	Low. This species has been recorded from within the locality in the last 10 years on BioNet however this species is not associated with the vegetation type (PCT 4025) within the Subject Land.
Eucalyptus camfieldii	V	V	Species	-	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. 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.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.

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Eucalyptus nicholii	V	V	Species	-	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire.	8	Low. This species has not been recorded from within the locality in the last 10 years on BioNet and does not naturally occur within the locality.
Eucalyptus scoparia	E	V	Species	-	In NSW it is known from only three locations near Tenterfield. Found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops, typically at high altitudes. At lower elevations can occur in less rocky soils in damp situations.	10	Low. This species has been recorded from within the locality in the last 10 years on BioNet however it does not naturally occur within the locality.
Genoplesium baueri	E	E	Species	-	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	Modelled Only	Low. There are no recent or nearby records of this species and there is no suitable habitat for this species within the Subject Land.

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Grevillea parviflora subsp. parviflora	V	V	Species	-	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	1910	Low. This species has been recorded from within the locality in the last 10 years on BioNet however this species is not associated with the vegetation type (PCT 4025) within the Subject Land. A targeted survey did not detect this species.
Gyrostemon thesioides	E	-	Species	-	Grows on hillsides and riverbanks and may be restricted to fine sandy soils Within NSW, has only ever been recorded at three sites, to the west of Sydney, near the Colo, Georges and Nepean Rivers. The most recent sighting was of a single male plant near the Colo River within Wollemi National Park. The species has not been recorded from the Nepean and Georges Rivers for 90 and 30 years respectively, despite searches. Also occurs in Western Australia, South Australia, Victoria and Tasmania.	33	Low. There are no recent or nearby records of this species and there is no suitable habitat for this species within the Subject Land.
Hibbertia fumana	CE	-	Species	-	At the beginning of the species rediscovery the only known extant population was found to occur in the Moorebank area. As a result of recent surveys populations of this species have been detected over a wider range within	1118	Low. This species has been recorded from within the locality in the last 10 years on BioNet however this species is not associated with the

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					greater Sydney stretching from Richmond to Mittagong. Species is known to occur in a long intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest. Also recently found associated with aeolian sand deposits.		vegetation type (PCT 4025) within the Subject Land.
Hibbertia puberula	E	-	Species	-	Occurs on sandy soil often associated with sandstone. Flowering time is October to November.	1284	Low. This species has been recorded within the locality in the last 10 years on BioNet however there is no suitable habitat within the Subject Land.
Hibbertia sp. Bankstown	CE	CE	Species	-	This species is endemic to New South Wales and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown local government area.	218	Low. This species has been recorded from within the locality in the last 10 years on BioNet however there is no suitable habitat within the Subject Land.
Hibbertia stricta subsp. furcatula	E	-	Species	-	Habitat of the Southern Sydney population is broadly dry eucalypt forest and woodland. This population appears to occur mainly on upper slopes and above the Woronora River gorge escarpment, at or near the interface between the Lucas Heights soil landscape and	8	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat within the Subject Land.

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					Hawkesbury sandstone. Habitat of the South Coast population is poorly recorded, but appears to be dry sclerophyll forest or woodland associations in sandy soils over sandstone.		
Leucopogon exolasius	V	V	Species	-	Grows in woodland on sandstone. Restricted to the Woronora and Grose Rivers and Stokes Creek, Royal National Park.	4	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat within the Subject Land.
Macadamia integrifolia	-	V	Species	-	Macadamia Nut occurs from Mt Bauple, near Gympie, to Currumbin Valley in the Gold Coast hinterland, south-east Queensland. The species was known to occur in north-east New South Wales; was described from 1850-60 specimens collected from Camden Haven, and there are specimens also from Lismore. This species grows in remnant rainforest, including complex mixed notophyll forest, and prefers partially open areas such as rainforest edges.	3	Low. This species has not been recorded from within the locality in the last 10 years on BioNet and it does not naturally occur within the locality.
Macadamia tetraphylla	V	V	Species	-	Confined chiefly to the Richmond and Tweed Rivers in north-east NSW, extending just across	3	Low. This species has not been recorded from within the locality in the last 10 years on BioNet and it

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					the border into Queensland. Found in subtropical rainforest, usually near the coast.		does not naturally occur within the locality.
Marsdenia viridiflora subsp. viridiflora	E	-	Species	-	Grows in vine thickets and open shale woodland.	487	Low. This species has been recorded from within the locality in the last 10 years on BioNet. The vegetation within the Subject Land was highly degraded and a targeted survey did not detect this species.
Melaleuca deanei	V	V	Species	-	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	9	Unlikely. There is no suitable habitat for this species within the Subject Land.
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.	Modelled Only	Low. This species has not been recorded from within the locality in the last 10 years on BioNet.
Persoonia hirsuta	E	E	Species	-	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species's fragmentation in the landscape. Found in sandy soils in dry	3	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat within the Subject Land.

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					sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other Persoonia spp. are) but will regenerate from seed.		
Persoonia nutans	E	E	Species	-	Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks woodland or Castlereagh Scribbly Gum woodland. Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south.	580	Low. This species has been recorded from within the locality in the last 10 years on BioNet however there is no suitable habitat for this species within the Subject Land.
Pimelea curviflora var. curviflora	V	V	Species	-	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shaley-lateritic soils over sandstone and shale-sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Modelled only	Unlikely. There is no suitable habitat for this species within the Subject Land.

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Pimelea spicata	E	E	Species	-	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Narellan, Marayong, Prospect Reservoir areas) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the inland Cumberland Plain sites it is associated with grey box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	358	Low. This species has been recorded from within the locality in the last 10 years on BioNet. A targeted survey during the NSW DCCEEW endorsed survey period did not detect this species.
Pomaderris brunnea	E	V	Species	-	The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria.	11	Low. This species has not been recorded within the locality in the last 10 years on BioNet.
Pomaderris prunifolia	E	-	Species		Known from only three sites within the listed local government areas, at Rydalmere, within	2	Low. There are no nearby or recent records of this species on BioNet

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					Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere it occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River - Castlereagh Ironbark forest on shale soils.		and there is no suitable habitat within the Subject Land.
Pultenaea pedunculata	E	-	Species	-	*Pultenaea pedunculata* occurs in a range of habitats. NSW populations are generally among woodland vegetation but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.	12	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.
Prostanthera saxicola	E	-	Species	-	In the Sutherland Shire LGA, *Prostanthera saxicola* grows in localised patches in heath and open woodland and is often a major component of the ground flora of the *Angophora hispida/Eucalyptus squamosa/Corymbia gummifera*.	2	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat within the Subject Land.
Pterostylis saxicola	E	E	Species	-	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most commonly found growing in small pockets of shallow soil in depressions on	89	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no

