Transport
for NSW

Richmond Road upgrade, Marsden Park

Addendum review of environmental factors

April 2025

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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.

Document control

Approval and authorisation

Title	**Richmond Road upgrade, Marsden Park addendum review of environmental factors**
Accepted on behalf of Transport for NSW by:	**Anthony Dillon** Project Manager
Signed:	
Dated:	

Document status

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Preliminary draft (V1)	16 December 2024	Tanmay Kulkarni and Salma Alyshia	Vivira Samuel
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Prepared by Jacobs and Transport for NSW.

Executive summary

The proposed modification

Transport for NSW proposes to modify Richmond Road upgrade between Elara Boulevard and Heritage Road, Marsden Park by adjusting the proposal area following detailed design and to facilitate general constructability (proposed modification).

Key features of the proposed modification would include:

- Increasing road height by up to an additional metre, from five metres to six metres above the existing road height
- Updating tie-ins to:
  - Charles Tompson Boulevard
  - Clydesdale Farm Road
  - Bolwarra Drive
  - Richmond Road
  - Existing driveway east of Richmond Road.
- Modifications to drainage infrastructure
- Widening shared user path from three metres to 3.5 metres
- Changing ancillary sites including:
  - Relocating the main project ancillary site from west of Richmond Road to the east of Richmond Road (AS1)
  - New compound area on Bolwarra Drive (AS2)
  - New stockpile area west of Richmond Road, north of South Creek (AS3).
- Changes to the construction footprint throughout, in particular at:
  - Tie-ins to Richmond Road
  - Existing driveway east of Richmond Road
  - AS1
  - Access track to the west of Richmond Road.
- Construction intersection and access upgrades from Richmond Road to AS3
- Provision for future works including the duplication of Richmond Road north of the project.

The construction of the proposed modification is expected to start in 2026 and would be completed over a 30-month period subject to approvals.

Background

Richmond Road is one of the main north-south arterial roads for Sydney's north-west, providing a vital link for freight and commuters between Blacktown and Richmond. Richmond Road forms part of the wider arterial network, from the M7 Motorway to new housing and employment precincts in the North West Growth Area (NWGA). An upgrade of Richmond Road was proposed to provide connectivity for the NWGA and improve flood evacuation for the Hawkesbury-Nepean Valley.

A review of environmental factors (REF) was prepared for the Richmond Road Upgrade between Elara Boulevard and Heritage Road, Marsden Park in October 2020 (project REF). The project REF was placed on public display between 2 November 2020 and 11 December 2020 for community and stakeholder comment. A submissions report, dated April 2021 and published with minor amendments in November 2024, was prepared to respond to issues raised. The REF was determined in August 2021 (any further reference in this Addendum to "the project "refers to the activities and scope of works described in the previously determined REF and submissions report).

This addendum REF provides a detailed description of the potential environmental impacts associated with the proposed modification for Richmond Road Upgrade, Marsden Park.

Need for the proposed modification

Following additional traffic modelling undertaken in 2024, improvements to the road design have been developed to further improve traffic flows.

The previous road design had undulations resulting in concerns about driveability. The proposed changes have addressed these concerns by adjusting the road height to create a smoother and safer driving experience. The proposed modification also connects to recent developments, with updated road connections, and allows for a future extension to duplicate Richmond Road north of the project

Additionally, the proposed modification addresses practical issues such as drainage, sight distances, and construction traffic movements. It also provides an alternative construction compound area, as the previous one described in the project REF is no longer available due to residential development.

Proposal objectives

The proposed modification is consistent with the project objectives. These objectives are:

- Provide safe and efficient access from the Marsden Park Precinct and Marsden Park North Precinct to Richmond Road
- Support the use of Richmond Road as the key freight route linking Richmond to the M7 Motorway, as well as for accessing major industrial areas such as Marsden Park along its length
- Ensure the road asset and infrastructure is designed to support emergency services
- To be consistent with the features of previous Richmond Road upgrades in line with the Growth Centres Road Framework, such as provisions for buses, pedestrians, cyclists, and motorists
- To reduce the number of crashes and serious injuries on the corridor in line with the Road Safety Plan 2021.

Options considered

Two options were considered for the proposed modification including:

- Option 1 – do nothing
- Option 2 – different location for compound site and other design changes.

Option 1 is no longer viable due to the main compound site now being used for residential development. Option 1 fails to address updated traffic modelling data and drivability concerns from fluctuations in the road level. The project's road connections with recent developments in the area also requires design changes to be made. Therefore, option 2 was selected as the preferred option as it:

- Meets the project objectives
- Is constructible
- Addresses updated traffic modelling
- Interfaces with recent development
- Facilitates future projects to the north.

Statutory and planning framework

The proposed modification is categorised as development for the purpose of a road and road infrastructure facilities and is being carried out by or on behalf of a public authority. Section 2.109 of State Environmental Planning Policy (Transport and Infrastructure) 2021 (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. Therefore, the proposed modification can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification is within land to which the Blacktown Local Environmental Plan (LEP) 2015, Penrith Local Environmental Plan 2010 and Hawkesbury Local Environmental Plan 2012 applies. The proposed modification is considered to be consistent with the zoning objectives of the applicable land use zone under each LEP.

This AREF also addresses the relevant consideration of the *Biodiversity Conservation Act 2016* (BC Act), *National Parks and Wildlife Act 1974* (NPW Act), *Biosecurity Act 2015* (Biosecurity Act), *Protection of the Environment Operations Act 1997* (POEO Act) and *Western Parkland City Authority Act 2018* (WPCA Act).

Community and stakeholder consultation

Consultation was carried out with the Deerubbin Local Aboriginal Land Council as part of the site visit on 2 October 2024 for the proposed modification area. No issues were raised.

Blacktown, Hawkesbury and Penrith City Councils, the State Emergency Service (SES) and the Department of Planning, Housing and Infrastructure (DPHI) were consulted in December 2024 and January 2025 about the proposed modification as per the requirements of sections 2.10, 2.12 and 2.13 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 and section 3.24 of the State Environmental Planning Policy (Precincts - Central River City) 2021. Bradfield Development Authority (previously Western Parkland City Authority) was consulted in March 2025 as per the requirements of section 2.15 of the State Environmental Planning Policy (Transport and Infrastructure) 2021. Penrith City Council raised concerns about potential traffic and flooding impacts to residents caused by the proposed construction ancillary facility (AS3). The SES advised on management measures to ensure safety from flood risks. The Bradfield Development Authority supported the proposed modification. No responses were received from Blacktown and Hawkesbury City Council and DPHI. These matters have been considered within this addendum REF.

Various government agencies and stakeholders have also been consulted about the proposed modification including the Blacktown City Council design review panel. The design review panel raised safety concerns for pedestrians and cyclists as well as potential impacts to bus routes. Stockland was consulted regarding the Clydesdale Farm Heritage Wall and Gate located on their land. These matters have been considered within this addendum REF.

Environmental impacts

The main environmental impacts for the proposed modification are:

Traffic and transport

During construction, the proposed modification would cause some delays and congestion at the intersection of Richmond Road and the proposed ancillary site near Clydesdale Rural Estate (AS3). The southbound right turn into AS3 and the eastbound approach to Richmond Road would be most impacted.

Due to minimal gaps in traffic for right-turning vehicles out of AS3, construction traffic would increase intersection delays and queuing. These impacts will be temporary, limited to the construction phase of the project.

Construction traffic would have a minor impact to the operation of the Richmond Road / Garfield Road intersection, with the level of service of the northbound and southbound approaches degrading slightly during the AM peak in 2026 and 2027. The average delay on the southbound approach would be 75 seconds, while the average delay on the northbound approach would be 52 seconds. This is an eight second increase to the average delay on the southbound approach and a 14 second increase on the northbound approach compared to the anticipated existing traffic scenario in 2027.

Staff and worker parking will be located primarily at AS1. However, some light vehicle parking may occur along Bolwarra Drive, close to AS2. This may have a minor impact on local street parking.

To mitigate construction phase traffic impacts, a Road Occupancy License (ROL) and Construction Traffic Management Plan (CTMP) would be prepared by the construction contractor prior to commencing roadworks construction. The construction contractor will implement the requirements of the ROL and implement temporary traffic controls to manage traffic impacts. Staff parking will be limited to the ancillary sites, construction area and Bolwarra Drive.

Noise and vibration

Noise modelling was carried out with an updated methodology. The modelling took into account the actual locations of buildings instead of predicted locations as per the project REF.

Noise impacts have been predicted for the construction of the proposed modification. Worst-case noise levels and impacts at the Noise Catchment Area (NCA) in Marsden Park directly west of the proposed modification (NCA01) have generally increased from the project REF Noise and Vibration Impact Assessment (NVIA).

A number of construction stages are predicted to result in 'highly intrusive' noise impacts at the most affected receivers. Worst-case noise levels and impacts at Angus and Marsden Park east of the proposed modification (NCA02) have increased from the project NVIA. This is due to the proposed modification construction boundary being closer to the nearest resident at this NCA at Richmond Road. Noise levels at other receivers in the NCA02 remain similar to the project REF NVIA.