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					sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale-sandstone transition soils or shale soils.		suitable habitat for this species within the Subject Land.
Pultenaea aristata	V	V	Species	-	Grows in moist, dry sclerophyll woodland to heath on sandstone, specifically the drier areas of Upland Swamps. Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Keira above Wollongong.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Pultenaea parviflora	E	V	Species	-	Endemic to the Cumberland Plain. May be locally abundant, particularly within scrubby-dry heath areas within Castlereagh Ironbark forest and Shale Gravel Transition forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum woodland.	79	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat within the Subject Land.
Pultenaea pedunculata	E	-	Species	-	*Pultenaea pedunculata* occurs in a range of habitats. NSW populations are generally among woodland vegetation but plants have	27	Low. There are no nearby or recent records of this species on BioNet

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					also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.		and there is no suitable habitat within the Subject Land.
Rhodamnia rubescens	CE	CE	Species	-	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	2	Unlikely. There is no suitable habitat for this species within the Subject Land.
Syzygium paniculatum	V	V	Species	-	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities	2	Unlikely. There is no suitable habitat for this species within the Subject Land.
Wahlenbergia multicaulis	E	-	Species	-	Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of	8	Low. There are no nearby or recent records of this species on BioNet. The nearest record is >4km from the Subject Land and from 2015.

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					various forms), typically amongst other herbs rather than in the open.		
Wilsonia backhousei	V	-	Species	-	In NSW Narrow-leaf Wilsonia is found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney. This is a species of the margins of salt marshes and lakes.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Birds							
Anthochaera phrygia	CE	CE	Species/ Ecosystem	As per Important Habitat Map.	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented	8	Low. This species has not been recorded within the locality in the last 10 years on BioNet. The Subject Land is not mapped as important habitat on the important habitat map for this species.

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					woodlands. In some years flocks converge on flowering coastal woodlands and forests.		
Aphelocephala leucopsis	V	V	Ecosystem	-	Dry open forests and woodland and inland scrubs of mallee, mulga and saltbush are the preferred habitat of Southern Whiteface, especially areas with fallen timber or dead trees and stumps.	2	Unlikely. There is no suitable habitat for this species within the Subject Land.
Artamus cyanopterus cyanopterus	V	-	Ecosystem	-	The Dusky Woodswallow is widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is	92	Moderate. There are nearby and recent records of this species within the locality. This highly mobile species may be an occasional visitor but this species is not dependent (i.e., for breeding or important life cycle periods) on habitats in the Subject Land.

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					typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris (Higgins and Peter 2002). Birds are also often observed in farm land, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber.		
Botaurus poiciloptilus	E	E	Ecosystem	Brackish or freshwater wetlands.	The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	2	Low. There is no suitable habitat for this species within the Subject Land.
Burhinus grallarius	E	-	Species	Fallen/standing dead timber including logs.	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen	4	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.

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					timber. Largely nocturnal, being especially active on moonlit nights.		
Calidris ferruginea	CE	CE	Species/ Ecosystem	As per Important Habitat Map.	The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes the inland	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Callocephalon fimbriatum	E	E	Species/ Ecosystem	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	7	Low. This species has not been recorded within the locality in the last 10 years on BioNet. The Subject Land is highly degraded and does not contain suitable habitat for this species.

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Calyptorhynchus lathami lathami	V	V	Species/ Ecosystem	Living or dead tree with hollows greater than 15cm diameter and higher than 8m above ground. Presence of Allocasuarina and casuarina species.	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	9	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is suitable foraging habitat within the Subject Land, however the Subject Land occurs within a highly disturbed landscape and does not contain any suitable breeding habitat.
Circus assimilis	V	-	Ecosystem	-	The Spotted Harrier occurs throughout the Australian mainland, except in densly forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	13	Low. This species has not been recorded within the locality in the last 10 years on BioNet.

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Climacteris picumnus victoriae	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, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	2	Low. This species has not been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is degraded and unlikely to support this species.
Daphoenositta chrysoptera	V	-	Ecosystem	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.	97	Low. This species has not been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is degraded and unlikely to support this species.

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Ephippiorhynchus asiaticus	E	-	Ecosystem	Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these swamps.	Mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation, including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters, as well as extending into adjacent grasslands, paddocks and open savannah woodlands. They also forage within or around estuaries and along intertidal shorelines, such as saltmarshes, mudflats and sandflats, and mangrove vegetation.	2	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.
Epthianura albifrons	E	-	Ecosystem	-	Low vegetation in salty coastal and inland areas and crops. Runs along ground and is found in local flocks in Winter.	2	Unlikely. There is no suitable habitat for this species within the Subject Land.
Falco hypoleucos	E	-	Ecosystem	-	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Modelled Only	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.

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	BC Act	EPBC Act					
Falco subniger	V	-	Ecosystem	-	The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day.	3	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.
Gallinago hardwickii	V	V	-	-	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration.	7	Unlikely. There is no suitable habitat for this species within the Subject Land.
Grantiella picta	V	V	Ecosystem	Mistletoes present at a density of greater than five mistletoes per hectare.	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its	Modelled Only	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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					distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests.		
Haliaeetus leucogaster	V	-	Species/ Ecosystem	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	96	Low. There are recent and nearby records of this species on BioNet. There is no suitable foraging habitat within the Subject Land however this highly mobile species may occasionally fly over the Subject Land.
Hieraaetus morphnoides	V	-	Species/ Ecosystem	Nest trees - live (occassionally dead) large old trees within vegetation.	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	69	Low. There are nearby and recent records of this species on BioNet. This highly mobile species may be an occasional visitor but this species is not dependent (i.e., for breeding or important life cycle periods) on habitats in the Subject Land.
Hirundapus caudacutus	V	V	Ecosystem	-	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	21	Low. This species has been recorded in the locality in the last 10 years on BioNet. However, this species is an

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							ariel species and is not dependent on habitats within the Subject Land.
Ixobrychus flavicollis	V	-	Ecosystem	Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation.	Usually found on coastal plains below 200 m. Often found along timbered watercourses, in wetlands with fringing trees and shrub vegetation. The sites where they occur are characterized by dense waterside vegetation.	26	Low. This species has been recorded in the locality in the last 10 years on BioNet. However, there is no suitable habitat within the Subject Land.
Lathamus discolor	E	CE	Species/ Ecosystem	As per Important Habitat Map.	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW . This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	61	Moderate. This species has been recorded in the locality in the last 10 years on BioNet. The Subject Land is not mapped on the Important Habitat Map for this species. Habitat within the Subject Land is highly degraded and unlikely to support this species.
Lophochroa leadbeateri	V	E	Species/ Ecosystem	Living or dead tree with hollows greater	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially	2	Unlikely. This species is not known to occur within the locality. The only