Worst-case noise levels and impacts at Berkshire Park and Windsor Downs (NCA03) generally remain consistent with the project REF NVIA, with the exception of the area around the proposed ancillary site AS3. Construction works at AS3 and the intersection to AS3 will result in noise impacts up to 'highly intrusive.' Vibration impacts assessed for the proposed modification were found to be similar to the project REF NVIA.

Construction noise impacts will be mitigated through measures including consultation with affected parties, works programming and practices to reduce noise effects.

Operational noise modelling for the proposed modification found that 75 residential receivers (50 buildings) would be impacted by noise greater than the relevant noise guidelines, up from 74 residential receivers (74 buildings) in the project REF NVIA.

Receivers approved and built after the project determination date (13 August 2021) have not been considered for noise mitigation as that responsibility falls on the developer. Display homes were also not considered for noise mitigation. Consequently, six receivers have been identified as potentially eligible for Transport for NSW noise mitigation. This includes five residential receivers along Chambers Street and Goodstart Early Learning. This is a reduction from the ten eligible receivers along Chambers Street identified in the project submissions report. The reduction is primarily due to the change in methodology, including modelling impacts on existing buildings instead of predicted buildings.

Non-Aboriginal heritage

The increase in road height by an additional metre potentially further impacts on the rural setting of Clydesdale Estate (a heritage item of state significance) by making Richmond Road a more noticeable and intrusive element when viewed from the heritage area in comparison to the project REF. Nevertheless, the scale of visual impact to the Clydesdale Estate remains moderate, consistent with the project REF. Similarly, raising and widening Richmond Road is expected to alter the rural setting from which St Phillips Church Cemetery derives part of its heritage significance. Therefore, minor adverse impacts to the historical and aesthetic heritage significance of St Phillips Church Cemetery are also expected as a result of the proposed modification.

During the construction phase, activities such as earthworks and drainage adjustments are expected to alter the rural setting and fabric of the Clydesdale Estate, resulting in minor temporary adverse impacts to its historic, aesthetic, and representative significance values.

Despite the new impacts of the proposed modification, the scale of impacts are consistent with the project REF.

Biodiversity

About an additional 0.03 hectares of Plant Community Type (PCT) 3320 (Cumberland Plain Woodland), which is listed as a critically endangered ecological community under the *Biodiversity Conservation Act 2016* (BC Act), would be impacted within the non-certified area. A non-certified area is an area that has not been marked for development at the strategic planning stage and requires biodiversity impact assessment. A total of 1.41 hectares of suitable habitat for the Cumberland Plain Land Snail, which is listed as endangered under the BC Act, would now be impacted by the project within the non-certified area. This would need to be offset per the Transport for NSW Biodiversity Policy.

About an additional 0.93 hectares of a mix of mature, native tree species would also be impacted within the non-certified area. Vegetation clearance would result in about 0.96 hectares of suitable foraging habitat for various fauna species listed on the BC Act and *Environment Protection and Biodiversity Conservation Act 1999* being impacted. About an additional 0.44 hectares of land occupied by *Grevillea juniperina* subsp. j*uniperina* within the non-certified area would also be impacted.

These additional impacts are not likely to significantly impact threatened species, populations, ecological communities, habitats or migratory species within the meaning of the *Biodiversity Conservation Act 1999*, *Fisheries Management Act 1994* and *Environment Protection and Biodiversity Conservation Act 1999*.

Hydrology, flooding and water quality

Hydrology and flooding

The upgraded Richmond Road would form an important evacuation route in times of flood. A minimum road level of RL 20.0 metres Australian Height Datum (AHD) has been adopted in the proposed modification. The upgraded section of Richmond Road would have a minimum elevation which approximates a 1-in-500 year flood event on the Hawkesbury-Nepean River. Drainage infrastructure has been sized to convey flows up to severe flooding event without overtopping the road.

The construction of the proposed modification would result in less than a 1 millimetre increase in peak flood levels due to floodplain storage displacement from Hawkesbury-Nepean River flooding, or up to 2 millimetres when considered in combination with other nearby road projects. As such, compensatory flood storage is no longer required, following agency consultation.

The proposed modification would not impact Major Tributary Flooding from South Creek. The proposed modification would result in minor increases in peak flood levels within the Marsden Park Precinct during a 1-in-100 and 1-in-500 year flood events but it would not reduce freeboard below 500 millimetres or result in adverse flooding impacts to existing development. The proposed modification would not adversely impact flooding conditions in existing development should rainfall intensities increase from future climate change. The proposed modification would result in increases in inundation in existing development in the Marsden Park Precinct during severe flood events but will not significantly change the flood hazard vulnerability.

Minor increase in peak flood levels and flows, and flow velocities within Marsden Creek are anticipated but can be managed through future planned development in the Marsden Park North Precinct.

Overall, the proposed modification would result in a minimal change in flood behavior and flood risk whilst providing a major benefit in providing an improved flood evacuation route.

Water quality

Up to four sediment basins would be constructed to capture and treat runoff before discharging into Marsden Creek and South Creek. Sediment basins are required to protect water quality downstream during construction. Discharges with a turbidity of up to 50 nephelometric turbidity units from controlled releases would not increase the ambient concentrations in South Creek and Marsden Creek. The discharges would also meet the recommended guideline limit for protection for aquatic ecosystems, visual amenity, and primary and secondary contact recreation.

Stockpiling of material during construction may increase pollutants being transferred to downstream waterways via wind and stormwater runoff. Without appropriate mitigation measures, this could lead to an increased risk of algal blooms, reduction in dissolved oxygen and poor water quality. The realignment of drainage infrastructure could also impact water quality due to the additional cutting required to extend the drainage infrastructure by about 50 metres.

During operation, the new culverts may cause increased flow velocities to the downstream receiving channels. The proposed modification also increases impervious surface area, which would increase pavement runoff and pollutant loads within the downstream environment. To mitigate these impacts five vegetated swales of varying length are proposed to provide treatment of runoff prior to discharge to South Creek or a tributary of South Creek. Modelling of these proposed controls indicates that there would be no adverse impacts as the pollutant loads following treatment by the swales would be below existing levels.

To mitigate these impacts safeguards and management measures identified in the project REF have been modified. Culvert and scour protection is recommended at all new culvert and pavement drainage pipes.

Topography, geology, soils and contamination

Changes in landforms and stockpiling from surrounding construction developments were observed within the proposed modification area during a site walkover. The contamination risk from imported fill, wastes and surface water has been reassessed to be moderate instead of low.

Earthworks would result in a minor change to the topography as the proposed modification raises the road level by one additional metre.

Safeguards and management measures identified in the project REF would be extended to the proposed modification area and are considered to be sufficient to mitigate these impacts.

Aboriginal heritage

One known Aboriginal archaeological site and one newly recorded site were identified within the proposed modification area. Two known sites, one newly recorded site and several areas of archaeological sensitivity were identified bordering the proposed modification area.

The proposed modification area overlaps an area that is covered under an existing Aboriginal Heritage Impact Permit (AHIP C0004249). Any works related to the project undertaken within this existing AHIP area will be required to comply with the AHIP conditions.

No new impacts to Aboriginal heritage are expected from the proposed modification, as the Aboriginal archaeological sites would be avoided by construction works by establishing an exclusion zone. Existing management measures are considered to be sufficient to mitigate these impacts. If impact to these sites cannot be avoided, extra assessment and an AHIP would be required.

Landscape character and visual impacts

As a result of the proposed modification, impacts to two previously assessed landscape character zones remain unchanged and the impacts to one zone (comprised of rural and open pasture) have increased due to the withdrawal of a development proposal within the Marsden Park North Precinct. The sensitivity of this landscape zone has increased from low to moderate, and moderate temporary impacts are expected during construction from works at AS1. Nevertheless, the magnitude of impact remains unchanged from the project REF as moderate. Overall, the impact rating is moderate to low. This is an increase from the project REF, which had rated the impact as low.

Existing viewpoints have been reassessed where there has been a change in the existing environment. Several viewpoints have been added in areas potentially impacted by the proposed modification, and two viewpoints have been removed for areas no longer impacted. There is no change in the impact to the viewpoints that were reassessed, while the new viewpoints were determined to have the following impacts:

- Two viewpoints would experience a low impact
- One viewpoint would experience a low to moderate impact
- One viewpoint would experience a moderate impact.

Existing management measures are considered to be sufficient to mitigate these impacts.

Property, land use and socio-economic

The proposed modification would require the acquisition of about an extra 0.1 hectares of land for various uses. About an extra 0.3 hectares of land would now be required for easements, and about 4.8 less hectares of land would need to be leased. About 3 hectares of land would be dedicated as a road by the landowner.

Due to the expansion of residential development in Marsden Park, more properties may be impacted. This includes properties between Bolwarra Drive and St Philips Place. Properties next to the AS3 construction compound may also experience temporary changes in visual amenity, noise and dust from construction activities due to the presence of the stockpile site.

Safeguards and management measures identified in the project REF are considered to be sufficient to mitigate these impacts.

Other impacts

Minor air quality impacts are expected from the proposed modification, particularly dust emissions caused by extra earthworks required for raising the road height.

Safeguards and management measures identified in the project REF are considered to be sufficient to mitigate these impacts.

Cumulative impacts

The proposed modification maintains a comparable footprint to the project REF. As a result, no additional cumulative impacts are anticipated beyond those previously considered.

Justification and conclusion

The proposed modification would enhance the connections to the surrounding road network through updated tie-ins and provision for a future connection to the duplication of Richmond Road to the north of the project. The proposed modification addresses updated traffic modelling (2024) and reduces fluctuations in the road level, improving the experience for commuters using Richmond Road.

The proposed modification may result in some minor increases in environmental impacts, including impacts to biodiversity, and construction phase water quality, traffic and noise. However, safeguards and management measures have been identified to avoid, minimise or mitigate these potential impacts.

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 modification. The proposed modification is 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. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act.

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1. Introduction

1.1 Proposed modification overview

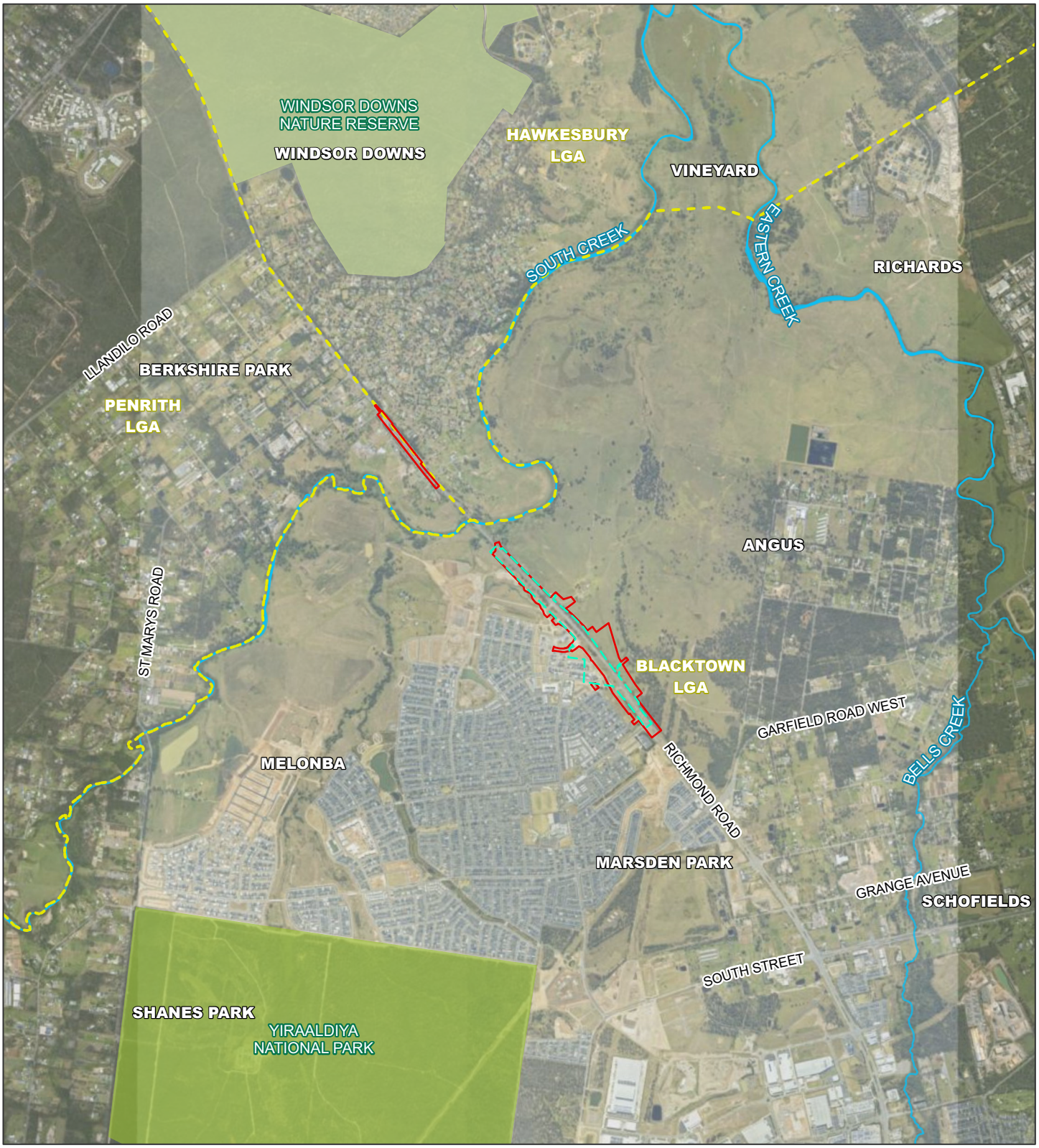
Transport for NSW proposes to modify Richmond Road Upgrade between Elara Boulevard and Heritage Road, Marsden Park by adjusting the proposal area following detailed design and to facilitate general constructability (proposed modification). Key features of the proposed modification would include:

- Increasing road height by up to an additional metre, from five metres to six metres above the existing road height
- Updating tie-ins to:
  - Charles Tompson Boulevard
  - Clydesdale Farm Road
  - Bolwarra Drive
  - Richmond Road
  - Existing driveway east of Richmond Road.
- Modifications to drainage infrastructure
- Widening shared user path from three metres to 3.5 metres
- Changing ancillary sites including:
  - Relocating the main project ancillary site from west of Richmond Road to the east of Richmond Road (AS1)
  - New compound area on Bolwarra Drive (AS2)
  - New stockpile area west of Richmond Road, north of South Creek (AS3).
- Changes to the construction footprint throughout, in particular at:
  - Tie-ins to Richmond Road
  - Existing driveway east of Richmond Road
  - AS1
  - Access track to the west of Richmond Road.
- Construction intersection and access upgrades from Richmond Road to AS3
- Provision for future works including the duplication of Richmond Road north of the project.

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

A review of environmental factors (REF) was prepared for the Richmond Road Upgrade, Marsden Park in October 2020 (referred to in this addendum REF as the project REF). The project REF was placed on public display between 2 November 2020 and 11 December 2020 for community and stakeholder comment. A submissions report (project submissions report), dated April 2021 and published with minor amendments in November 2024, was prepared to respond to issues raised. The REF was determined in August 2021.

Figure 1-1: Location of the proposed modification



LEGEND

- Proposed modification area
- Project area
- Watercourse
- Local government area
- Water body