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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				than 10cm diameter.	on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.		record is a Vagrant or escaped animal on BioNet.
Lophoictinia isura	V	-	Species/ Ecosystem	Nest trees	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata or E. smithii. Individuals appear to occupy large hunting ranges of more than 100km2. They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	19	Low. This species is highly mobile and has been recorded in the locality in the last 10 years on BioNet. This highly mobile species may be an occasional visitor but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent (i.e., for breeding or important life cycle periods) on habitats in the study area.
Melithreptus gularis gularis	V	-	Ecosystem	-	Eucalypt woodlands within an approximate annual rainfall range of 400-700mm	11	Low. This species has not been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is highly

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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							degraded and unlikely to support this species.
Neophema pulchella	V	-	Ecosystem	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	4	Low. This species has not been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species.
Ninox connivens	V	-	Species	A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	3	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land.
Ninox strenua	V	-	Species	A living or dead tree with a hollow >20 cm	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed	56	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is suitable

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				diameter that occurs >4 metres above the ground.	forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.		foraging habitat within the Subject Land, however the Subject Land occurs within a highly disturbed landscape and does not contain any suitable breeding habitat.
Pandion cristatus	V	-	Species/ Ecosystem	Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting.	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	14	Low. There are recent and nearby records of this species on BioNet. There is no suitable foraging habitat within the Subject Land however this highly mobile species may occasionally fly over the Subject Land.
Parvipsitta pusilla	V	-	Ecosystem	-	Distributed in forests and woodlands from the coast to the western slopes of the Great	204	Moderate. There are recent and nearby records of this species on

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					Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.		BioNet. There is suitable foraging habitat within the Subject Land, however the Subject Land occurs within a highly disturbed landscape and does not contain any suitable breeding habitat.
Petroica boodang	V	-	Ecosystem	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	16	Low. There are recent and nearby records of this species on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species.
Petroica phoenicea	V	-	Ecosystem	-	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered	8	Low. This species has not been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species.

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					migratory. The Flame Robin breeds from about August to January.		
Petroica rodinogaster	V	-	Species	-	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	1	Low. This species has not been recorded within the locality in last 10 years on BioNet. Habitat within the Subject Land is degraded and unlikely to support this species.
Pycnoptilus floccosus	-	V	Ecosystem	-	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria (Higgins & Peter 2002; Loyn et al. 2021). Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne (Higgins & Peter 2002; Loyn et al. 2021). Pilotbirds are strictly	1	Low. This species has not been recorded within the locality in the last 10 years on BioNet. There is no suitable habitat for this species within the Subject Land.

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					terrestrial, living on the ground in dense forests with heavy undergrowth (Higgins & Peter 2002).		
Sternula albifrons	E	-	Species/ Ecosystem	-	Almost exclusively coastal, preferring sheltered environments; however may occur several hundred kilometres from the sea in harbours, inlets and rivers.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Stictonetta naevosa	V	-	Ecosystem	-	The freckled duck breeds in permanent fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits.	6	Unlikely. There is no suitable habitat for this species within the Subject Land.
Tringa nebularia	E	E	-	-	Habitat is diverse, both inland and coastal. Found inland on both permanent and temporary wetland- billabongs, swamps, lakes, floodplains, sewage, farms and saltwater ponds. On the coast, it uses sheltered estuaries and bays with extensive mudflats, mangrove swamps, muddy shallows of harbours and lagoons and occasionally rocky tidal edges.	2	Unlikely. There is no suitable habitat for this species within the Subject Land.

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Tyto novaehollandiae	V	-	Species	A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	3	Low. This species has not been recorded within the locality in last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land.
Tyto tenebricosa	V	-	Species	Clifflines/ledges. A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground.	Often found in tall old-growth forests, including temperate and subtropical rainforests. In NSW mostly found on escarpments with a mean altitude less than 500 metres. Nests and roosts in hollows of tall emergent trees, mainly eucalypts often located in gullies. Nests have been located in trees 125 to 161 centimetres in diameter.	2	Low. There are nearby or recent records of this species on BioNet. There is no suitable habitat for this species within the Subject Land.
Rostratula australis	E	E	Ecosystem	-	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in	Modelled Only	Low. This species has not been recorded within the locality in last 10 years on BioNet. Habitat within the

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					the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.		Subject Land is degraded and unlikely to support this species.
Stagonopleura guttata	V	-	Ecosystem	-	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities.	Modelled Only	Low. This species has not been recorded within the locality in last 10 years on BioNet. Habitat within the Subject Land is degraded and unlikely to support this species.
Mammals							
Cercartetus nanus	V	-	Species	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest . Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will	4	Low. There are no nearby or recent records of this species on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species.

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					use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period .		
Chalinolobus dwyeri	E	E	Species	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	10	Low. This species has not been recorded within the locality in last 10 years on BioNet. There is no suitable roosting habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.
Dasyurus maculatus	V	E	Ecosystem	-	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and	3	Low. This species has not been recorded within the locality in last 10 years on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species.

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					inland riparian forest, from the sub-alpine zone to the coastline.		
Falsistrellus tasmaniensis	V	-	Ecosystem	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor . This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites .	53	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is no suitable roosting habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.
Isoodon obesulus obesulus	E	E	Species	Requires dense ground cover in a variety of habitats.	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	1	Low. There are no nearby or recent records of this species on BioNet. There is no suitable habitat for this species within the Subject Land.
Micronomus norfolkensis	V	-	Ecosystem	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	69	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is no suitable roosting habitat within the Subject Land and it would provide poor quality foraging habitat given its

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							location with an industrial landscape.
Miniopterus australis	V	-	Species/ Ecosystem	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	Coastal north-eastern NSW and eastern Queensland. Little Bent-wing Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel 100s km from feeding home ranges to breeding sites. Little Bent-wing Bat has a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	21	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.

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Miniopterus orianae oceanensis	V	-	Species/ Ecosystem	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500.	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	114	Low. This species has been recorded within the locaility in the last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.
Myotis macropus	V	-	Species	Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs,	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing	66	Moderate. This species has been recorded within the locality in the last 10 years on BioNet. Habitat within the Subject Land is highly degraded and unlikely to support this species. There is no suitable

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				lagoons, estuaries, dams and other waterbodies, on or within 200m of the site.	trees, storm water channels, buildings, under bridges and in dense foliage.		breeding habitat within the Subject Land.
Petaurus australis australis	V	-	Ecosystem	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	1	Low. There are no records of this species on BioNet. Habitat within the Subject Land is highly degraded and is unlikely to support this species.
Petauroides volans	E	E	Species	-	The Greater Glider occurs in eucalypt forests and woodlands. Utilise tree hollows	Modelled Only	Low. There are no records of this species on BioNet. Habitat within the Subject Land is highly degraded and is unlikely to support this species.
Petaurus norfolcensis	V	-	Species	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal	2	Low. There are no nearby or recent records of this species on BioNet.