NPWS reserve

- National Park
- Nature Reserve

N

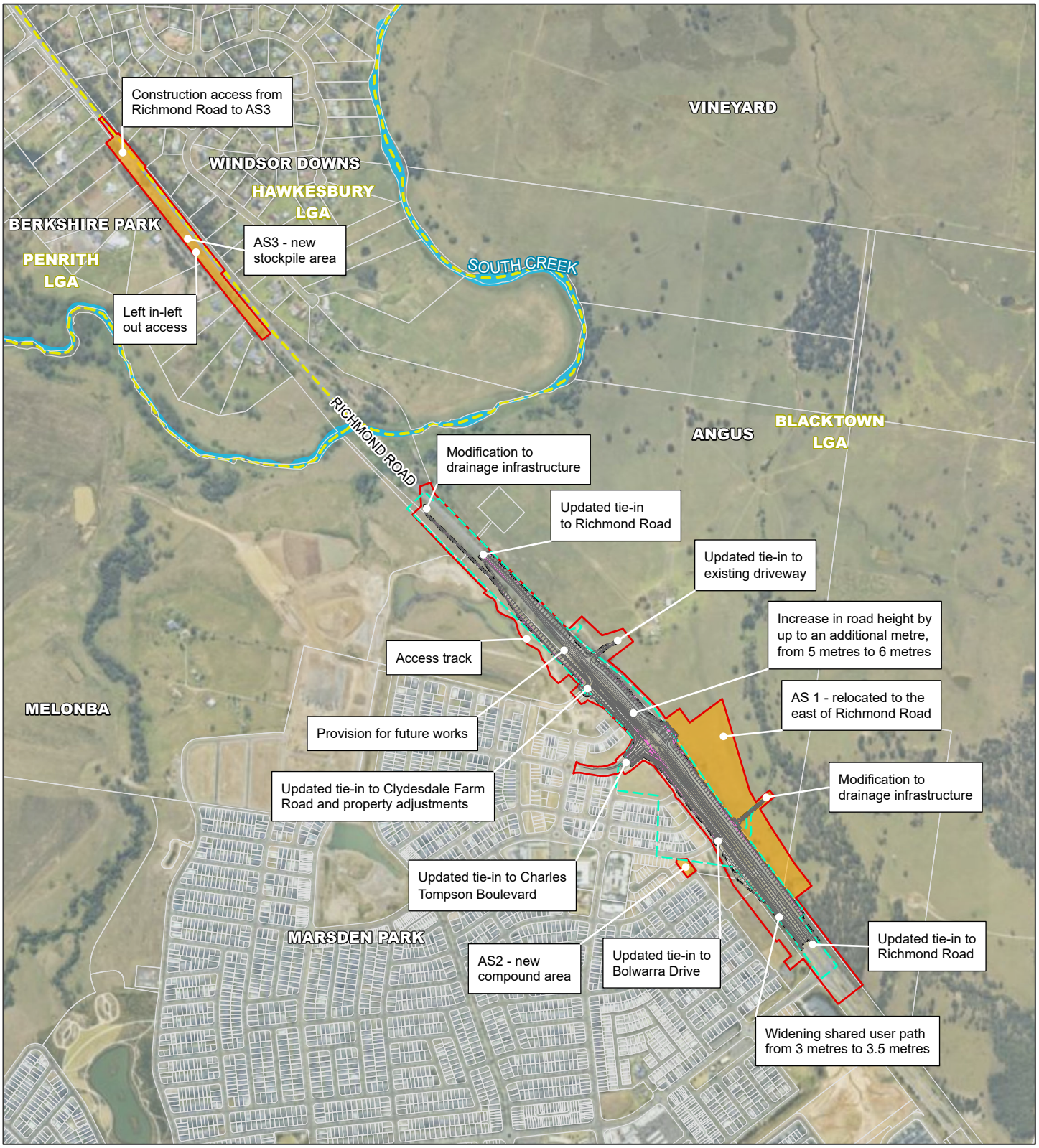
A4 1:40,000

GDA2020 MGA Zone 56

0 500 1,000

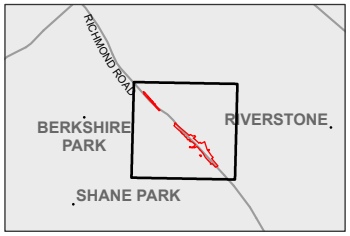
Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)



LEGEND

- Proposed modification area
- Project area
- Richmond Road Upgrade design
- Ancillary facilities
- Cut
- Fill
- Watercourse
- Local government area
- Water body
- Cadastre



N

A4 1:15,000

GDA2020 MGA Zone 56

0 100 200

Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

1.2 Purpose of the report

This addendum review of environmental factors (AREF) has been prepared by Jacobs on behalf of Transport for NSW. For the purposes of these works, Transport for NSW 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 (October 2020) and submissions report (November 2024). 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, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS Required? guidelines) (DUAP, 1995/1996), *Roads and Road Related Facilities EIS Guideline* (DUAP, 1996), 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 for NSW examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the 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 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

Chapter 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 as part of the project continues to address key drivers outlined in the project REF. This includes providing connectivity for the North West Priority Growth Area (NWPGA), meeting projected traffic volumes, improving flood evacuation routes for the Hawkesbury-Nepean Valley and reducing the potential of head on crashes.

The proposed modification is also consistent with State and local strategic plans discussed in Section 2.1.2 of the project REF.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies the project objectives and development criteria that apply to the proposed modification. The proposed modification is consistent with and addresses the key objectives of the project REF. No new project objectives are proposed.

2.3 Alternatives and options considered

2.3.1 Methodology for selection of preferred option

Route options are consistent with Section 2.4.1 of the project REF.

Two options were identified based on design, constructability, environmental and stakeholder considerations – the do nothing option and a proposed modification option.

A combined value engineering (VE), risk, Health and Safety in Design and constructability workshop was held in July 2024. The VE component of the workshop reviewed aspects of the design including cost and time, ease of construction and stakeholder considerations. VE recommendations identified initiatives that were implemented as part of Option 2 to improve its design and constructability. These initiatives are listed in Table 2-1.

Table 2-1: Initiatives identified during the VE workshop

Aspect	Initiatives
Ease of construction	• Providing space for future upgrade of Charles Tompson Boulevard intersection • Temporary U-turn for light and heavy vehicles at Elara Boulevard reduces construction vehicle trip length.
Operational safety	• Skewed pedestrian crossing designed to improve safety.
Time	• Identification of early works.

Subsequent to the VE workshop, the temporary U-turn for light and heavy vehicles at Elara Boulevard was discarded. This was due construction safety concerns, vegetation clearance required and other viable alternatives for a U-turn location being available. Options were assessed against the project objectives and the option performing best against those objectives was selected as the preferred option.

2.3.2 Identified options

Option 1 – do nothing

This option would proceed with the project as described in the project REF, without any adjustments or amendments.

Option 2 – different location for compound site and other design changes

This option involves adjusting the design to facilitate constructability, address traffic modelling and improve drivability. This option includes:

- Increasing road height
- Updating tie ins to better tie into existing infrastructure
- Modifying drainage infrastructure and shared path infrastructure
- Relocating one ancillary site and adding two new ancillary sites
- Adjustments to facilitate construction including a new construction access, widening the construction footprint in areas and including provision for future works.

2.3.3 Analysis of options

Option 1 would fulfil the project objectives. However, option 1 is no longer viable due to the main compound site now being used for residential development. Option 1 fails to address updated traffic modelling data and drivability concerns from fluctuations in road level. The development interfaces with recent development are also outdated. Option 1 would also result in minor impacts to land use to the east of Richmond Road.

Option 2 would also fulfil the project objectives. Option 2 would use an alternative main compound location and a stockpile location outside of the mapped flood extents. This option would address updated traffic modelling with improved Level of Service outcomes, while changes in road height would provide a smoother driving experience for commuters. Updated tie-ins would interface with recent developments more effectively and a future connection to the duplication of Richmond Road north of the project would be provided for. Furthermore, option 2 addresses practical considerations such as drainage and sight distance concerns. This option also addresses feedback received on the project REF. Option 2 would avoid minor impacts to land use to the east of Richmond Road but would have different environmental impacts to those associated with Option 1.

2.4 Preferred option

Option 2 was selected as the preferred option as it satisfies the project objectives, is constructible and addresses traffic, development interface and provides construction space for future projects to the north.

The Option 2 design is detailed further in Chapter 2 of this addendum REF.

3. Description of the proposed modification

3.1 The proposed modification

Transport for NSW proposes to modify the Richmond Road Upgrade, Marsden Park by adjusting the proposal area following detailed design and to facilitate general constructability. The proposed modification is shown in Figure 1-2 and Figure 3-1.

Key features of the proposed modification would include:

- Increasing road height by up to an extra metre, from five metres to six metres above the existing road height
- Updating tie-ins to:
  - Charles Tompson Boulevard
  - Clydesdale Farm Road
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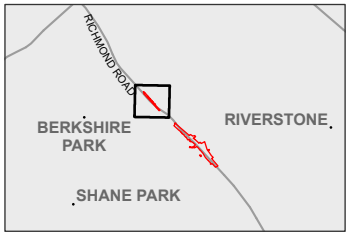
- Changing ancillary sites including:
  - Relocating the main project ancillary site from west of Richmond Road to the east of Richmond Road (AS1)
  - New compound area on Bolwarra Drive (AS2)
  - New stockpile area west of Richmond Road, north of South Creek (AS3).
- Changes to the construction footprint throughout, in particular at:
  - Tie-ins to Richmond Road
  - Existing driveway east of Richmond Road
  - AS1
  - Council access track to the west of Richmond Road.
- Construction intersection and access upgrades from Richmond Road to AS3
- Provision for future works including the duplication of Richmond Road north of the project.

Figure 3-1: Key features of the proposed modification

LEGEND

- Proposed modification area
- Richmond Road Upgrade design
- Ancillary facilities
- Local government area
- Water body
- Cadastre



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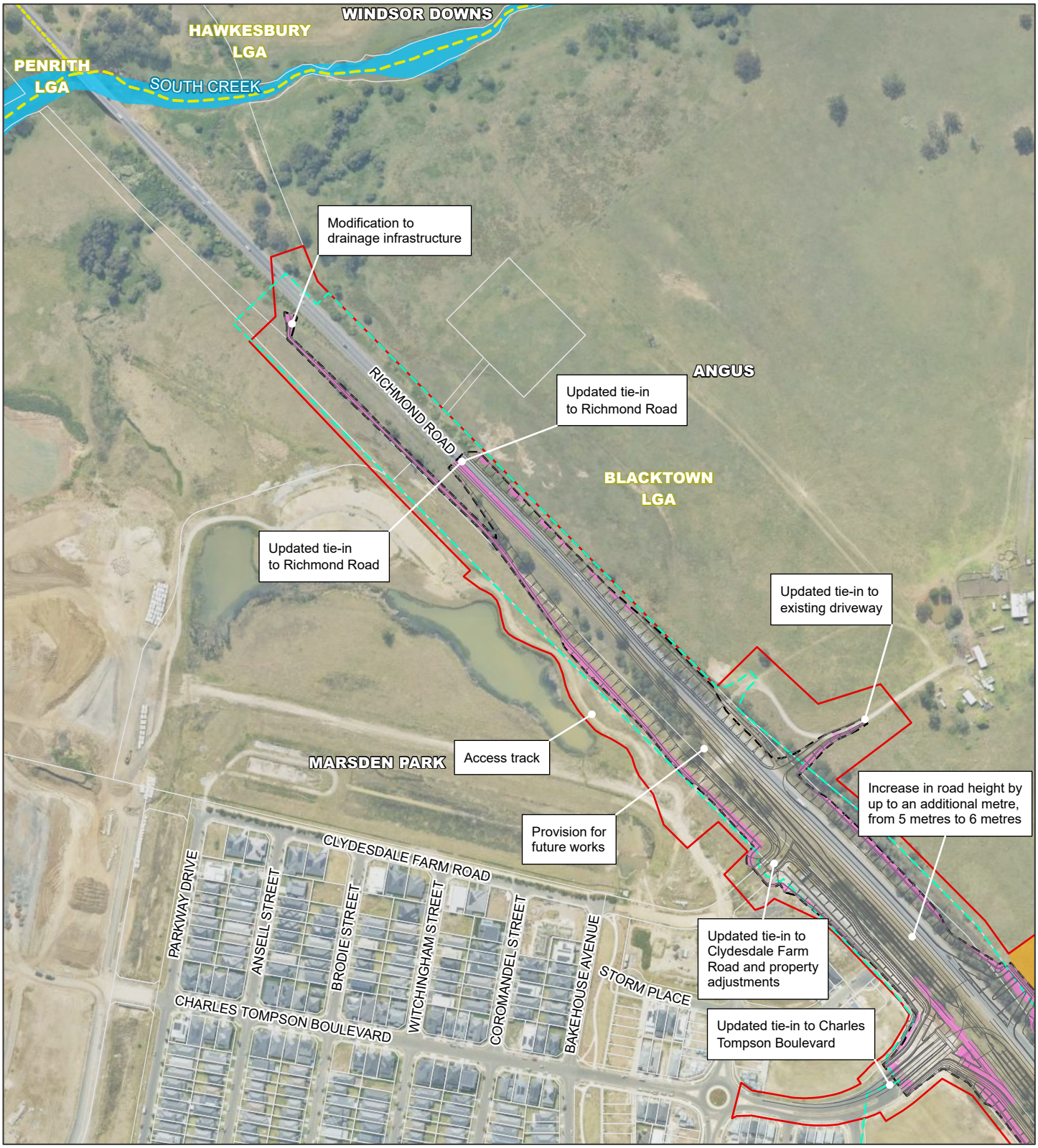
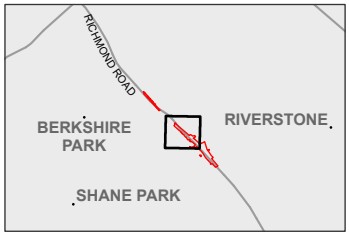
Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)



LEGEND

- Proposed modification area
- Project area
- Richmond Road Upgrade design
- Ancillary facilities
- Cut
- Fill
- Local government area
- Water body
- Cadastre



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GDA2020 MGA Zone 56

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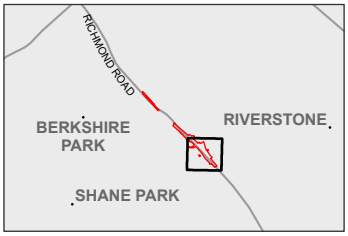
Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

Figure 3-3: Key features of the proposed modification

LEGEND

- Proposed modification area
- Project area
- Richmond Road Upgrade design
- Ancillary facilities
- Cut
- Fill
- Local government area
- Cadastre



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Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

3.2 Design

3.2.1 Design criteria

Section 3.2.1 of the project REF lists design criteria adopted for the project. Table 3-1 summarises changes to the adopted design criteria as part of the proposed modification.

Table 3-1: Changes to the design criteria

Specification	Element	Adopted criteria
Road design	Check vehicle	Left turn only side roads and driveway: 19 metre semi-trailer
	Shared footway	3.5 metre-wide shared path on the western side
	Pavement	• Main carriageways and intersection: deep strength asphalt over lean mix concrete subbase • Main carriageway temporary pavement: full depth asphalt • Northern tie-in with existing Richmond Road: Asphalt Inlay • Raised median: concrete slab base over unbound granular base
	Barriers	Temporary barriers are proposed at kerb ramps to prevent unaware pedestrians from crossing Richmond Road
	Street lighting	Both sides of the road for the main carriageway, intersections and shared path
Water quality design	Total suspended solids	19,000 kilograms per year
	Total nitrogen	32.2 kilograms per year
	Total phosphorous	134 kilograms per year

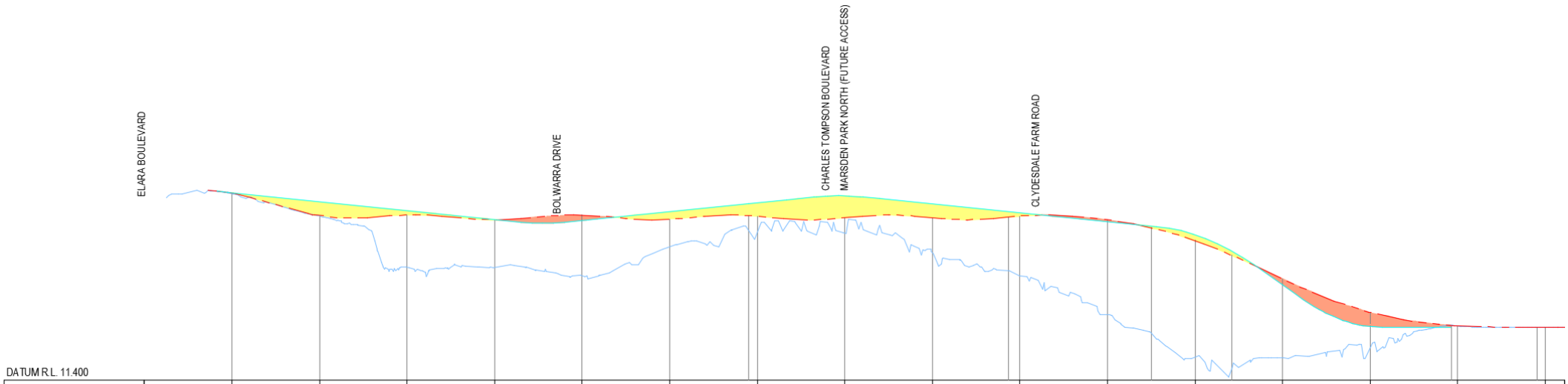
3.2.2 Engineering constraints

The engineering constraints outlined in Section 3.2.2 of the project REF remain consistent with the proposed modification.

3.2.3 Main features of the modification

Increase in road height

The detailed design has simplified the vertical alignment to a less undulating road, leading to an increased road height of up to one metre. The increase in road height addresses drivability and drainage concerns, simplifying the alignment and providing a smoother driving experience. Figure 3-4 shows the changes in road elevation while Figure 3-5 shows the cross section of the design at its highest point.



PROPOSED MODIFICATION ALIGNMENT	22.095	21.595	21.095	20.595	20.546	21.046	21.546	21.938	21.473	20.972	20.472	19.717	16.848	14.476			
PROJECT REF ALIGNMENT	22.091	20.798	20.862	20.560	20.852	20.593	20.785	20.685	20.685	20.785	20.579	19.392	17.202	15.273	14.516	14.427	
LEVEL DIFFERENCE + −	0.00	0.80	0.23	0.03	-0.31	0.45	0.76	1.25	0.79	0.19	-0.11	0.32	-0.35	-0.80			
EXISTING LEVELS	22.066	20.787	17.860	17.855	17.364	19.038	19.798	19.815	18.713	17.358	15.153	12.745	12.700	13.276	14.506	14.427	14.420
CHAINAGE 0.000	100.000	200.000	300.000	400.000	500.000	600.000	700.000	800.000	900.000	1000.000	1100.000	1200.000	1300.000	1400.000	1500.000	1600.000	1621.761

Figure 3-4: Longitudinal section – proposed modification comparison with Richmond Road Upgrade project REF alignment (from south to north)

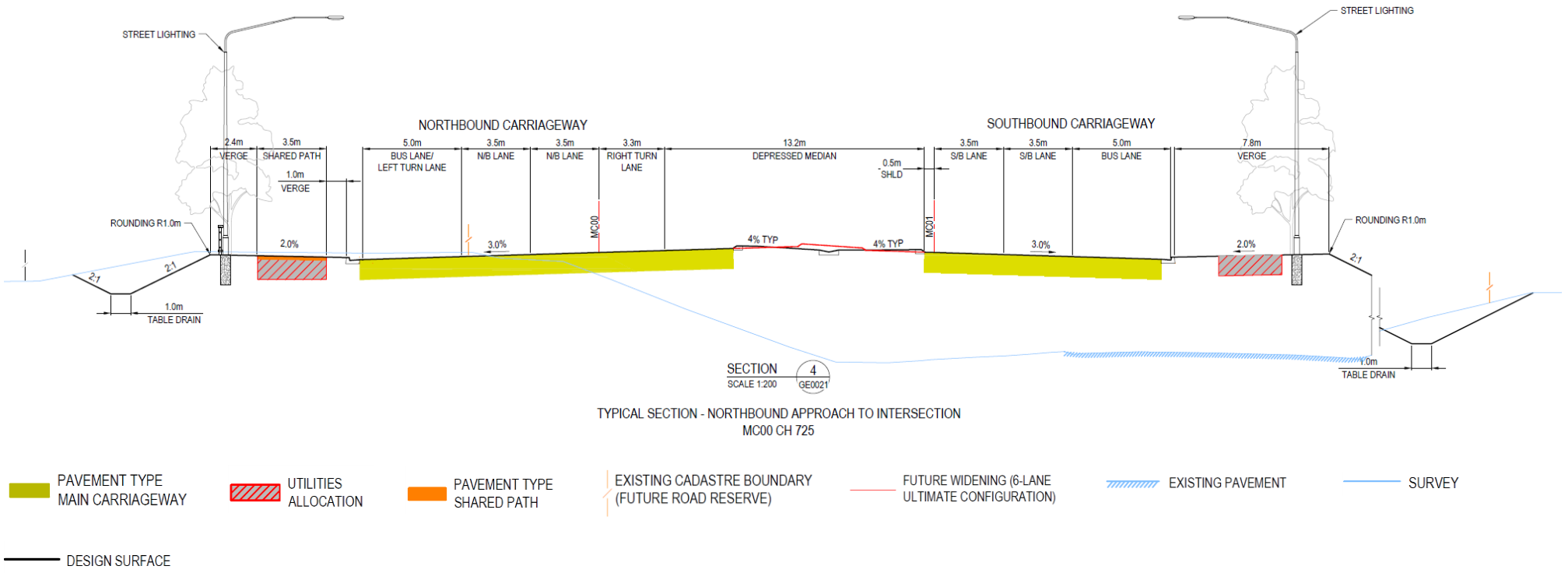


Figure 3-5: Typical cross section of Richmond Road Upgrade at its highest point, the approach to the signalised intersection