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					ranges in the southern part of its range . Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias . There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.		Habitat within the Subject Land is highly degraded and is unlikely to support this species.
Petrogale penicillata	E	V	Species	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines.	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	1	Unlikely. There is no suitable habitat for this species within the Subject Land.
Phascolarctos cinereus	E	E	Species	Presence of koala use trees.	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation	479	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is potential

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					depends on the size and species of trees present, soil nutrients, climate and rainfall .		foraging habitat within the Subject Land however the Subject Land occurs within a disturbed landscape and is unlikely to support this species. A targeted survey during the approved BAR did not detect this species and no evidence of Koalas was detected during the site assessment.
Pseudomys novaehollandiae	V	V	Ecosystem	-	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	7	Low. There are no nearby or recent records of this species on BioNet and there is no suitable habitat for this species within the Subject Land.
Pteropus poliocephalus	V	V	Species/ Ecosystem	Breeding camps.	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	1074	Moderate. There are nearby and recent records of this species on BioNet. This species may use the Subject Land for foraging but this species is not dependent (i.e., for breeding or important life cycle

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							periods) on habitats in the Subject Land.
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. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	27	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.
Scoteanax rueppellii	V	-	Ecosystem	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	69	Moderate. This species has been recorded within the locality in the last 10 years on BioNet. There is no suitable breeding habitat within the Subject Land and it would provide poor quality foraging habitat given its location with an industrial landscape.
Amphibians							

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Heleioporus australiacus	V	V	Species	-	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Modelled Only	Low. There are no records of this species on BioNet and there is no suitable habitat within the Subject Land.
Litoria aurea	E	V	Species	Within 1km of wet areas.	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	40	Low. There are no nearby or recent records of this species on BioNet. Habitat within the Subject Land is degraded and unlikely to support this species.
Pseudophryne australis	V	-	Species	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests	6	Low. There are no nearby or recent records of this species on BioNet

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					and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.		and there is no suitable habitat for this species within the Subject Land.
Reptiles							
Varanus rosenbergi	V	-	Ecosystem	-	This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	2	Unlikely. There is no suitable habitat for this species within the Subject Land.
Hoplocephalus bungaroides	E	E	Species/ Ecosystem	Rocky Areas.	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most	Modelled only	Unlikely. There is no suitable habitat for this species within the Subject Land.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.		
Gastropods							
Meridolum corneovirens	E	-	Species	-	Primarily inhabits Cumberland Plain woodland (an EEC). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	341	Low. This species has been recorded within the locality in the last 10 years on BioNet. There is suitable habitat within the Subject Land. However, a targeted survey during the approved BAR did not detect this species within the locality.
Pommerhelix duralensis	E	E	Species	-	Endemic to NSW and confined to northwest fringes of the Cumberland Plain. Distribution extends as far north as St. Albans; southwest to Mulgoa, and southeast to Parrammatta. Occurs in low densities in Hawkesbury Sandstone Vegetation and Shale/Sandstone Transition Forest. Found under rocks, logs, bark and in leaf litter. Has a strong preference for shale-	Modelled only	Low. There are no records of this species on BioNet. There is no suitable habitat for this species within the Subject Land.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					influenced transitional landscapes and has not been confirmed outside such habitats.		
Fish							
Macquaria australasica	-	E	-	-	Macquarie perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	Modelled Only	Unlikely. There is no suitable habitat for this species within the Subject Land.

Appendix B. BC Act 5-part tests.

Biodiversity Conservation Act 2016 (NSW)– Test of Significance (5-part Test) for River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – Endangered

(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

N/A

(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

The proposed activity is not likely to have an adverse effect on the extent of River-Flat Eucalypt Forest such that its local occurrence is at risk of extinction. A total of 3ha of associated PCTs will be impacted by the proposal. The extent of River-Flat Eucalypt Forest to be impacted by the proposed activity is degraded (which is typical of the location) and subject to considerable edge effects from the surrounding land use and historical clearing. Occurrences of River-Flat Eucalypt Forest in equal quality will continue to exist adjacent to the proposed activity and in the wider locality.

(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,

The proposed activity is not likely to substantially and adversely modify the composition of River-Flat Eucalypt Forest such that its local occurrence is a risk of extinction. Approximately 3ha of this community will be impacted. The extent of River-Flat Eucalypt Forest to be impacted by the Project is degraded (which is typical of the location) and subject to considerable edge effects. Moreover, it occurs on the edge of a larger patch and therefore does not cause fragmentation. Occurrences of River-Flat Eucalypt Forest in equal quality will continue to exist adjacent to the proposed works area and in the wider locality.

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

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

While all habitat is important, the extent of River-Flat Eucalypt Forest within the proposed works area (3ha) is degraded and subject to considerable edge effects from surrounding land use and historical clearing.

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

The local occurrence of River-Flat Eucalypt Forest is already heavily fragmented by roads and industrial development. No increased fragmentation will occur as a result of the proposed activity. Occurrences of River-Flat Eucalypt Forest in equal quality will continue to exist adjacent to the proposed works area and in the wider locality.

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

The habitat to be impacted is unlikely to be of high importance to this community given its level of degradation. Occurrences of River-Flat Eucalypt Forest in equal quality will continue to exist adjacent to the proposed works area and in the wider locality.

(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),

The activity proposed is not likely to have an adverse effect on any declared area of critical habitat, directly or indirectly.

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

The following Key Threatening Processes (KTPs) are documented to impact upon the survival of the ecological community:

- Clearing of native vegetation

The area of River-Flat Eucalypt Forest to be impacted by the proposed activity is highly degraded and located on the edge of a larger patch. Equally suitable habitat will remain adjacent to the proposed works area and in the broader locality.

Conclusion

There will be no significant impact on the ecological community and therefore, the proposed activity should not warrant the preparation of a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR).

Appendix C. EPBC Act Assessments of Significance.

Environment Protection and Biodiversity Conservation Act 1999 – Assessment of Significance for River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria – Critically Endangered

(1) Reduce the extent of an ecological community

A total of 2.04 ha of this TEC is expected to be impacted as a result of the proposal, representing a loss of 2.74% of the local distribution. The extent of River-Flat Eucalypt Forest to be impacted by the proposed activity is degraded (which is typical of the location) and subject to considerable edge effects from the surrounding land use and historical clearing. Occurrences of River-Flat Eucalypt Forest in equal quality will continue to exist adjacent to the proposed activity and in the wider locality.