Updated tie-ins

Tie-in design has been updated as part of design development, including to interface with current and future developers' site conditions next to the project. Tie-ins that would be changed as part of the modification are:

- Charles Tompson Boulevard: Raising connections from Richmond Road to Charles Tompson Boulevard with consideration of future development height
- Clydesdale Farm Road (formerly Access Road 2): Raising connections from Richmond Road to Clydesdale Farm Road with consideration of future development height and drainage needs, and proposed road stub
- Bolwarra Drive (formerly Access Road 1): Reducing the length of the tie-in by about ten metres with consideration of the existing road
- Existing driveway: Tie-in from Richmond Road about 70 metres south of the existing driveway to Clydesdale Farm, straightened and widened
- Northern tie-ins to Richmond Road: Tie-in to Richmond Road about 130 metres south of previous tie-in location.

Modifications to drainage infrastructure

Section 3.2.3 of the project REF describes drainage features. Changes to these drainage features are shown in Figure 3-6 and listed below:

- One new transverse culvert crossing under Richmond Road just north of Charles Tompson Boulevard to convey runoff from east to west
- Realignment of drainage infrastructure discharging to the east of the project, including a 50 metre extension to the channel
- Realignment of drainage infrastructure discharging to the north of the project
- All water received north of the signalised intersection would now be discharged to the north into a culvert which eventually would discharge to South Creek. All remaining project water would be discharged to the east of the project into a tributary of Marsden Creek
- In the un-kerbed section along the northbound side of Richmond Road, pit and pipe pavement drainage infrastructure would direct flow into an open channel
- In the un-kerbed section along the southbound side, north of the driveway, the open channel has been removed.

Widening shared user path

The shared user path has been widened by an extra 0.5 metres, to a total width of 3.5 metres, in response to feedback during REF display. The wider path will facilitate easier maintenance and provide better protection for underground utilities.

Changing ancillary sites

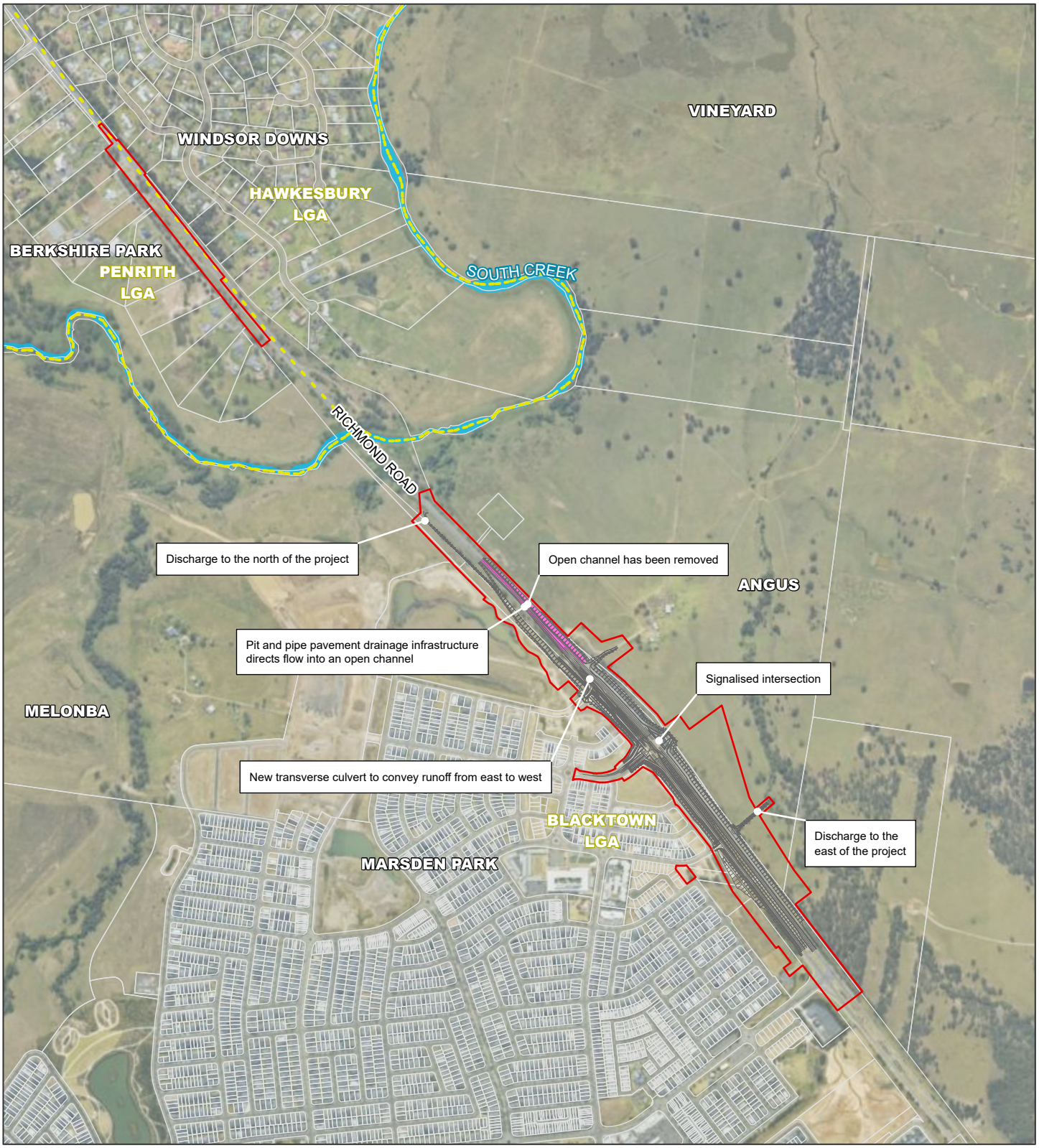
The 3.5 hectare main construction ancillary site has been moved from west of Richmond Road due to the area now being used for residential housing. A new ancillary site about five hectares in size (AS1) is proposed east of Richmond Road. A new compound area is proposed at Bolwarra Drive (AS2) and a new stockpile area about 2.3 ha in size (AS3) is proposed north of South Creek. Further detail is provided in Section 3.4.

Changes to the construction footprint

A wider construction footprint is proposed to include the access track on council land to the west of Richmond Road, extending the proposal area by about 40 metres from the project area's western boundary. This modification would facilitate construction traffic movements along the existing access track and avoid impacts caused by the construction of a new access track.

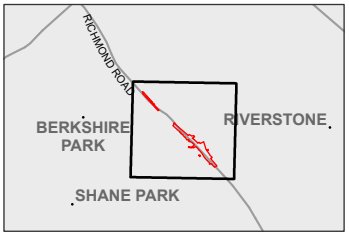
The proposal area has been extended to the east at the tie-in to the existing driveway. This is to accommodate the change to this tie-in as described above. Similarly, the proposal area has been reduced in the west by about 140 metres and extended to the east by about 160 metres for the relocation of AS1. Further detail on the relocation of AS1 is provided in Section 3.4.

The proposal area has also been extended at Elara Boulevard by about 85 metres to the south to facilitate construction traffic movements.



LEGEND

- Proposed modification area
- Richmond Road Upgrade design
- Unkerbed section
- Watercourse
- Local government area
- Water body
- Cadastre



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GDA2020 MGA Zone 56

0 200 400

Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

Richmond Road and Charles Tompson Boulevard intersection

The Richmond Road and Charles Tompson Boulevard signalised intersection, about 760 metres north of Elara Boulevard, has been modified. Dual right turn lanes in northbound and southbound directions have been lengthened, as shown in Figure 3-7. Dual right turns in the northbound direction have been extended from about 25 metres to 230 metres each while dual right turns in the southbound direction have been extended from about 40 metres to 160 metres and 150 metres. Bus bay lengths have also increased from 40 metres to 100 metres in length.

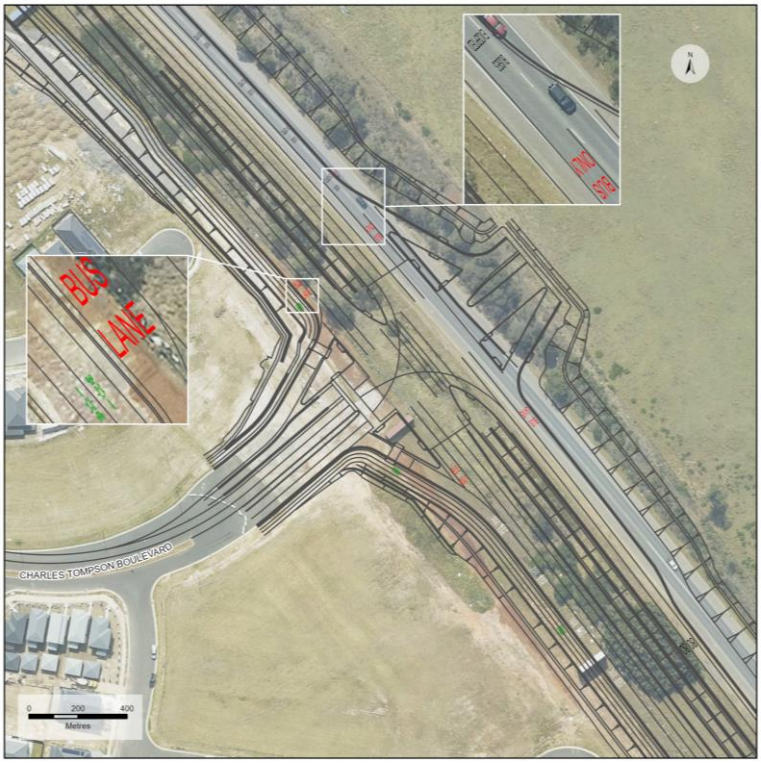


Figure 3-7: Richmond Road and Charles Tompson Boulevard intersection

Provision for future works

A northbound road stub has been included in the design. The road stub would help to facilitate the future duplication of Richmond Road to the north of the project by providing an area for road construction activities away from live traffic.

The Charles Tompson Boulevard Intersection has provisioned for a connection to the future Marsden Park North Precinct. This is described above.

Construction access from Richmond Road to AS3

Road treatment to the intersection between Richmond Road and Clydesdale Rural Estate entry road would be provided to allow construction vehicles to turn from and onto Richmond Road. These changes may be retained long term

3.3 Construction activities

3.3.1 Work methodology

The proposed modification is consistent with the indicative construction phases and activities outlined in Section 3.3.1 of the project REF. Detailed work methodologies would be decided by the construction contractor during construction planning.

Construction staging remains consistent with the project REF.

3.3.2 Construction workforce

The proposed modification would not require additional construction staff. The proposed modification is consistent with an estimated workforce of about 50 personnel at any given time during construction, as detailed in Section 3.3.2 of the project REF. Most staff parking would be accommodated within the proposed modification area, however, some light vehicle parking may occur at Bolwarra Drive close to AS2.

3.3.3 Construction hours and duration

Construction is expected to start in 2026 and take about 30 months to complete subject to construction approvals and weather.

Working hours during the construction phase remain consistent with the hours listed in Section 3.3.3 of the project REF, noting that out of hours activities would occur in accordance with Section 3.3.3.

3.3.4 Plant and equipment

Extra indicative plant and equipment to that listed in Section 3.3.4 of the project REF is provided below. Equipment that would likely be used would be identified before construction by the construction contractor.

- Woodchipper / tub grinder
- Spreader compactor
- Water trucks
- Trench digger
- Road trucks (material / plant delivery / mobilisation)
- Road sweepers
- Pneumatic and electrical hand tools
- Lighting towers
- Piling rig
- Asphalt material transfer vehicle
- Kerb and gutter slip former
- Traffic safety barrier post driver
- Line marking plant
- Hydroseed / hydramulch spray truck
- Air compressors

3.3.5 Earthworks

The proposed modification would require additional earthworks.

Most extra earthworks would be to facilitate the additional raising of the road to a minimum relative level of 20 metres. About an extra 68,000 cubic metres of fill would be needed for the proposed modification, to a total of 267,000 cubic metres. The proposed modification reduces the volume of cut required for the project by about 14,000 cubic metres, to a total of about 11,000 cubic metres. Earthwork quantities would be confirmed before construction. Indicative cut and fill locations have been provided on Figure 3-1 to Figure 3-3.

3.3.6 Source and quantity of materials

Section 3.3.6 of the project REF lists construction materials and quantities required. Changes to indicative material quantities for construction are listed in Table 3-2. Spoil usage and water required would be as per Section 3.3.6 of the project REF.

The source of materials would be determined during construction in consultation with Transport for NSW.

Table 3-2: Indicative material quantities for construction

Material type	Change in indicative quantity	Total indicative quantity
Asphalt	200 cubic metres less	6,300 cubic metres
Subbase	Previously unquantified	39,000 cubic metres
Select material	Extra 11,000 cubic metres	22,000 cubic metres
Lower upper zone of formation	Included within select material	Included within select material
Imported fill	Extra 88,000 cubic metres	267,000 cubic metres

3.3.7 Traffic management and access

Traffic management, control and signage would be in accordance with the Section 3.3.7 of the project REF. Haulage routes have been assessed in Section 6.1.

Access

Most access to the construction site would be via Richmond Road. Access to AS2 would be via local roads, including Elara Boulevard and Bolwarra Drive. Access to AS3 would require intersection treatment at the existing intersection with Clydesdale Rural Estate. The intersection treatment will be finalised prior to use of AS3.

3.4 Ancillary facilities

The proposed modification involves relocating the ancillary site described in the project REF (main project ancillary site, AS1), and proposes two new ancillary sites (AS2 and AS3). These sites are shown on Figure 1-2 and summarised in Table 3-3.

The main project ancillary site (AS1) would be located about 210 metres north of Elara Boulevard on the eastern side of Richmond Road and would have an area of about 50,000 square metres. The activities proposed for this ancillary site remain unchanged from those presented in Section 3.4 of the project REF.

AS2 is a new compound area proposed south of Bolwarra Drive, 145 metres west of Richmond Road. The compound area would mainly be used for parking, site facilities and materials storage.

AS3 is a new area about 21,500 square metres in size. AS3 would be located directly along the western boundary of Richmond Road about 340 metres north of South Creek, but outside of the 5% Annual Exceedance Probability (AEP) flood level. Activities proposed for AS3 are consistent with Section 3.4 of the project REF but would predominantly be used for stockpiling.

Table 3-3: Ancillary facility location

Site ID	Lot / DP	Area (m^2)	Land use zone (LEP)	Description
AS1	Lot 99 DP752061 and Lot 1 DP715318	50,000* (increase of 15,143)	RU4 – Primary Production Small Lots	Compound and stockpile area
AS2	Lot 3513 DP1301072	1,120	SP2 – Local Drainage	Compound area
AS3	N/A	21,500	SP2 Classified Road	Stockpile area

* The construction compound is expected to only require 30,000 square metres at any one time. The larger area has been assessed to allow flexibility to avoid sensitive environmental features and optimise site layout.

3.5 Public utility adjustment

Changes to public utility adjustments (Section 3.5 of the project REF) are described in Table 3-4.

Table 3-4: Ancillary facility location

Utility	Existing to be retained	Existing to be abandoned / relocated	New utility
Electricity	No extra utilities would be retained	Existing underground street lighting cable on the west side of Richmond Road from around the southern tie-in to Bolwarra Drive, previously to be retained, would now be abandoned. The power poles on the eastern road reserve boundary affected by the earthworks would require relocation beneath the eastern shared path	New underground street lighting cable would be installed underneath the western shared path to replace existing abandoned cable

Utility	Existing to be retained	Existing to be abandoned / relocated	New utility
Water	No extra utilities would be retained	The existing DN375 pipe would be abandoned	A new DN375 pipe would be installled underneath the western shared path
Telecommunications	Telecommunication cables and conduits running along the eastern road reserve boundary now include TPG	Cables and conduits located on the eastern road reserve boundary affected by the earthworks would now be abandoned	New cables and conduits would be installed underneath the eastern footpath
Gas	No extra utilities would be retained	Existing gas main on the west side of the road, from Charles Tompson Boulevard would be abandoned where it intersects the road design	No extra utilities are proposed

3.6 Property acquisition

Property adjustments includes partial acquisition, lease and easements. The proposed modification requires property adjustments over privately owned and council land as described in Table 3-5 and shown in Figure 3-8. Table 3-5 sets out the total area that would need to be adjusted including the area identified in the project REF. The change in area refers to the additional or reduced area that would need to be adjusted due to the proposed modification. All acquisitions would be conducted in accordance with the Transport for NSW Land Acquisition Policy, based on the requirements of the *Land Acquisition (Just Terms) Compensation Act 1991*.

Final lease and acquisition areas would be confirmed before construction in consultation with land owners.

Table 3-5: Proposed property adjustments including partial acquisitions, leases and easements.