(2) Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The TEC is already heavily fragmented from the M5 motorway, and the surrounding industrial area. The proposal is expected to cause slightly more fragmentation by increasing the distance between the remnant vegetation north and south of the M5 in the Georges River riparian zone.

(3) Adversely affect habitat critical to the survival of an ecological community

No critical habitat will be impacted as a result of the proposed works.

(4) Modify or destroy abiotic (nonliving) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

Construction works across the Georges River including proposed basin constructions could potentially lead to erosion or disturbance of the bed and banks of watercourses which could alter the channel form and stability and lead to sedimentation in the watercourse potentially resulting in water quality impacts.

(5) Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

There is not expected to be a substantial change in species composition as a result of the proposal.

(6) Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- **assisting invasive species, that are harmful to the listed ecological community, to become established**
- **causing regular mobilisation of fertilisers, herbicides, or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community**

The proposed development will not cause a substantial reduction in the quality or integrity of the occurrence of this TEC.

(7) Interfere with the recovery of an ecological community.

It is not expected that the removal/modification of approximately 2.04ha of the TEC will interfere with the recovery of this ecological community.

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Appendix D

PACHCI Stage 2 Addendum

250115 M5 Westbound Traffic Upgrade – PACHCI Stage 2 Addendum

Transport for NSW PACHCI Stage 2

Navin Officer Heritage Consultants Pty Ltd *August 2025*

BD Infrastructure –Helles Ave Laydown Site at Moorebank

Summary

Transport for NSW have engaged NOHC to provide a heritage assessment for the M5 westbound upgrade, as part of the PACHCI stage 2 assessment. This addendum report augments an earlier assessment of the M5 Motorway westbound upgrade between Moorebank Avenue and Hume Highway (NOHC 2021).

This addendum report assesses the Aboriginal heritage potential of a proposed laydown site at Helles Ave, Moorebank and installation of a new conduit for NBN cabling almond a section of Anzac Road near Yulong Close.

In relation to the cabling this will be within the existing road easement which constitutes previously disturbed lands with little or no archaeological potential. In relation to the lay down area, all proposed works will be contained within the previously disturbed Helles Park Landfill area. NOHC conducted a pedestrian survey for Aboriginal Archaeological sites of the subject land on the 15th August 2025 (see section 3). The findings of this assessment are as follows:

- There are no AHIMS sites within the impact area (outlined area in orange and Yellow in Figure 3-8).
- Three areas were identified
    - a n no disturbance area along the eastern bank of the Georges River.
    - a proceed with caution area between the existing boat ramp and existing storm water infrastructure that will be used as a barge loading point. This section of the riverbank has been subject to historical disturbance including earthworks for the construction of the existing bridge, large stormwater outlet and the existing boat ramp. Works in this area will be subject to an unexpected finds protocol and
    - two laydown areas that have been highly disturbed and require no further assessment.

This assessment concludes that as long as the remainder of the river bank shown in the red hatched areas in Figure 3-7and Figure 3-8 are not subject to disturbance then no further archaeological assessment is required.

This report was written by Christian Keyes, archaeologist B. Sc. UNSW (2019) and reviewed by Susan McIntyre-Tamwoy, archaeologist BA (Hons) USyd 1982and PhD JCU (2002)

1 Project Brief

This project involves a proposed additional compound / stockpiling area to the north of the M5 Motorway (accessed from Helles Avenue), including placement of hardstand material and removal of trees to accommodate heavy vehicle access.

The project will involves:

- extension of the compound / stockpile site (by about 0.2 hectares) to the south of the M5 Motorway
- Extension of the project area to accommodate use of the existing boat ramp (about 0.09 hectares) adjacent to the southern compound site) and barge/crane pads if required. Use of Woodbrook Road (on the western side of the Georges River) as a construction access route for light vehicles and an alternative route for local traffic where required
- Installation of a new conduit for NBN cabling, along a section of Anzac Road near Yulong Close.

1.1 Previous Works

Several past projects are directly relevant to the M5 upgrade works. These reports are summarized below.

M5 Motorway Westbound Traffic Upgrade: Preliminary Site Investigation and Landfill Gas Assessment (Aurecon, 2022)

This investigation was undertaken for Transport for NSW prior to the upgrading of the M5 Motorway westbound between Moorebank Avenue and the Hume Highway to ease traffic congestion and improve connectivity. This included constructing a new bridge over the Georges River and upgrading the Moorebank Avenue intersection.

This report is relevant because it identifies and maps the disturbance area related to this Helles Ave landfill along with the ABB Australia site, both of which containing hazardous materials such as PCBs, hydrocarbons, heavy metals, asbestos, and landfill gases (methane and CO_2). Investigations identified potential environmental and safety risks, including explosive gas levels and contaminated groundwater. A Conceptual Site Model outlined these risks and recommended mitigation strategies.

M5 Motorway Westbound Traffic Upgrade, Moorebank Aboriginal and Non-Aboriginal Heritage Impact Assessment (Navin Officer Heritage Consultants, 2021)

Navin Officer Heritage Consultants, commissioned by Aurecon, conducted an Aboriginal and Non-Aboriginal Heritage Impact Assessment for the proposed M5 Motorway westbound upgrade between Moorebank Avenue and Hume Highway. The assessment, which was part of Stage 1 of Transport for NSW's Aboriginal cultural heritage procedure, supports the project's Review of Environmental Factors. Key findings include the verification of the location of a previously destroyed Aboriginal site (MA PAD 1), one listed historic heritage item (Kitchener House), and another historic heritage feature - the former "Yulong" playing field gates, which hold potential heritage value.

The report concluded that some historical archaeological remains related to past military use may exist, however, overall potential for Aboriginal objects is low due to prior land disturbance. Recommendations include proceeding with caution, protecting identified built heritage during construction, and monitoring vibration impacts. Options for managing possible archaeological remains through an Excavation Permit or Exception under the Heritage Act. Heritage inductions for site personnel and the adoption of clear procedures for unexpected finds.

Moorebank Intermodal Terminal: Archaeological Salvage Report (Biosis Pty Ltd, 2020)

Biosis was commissioned by Liberty Industrial, on behalf of the Sydney Intermodal Terminal Alliance, to undertake Aboriginal cultural heritage salvage for the Moorebank Intermodal Terminal project in Moorebank, NSW. This work was completed in line with the approved salvage strategy and in compliance with Condition B7 of the Minister's Conditions of Approval. The Environmental Assessment identified six Aboriginal sites within the construction footprint requiring salvage

excavations. Surface artefact recovery was limited due to dense ground cover, with only one artefact retrieved from MA5. Subsurface excavations at MA5 and MA9 uncovered a total of 799 stone artefacts, and OSL dating placed occupation at both sites between approximately 2,800 and 16,400 years ago. The salvage fulfils cultural heritage obligations for the identified sites.

Moorebank Intermodal Terminal Aboriginal Heritage Assessment (Navin Officer Heritage Consultants, 2014)

In 2010, the Australian Government tasked the Department of Finance to study the feasibility of developing an intermodal terminal at Moorebank, southwestern Sydney. Following a positive business case, the Government committed to the Moorebank Intermodal Terminal Project in 2012. The site, which was then occupied by the School of Military Engineering, was soon to be vacated (by mid-20150. The 220-hectare project will include two freight terminals, one for international cargo and one for interstate freight, as well as warehousing facilities.

This project was required to boost rail freight usage, reducing reliance on Sydney's road network by linking to the Southern Sydney Freight Line. Navin Officer Heritage Consultants was engaged to assess cultural heritage as part of the Environmental Impact Statement. This site had five artefact occurrences, three scarred trees and three potential archaeological deposits.

2 AHIMS Search

There are no sites within the construction and laydown area. There are 3 sites nearby. These include:

45-5-3629 - Collingwood Precinct Aboriginal Place

45-5-4281 – MAPAD2

45-5-4280 – MAPAD1 (Destroyed)

All of these sites are well away from the subject land and will not be impacted by this proposal.

3 Site Visit 15/08/2025

A site visit was conducted on Friday 15/08/2025 to look at any potential heritage impacts at the Helles Avenue site. The walk over was conducted by

Dr Susan McIntyre-Tamwoy (NOHC)
Christian Keyes (NOHC)
Adam Moore (Transport for NSW)
Graham Christy (Transport for NSW)
Noni Ross (Transport for NSW)
Shalina Donovan (Transport for NSW)
Nick Cowman (BD Infrastructure)
Daniel Di Salvo

The walk over identified three key areas that will have different heritage outcomes.

No Disturbance Area

The riverbank to the south of the boat ramp Figure 3-7 and Figure 3-8 red hatched area is the area that should not be disturbed as it is the natural bank of the Georges River with mature trees (Figure 3-2). The bank was identified as having natural over bank sediment build up (Figure 3-1).

Although trees appear to be regrowth along the bank, there is deep undisturbed sediment with heritage potential. The bank is greater than 6 metres high upriver from the boat ramp and is heavily vegetated. There is potential for heritage items to be *in situ* sub surface (Figure 3-2 Figure 3-3).

Figure 3-1 Overbank sediment at the base of the Boat Ramp

Figure 3-2 View to the west from the top of the eastern bank 6+ metres high

Figure 3-3 Silt sediment at the top of the eastern bank

Figure 3-4 Looking north towards the M5 bridge with the no disturbance area to the left.

Caution Area

This area is part of the riverbank which is immediately north of the no disturbance area. It is the yellow hatched area in Figure 3-7 and Figure 3-8. The area between the northern side of the boat ramp and the storm water outfall will require tree removal and earthworks to accommodate new storm water infrastructure and bridge footings.

The eastern foreshore, specifically the area to the north of the boat ramp, including under the existing M5 bridge carriageway, will be used for temporary and permanent construction purposes. This will involve in summary:

- Temporary barge platform, including sheet piled river wharf, in-river gabion rock, cofferdam, stabilised DGS crane and civil pad. This will involve excavation of unsuitable material and building up for geotechnical stability purposes (Figure 3-6)
- Temporary and permanent bridge pier (#4) construction pad, including stabilised pad, sheet pile embankment (Figure 3-5)
- Construction of permanent drainage infrastructure including twin pipes and headwall (at SWL of river) with required cofferdam and earthworks

An unexpected finds protocol should be implemented to mitigate any heritage items being damaged or destroyed.

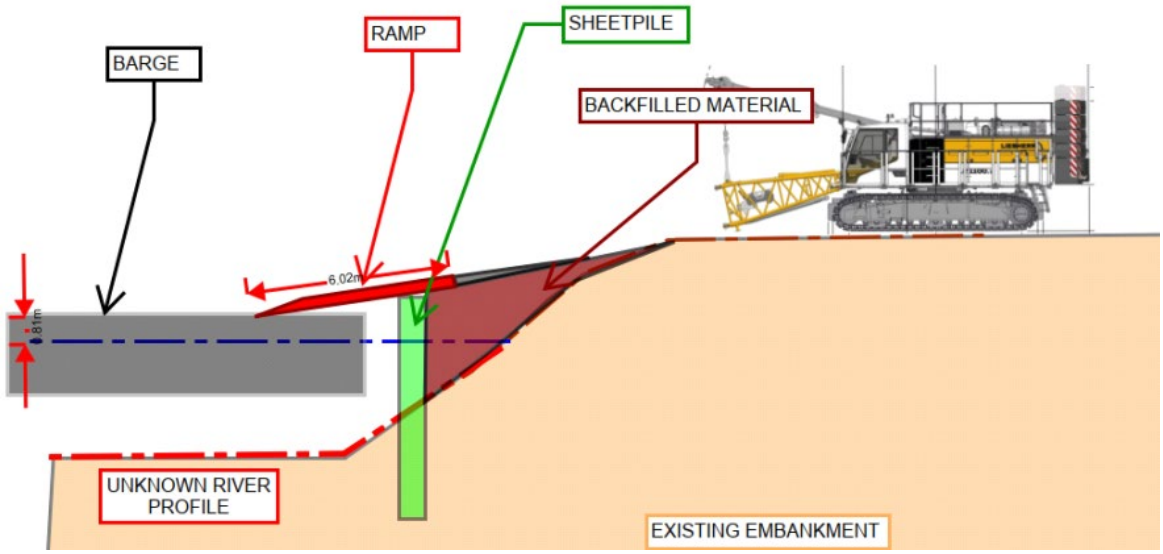

Figure 3-5 Temporary Ramp and barge access in Caution area

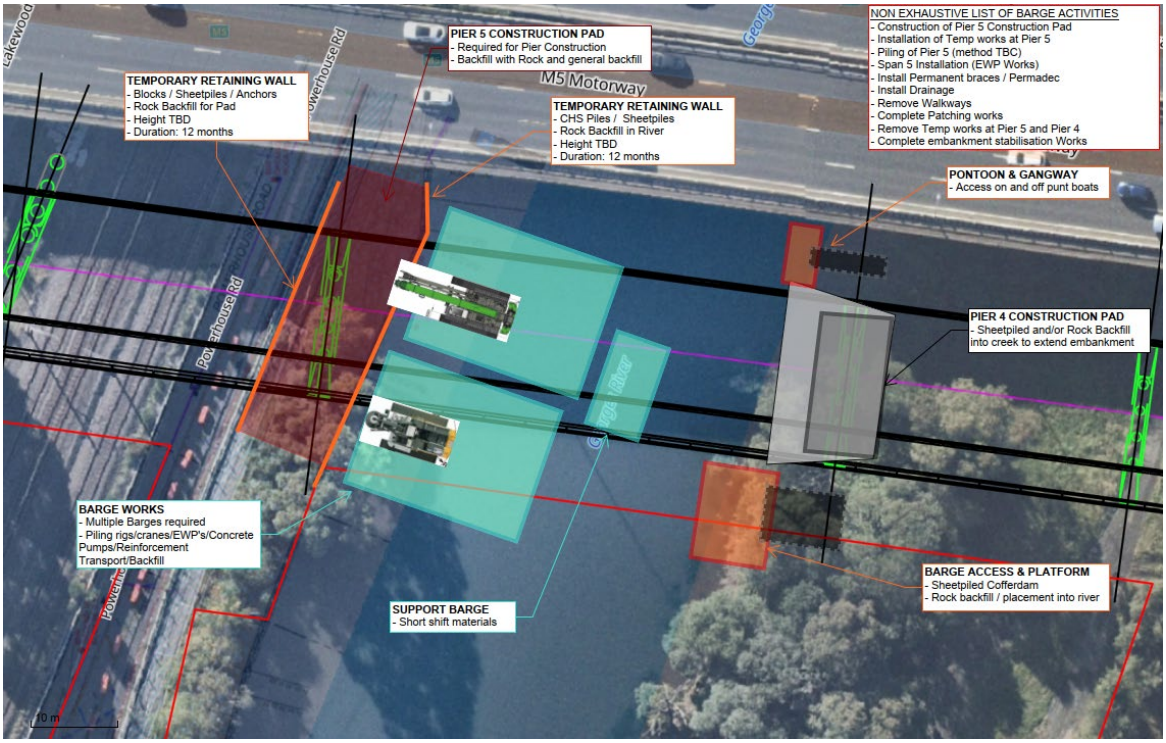

Figure 3-6 Barge and Ramp platform at the northern end of the proceed with caution area

Ancillary Laydown Area

The ancillary laydown area is adjacent to the barge ramp and shown in orange in Figure 3-8. This area was previously part of the Helles Park landfill that was active from the mid 1970's. The former Helles Park landfill is located on the eastern side of the Georges River and comprises about 12 hectares of land extending north and south of the proposal area. The exact dates of the landfilling activities are not known but likely occurred in the early to mid-1970s and was covered with a nominal clay cap when it was finally decommissioned in the 1980s.

The EP Risk investigations included the collection of numerous soil, groundwater, and surface water samples for laboratory analysis across the former landfill. Limited sampling was conducted within the proposal area or below the bridge over the Georges River. (Aurecon, 2022). Soil within the proposal area contains contaminants such as PCBs, total recoverable hydrocarbons (TRH C16-C34) and heavy metals in excess of the applicable Tier I screening values. Asbestos containing materials have also been detected in the proposal area. Additionally, waste inclusions from the former landfill have been encountered during the investigations commencing at about 0.7m and extending to two metres below ground level depending on the area sampled. The waste materials encountered ranged from four to seven metres thick (Aurecon, 2022).

Due to this level of disturbance any heritage items will have been destroyed. Transport for NSW will be putting down a gravel cap on the laydown area to ensure that impacts to the fill is avoided. This area will be used for services and equipment for the barge ramp area.

Proposed Laydown Area

The proposed laydown area off Helles Avenue will be primarily used for equipment delivered by road. The area shown in green in Figure 3-7, the main part of this area will be in the northern section of the site as the land adjoining the water ski club and the remote-control car club will be kept clear. The roadway along the eastern edge of the green bounded area will be used as primary truck access. There is a possibility that some trees will need to be removed or trimmed to allow for larger truck access. This area has similar contamination issues to the ancillary area and so ground disturbance be avoided. There will be a gravel cap over the laydown area to prevent any breach of the contaminated fill.

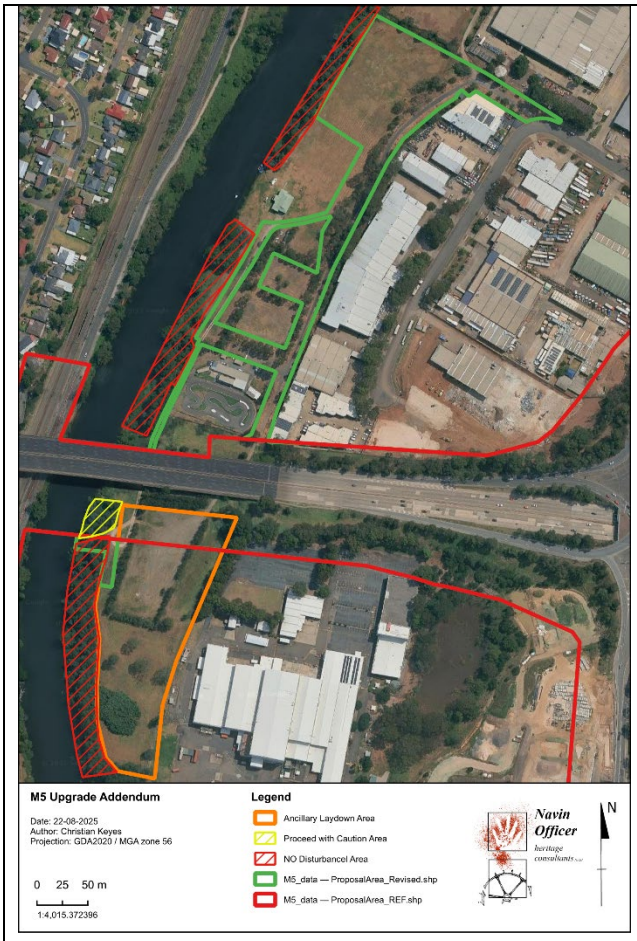

Figure 3-7 Helles Avenue Laydown area

Figure 3-8 No disturbance area and caution area with auxiliary laydown area

NBN Cable Conduit- Anzac Road near Yulong Close

This component of the works involves the laying of conduit for NBN cables along Anzac Road (see Figure 3-9). The proposed works are within the existing road easement bounded in green to the south of the motorway in Figure 3.9.

The area has been subject to past surface and subsurface disturbance that is likely to have removed evidence of past Aboriginal occupation and use. This area therefore requires no further archaeological assessment in relation to Aboriginal heritage. Works may proceed subject to an Unexpected Finds Protocol.

Figure 3-9 Anzac Road NBN Cable Conduit in Green

4 Recommendations

This assessment concludes that the subject land in both the Ancillary laydown area and the laydown area is heavily disturbed. Except for a thin band of land along the edge of the river that formed a natural barrier between the landfill and the river itself, any evidence which may once have existed in this area will have been removed during its past use as a landfill pit.

There is some potential that land along the immediate banks of the river may retain archaeological evidence of former Aboriginal use and occupation. This area is roughly delineated by the current tree line along the river and is shown as a red hatched area in Figure 3-7and Figure 3-8. In preparing this report we not that the LALC was not available to attend the site walk over and should be given a chance to review this addendum report.

It is therefore recommended that

1. a copy of this report be provided to Gandangarra LALC for comment
2. all disturbance stays within the proposed laydown area shown in green in Figure 3-7; and the Auxiliary laydown area shown in orange in Figure 3-8.
3. the Caution area shown hatched in yellow in Figure 3-8 be subject to an unexpected finds protocol. Transport for NSW may use their own approved protocols or the example attached (see appendix)
4. subsurface impact is avoided in the red hatched areas where some potential remains for remnant archaeological evidence of Aboriginal use and occupation.
5. cultural heritage inductions for this project should be updated to reflect the recommendations in this addendum.

5 References

Aurecon. (2022). M5-motorway-westbound-appendix-g-preliminary-site-investigation-and-landfill-gas-assessment.pdf (509608). Transport for NSW.

Biosis Pty Ltd. (2020). Moorebank Intermodal Terminal: Archaeological Salvage Report. Liberty Industrial on behalf of the Sydney Intermodal Terminal Alliance.

Navin Officer Heritage Consultants. (2014). Moorebank Intermodal Terminal: Aboriginal Heritage Assessment. Parsons Brinckerhoff.

Navin Officer Heritage Consultants. (2021). M5 Motorway Westbound Traffic Upgrade Final 200080.

Appendix

Unanticipated discovery protocols

Protocol to follow in the event that Aboriginal object(s) or historical relics (other than human remains) are encountered and no AHIP has been approved

In the event that object(s) which are suspected of being Aboriginal object(s) or relic(s) are encountered during development works, then the following protocol will be followed:

1. Cease any further excavation or ground disturbance, in the area of the find(s).

    a. The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be temporarily halted; and

    b. The site supervisor and the principal will be informed of the find(s).

2. Do not remove any find(s) or unnecessarily disturb the area of the find(s);

3. Ensure that the area of the find(s) is adequately marked as a no-go area for machinery or further disturbance, and that the potential for accidental impact is avoided;

4. Note the location and nature of the finds, and report the find to:

    a. Relevant project personnel responsible for project and construction direction and management, including the First Nations unit in TfNSW,

    b. Report the find to Heritage NSW.

5. Where feasible, ensure that any excavation remains open so that the finds can be recorded and verified. An excavation may be backfilled if this is necessary to comply with work safety requirements, and where this action has been approved by Heritage NSW. An excavation that remains open should only be left unattended if it is safe and adequate protective fencing is installed around it.

6. Following consultation with the relevant statutory authority (Heritage NSW), and, where advised, any other relevant stakeholder groups, the significance of the finds should be assessed and an appropriate management strategy followed. Depending on project resources and the nature of the find(s), this process may require input from a consulting heritage specialist.

7. Development works in the area of the find(s) may re-commence, if and when outlined by the management strategy, developed in consultation with, and approved by the relevant statutory authority.

8. If human skeletal material is encountered, the protocol for the discovery of human remains should be followed (refer attached).

Protocol to follow in the event of the discovery of suspected human remains

The following protocol will be actioned if suspected human bone material is revealed during development activities or excavations:

1. All works must halt in the immediate area of the find(s) and any further disturbance to the area of the find(s) prevented.

    c. The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted; and

    d. The site supervisor and the Principal/Project manager will be informed of the find(s).

2. If there is substantial doubt regarding a human origin for the remains, then consider if it is possible to gain a qualified opinion within a short period of time. If feasible, gain a qualified opinion (this can circumvent proceeding further along the protocol for remains which are not human). If conducted, this opinion must be gained without further disturbance to the find(s) or the immediate area of the find(s). (Be aware that the site may be considered a crime scene that retains forensic evidence). If a quick opinion cannot be gained, or the identification is positive, then proceed to the next step.

3. Immediately notify the following of the discovery:

    a. The local Police (this is required by law);

    b. Heritage NSW;

    c. Representative(s) from the Local Aboriginal Land Council (LALC); and

    d. The project archaeologist (if not already notified).

4. Co-operate and be advised by the Police and/or coroner with regard to further actions and requirements concerning the find area. If required, facilitate the definitive identification of the material by a qualified person (if not already completed).

5. In the event that the Police or coroner instigate an investigation, construction works are not to resume in the designated area until approval in writing is gained from the NSW Police.

6. In the event that the Police and/or Coroner advise that they do not have a continuing or statutory role in the management of the finds then proceed with the following steps:

7. If the finds are not human in origin but are considered to be archaeological material relating to Aboriginal occupation then proceed with Protocol for the discovery of Aboriginal objects (other than human remains).

8. If the finds are Aboriginal or probably Aboriginal in origin:

    a. Ascertain the requirements of Heritage NSW, the Project Manager, and the views of the LALC, and the project archaeologist.

    b. Based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

        i. Avoiding further disturbance to the find and conserving the remains *in situ*;

ii. Conducting archaeological salvage of the finds following receipt of any required statutory approvals;

iii. Scientific description (including excavation where necessary), and possibly also analysis of the remains prior to reburial;

iv. Recovering samples for dating and other analyses; and/or

v. Subsequent reburial at another place and in an appropriate manner determined by the Local Aboriginal land Council in consultation with Heritage NSW and the First Nations Unit, TfNSW.

9. If the finds are non-Aboriginal in origin:

    c. Ascertain the requirements of the Heritage NSW, Project Manager, and the views of any relevant community stakeholders and the project archaeologist.

a. Based on the above, determine and conduct an appropriate course of action. Possible strategies could include one or more of the following:

    a. Avoiding further disturbance to the find and conserving the remains *in situ*;

    b. Conducting archaeological salvage of the finds following receipt of any required statutory approvals;

    c. Scientific description (including excavation where necessary), and possibly also analysis of the remains prior to reburial;

    d. Recovering samples for dating and other analyses; and/or

    e. Subsequent reburial at another place and in an appropriate manner determined in consultation with the Heritage Office and other relevant stakeholders.

10. Construction related works in the area of the remains (designated area) may not resume until the proponent receives written approval in writing from the relevant statutory authority: from the Police or Coroner in the event of an investigation, from Heritage NSW in the case of Aboriginal remains outside of the jurisdiction of the Police or Coroner, and from the Heritage NSW in the case of non-Aboriginal remains outside of the jurisdiction of the Police or Coroner.

NSW GOVERNMENT