Area ID	Project REF Area ID	Description	Total area (m²)	Change in area (m²)	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
1	N/A	Part of road design	7,493	+7,493	To be dedicated as road by landowner	Private land	Lot 1 DP1270086	SP2 Classified Road
2	N/A	Part of road design	12,329	+12,329	To be dedicated as road by landowner	Private land	Lot 2 DP1270086	SP2 Classified Road
3	N/A	Access on council land during construction. New area requiring property acquisition	6,883	+6,883	Lease	Council land	Lot 6 DP1270086	SP2 Local Drainage, Classified Road
4	N/A	Land for Clydesdale Farm access. New area requiring property acquisition.	8,609	+8,609	Lease	Private land	Lot 1 DP715318	RU4 Primary Production Small Lots
5	N/A	Tie-in to Clydesdale Farm Road. New area requiring property acquisition.	263	+263	Acquisition	Private land	Lot 6 DP1270086	SP2 Local Drainage
6	N/A	Part of road design	5,281	+5,281	Owned by Transport for NSW	Private land	Lot 2 DP715318	SP2 Classified Road
7	N/A	Part of road design	11,257	+11,257	To be dedicated as road by landowner	Private land	Lot 7148 DP1284227	SP2 Classified Road
8	N/A	Land for eastern side of intersection	762	+762	Acquisition	Private land	Lot 1 DP715318	RU4 Primary Production Small Lots
9	N/A	Construction area for the eastern side of intersection	1,968	+1,968	Lease	Private land	Lot 1 DP715318	RU4 Primary Production Small Lots
10	N/A	Main project ancillary site	46,569	+46,569	Lease	Private land	Lot 1 DP715318	RU4 Primary Production Small Lots

Area ID	Project REF Area ID	Description	Total area (m²)	Change in area (m²)	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
11	5	Easement for drainage line. Increase in project REF acquisition.	2,027	+704	Easement	Private land	Lot 1 DP715318	RU4 Primary Production Small Lots
12	N/A	New compound area	1,120	+1,120	Lease	Private land	Lot 3513 DP1301072	RU4 Primary Production Small Lots
13	N/A	Western side of road reserve	550	+550	Lease for construction / easement for maintenance	Private land	Lot 3514 DP1301072	SP2 Infrastructure R3 Medium Density Residential
14	6	Western side of road reserve. DPIE has rezoned for road dedication. The area would now be acquired	1,067	+542	Lease for construction / easement for maintenance	Private land	Lot 3515 DP1301072	SP2 Local Drainage
15	N/A	Western side of road reserve	744	+744	Lease for construction / easement for maintenance	Private land	Lot 2515 DP1223745	SP2 Infrastructure R3 Medium Density Residential
16	N/A	Main project ancillary site	2,477	+2,477	Lease	Private land	Lot 99 DP752061	RU4 Primary Production Small Lots
17	N/A	Part of road design	213	+213	To be dedicated as road by landowner	Private land	Lot 7149 DP1284227	SP2 Classified Road
18	N/A	Part of road design	1,843	+1,843	To be dedicated as road by landowner	Private land	Lot 7148 DP1284227	SP2 Classified Road
N/A	1	Previously land for Access 2, now known as Clydesdale Farm Road. Land already dedicated as road.	223	-223	Developer to dedicate as road by landowner	Private land	Lot 5 DP1270086	SP2 Local Drainage

Area ID	Project REF Area ID	Description	Total area (m²)	Change in area (m²)	Acquisition type	Current owner	Lot and DP	Land use zone (LEP)
N/A	2	Previously known as Clydesdale estate access, now known as Charles Tompson Boulevard. Land already dedicated as road.	0	-2,420	Developer to dedicate as road by landowner	Private land	N/A	R3 Medium Density Residential
N/A	3	Construction compound. Lease no longer required	0	-34,857	N/A	Private land	Various lots	R3 Medium Density Residential
N/A	4	Flood off-site storage area. Lease no longer required.	0	-82,987	N/A	Private land	Lot 7 DP1270086	C3 Environmental Management

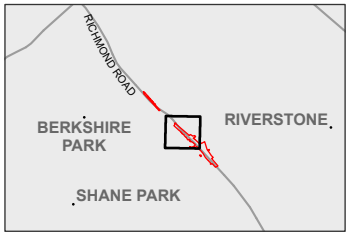
LEGEND

- Proposed modification area

Property access ID

- Land acquisition
- Land lease
- Land easement
- Lease for construction / easement for maintenance
- Owned by Transport for NSW
- To be dedicated as road by landowner

- Local government area
- Water body
- Cadastre



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GDA2020 MGA Zone 56

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Metres

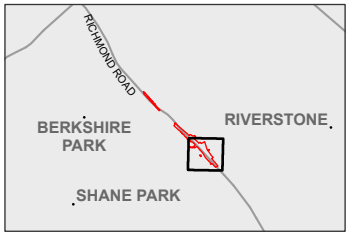
Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

LEGEND

- Proposed modification area
- Local government area
- Cadastre

Property access ID

- Land acquisition
- Land lease
- Land easement
- Lease for construction / easement for maintenance
- Owned by Transport for NSW
- To be dedicated as road by landowner



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GDA2020 MGA Zone 56

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Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

4. Statutory and planning framework

A review of the statutory and planning framework was carried out in the context of the proposed modification. The sections below only outline changes to legislation or application of provisions relevant to the proposed modification.

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 the State Environmental Planning Policy (Transport and Infrastructure) 2021 (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 Transport for NSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposed modification 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) (where applicable), is discussed in Chapter 5 of this AREF.

State Environmental Planning Policy (Precincts – Central River City) 2021

The State Environmental Planning Policy (Precincts – Central River City) 2021 (SEPP (Precincts – Central River City)) contains planning provisions for precincts which are located within the Central River City. The SEPP (Precincts – Central River City) came into effect in March 2022, and consolidated several existing SEPPs for precincts within the Central River City.

Chapter 3 (Sydney region growth centres) of SEPP (Precincts – Central River City) sets out planning controls to co-ordinate the release of land for residential, employment and other urban development in the North West Growth Centre (NWGC). Under the SEPP (Precincts – Central River City), the proposed modification is within the NWGC. The southern half of the proposed modification is within land to which the SEPP (Precincts – Central River City) applies.

Section 3.24 of Central River City SEPP confirms that public utility undertakings (which would include modification to drainage infrastructure) comprising clearing of native vegetation may be carried out without development consent. Section 3.24 also requires notification of the Department of Planning and Infrastructure (DPI) (now Department of Planning, Housing and Infrastructure (DPHI)) in relation to the clearing of native vegetation on land that is within a growth area but not subject to biodiversity certification.

The proposed modification area is partially within land mapped as Existing Certified and Existing Non-Certified (shown in Figure 4-1). Within the proposed modification area, and not previously assessed within the project area, certified areas total about 3.96 hectares and non-certified areas total about 6.68 hectares. Transport for NSW has consulted with DPHI regarding the intention of carrying out the proposed modification. Consultation details are provided in Chapter 5.

Based on the NWGC land zoning map, the proposed modification overlaps with the following land zones (refer to Figure 4-2.):

- R2 Low Density Residential
- R3 Medium Density Residential
- E3 Environmental Management
- RE1 Public Recreation

- SP2 Infrastructure (Classified Road)
- SP2 Infrastructure (Local Drainage).

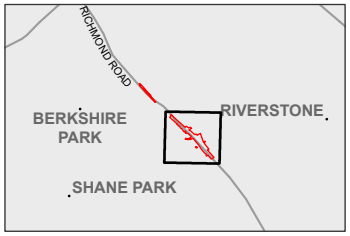
Development for the purpose of a road is permitted with development consent in all the above zones. The SEPP (Transport and Infrastructure) prevails over the SEPP (Precincts – Central River City) to remove those consent requirements.

LEGEND

- Proposed modification area
- Project area
- Local government area
- Cadastre

Land certification

- Existing Certified
- Existing Non Certified



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GDA2020 MGA Zone 56

0 150 300

Metres

Jacobs

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 6 (Water catchments) of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 (SEPP (Biodiversity and Conservation)) facilitates planning requirements for waterways, urban bushland, and water catchments for the Georges River catchment, Hawkesbury-Nepean catchment, Sydney Harbour catchment and Sydney drinking water catchment. The SEPP (Biodiversity and Conservation) applies to the proposed modification as it is located in the South Creek sub-catchment, which is part of the Hawkesbury-Nepean Catchment. The proposed modification is also located within the Hawkesbury-Nepean Riverine Scenic Area as an area of "regional significance".

Chapter 6 (Water Catchments), Part 6.2, Division 2 of the SEPP (Biodiversity and Conservation) sets general controls for consideration by consent authorities assessing a development on land in a regulated catchment. Section 6.12 requires that development in a Hawkesbury-Nepean Riverine Scenic Area may be carried out only with development consent. The SEPP (Transport and Infrastructure) prevails over the SEPP (Biodiversity and Conservation) to remove those consent requirements.

Biodiversity, hydrology, flooding and water quality impacts are assessed in Section 6.4 and 6.5 of the addendum REF.

4.1.2 Local Environmental Plans

The land zoning in and around the proposed modification is shown Figure 4-2.

Blacktown Local Environmental Plan 2015

There is no change for this particular local environmental plan that is relevant to the proposed modification.

Penrith Local Environmental Plan 2010

The stockpile area (AS3) is located north of South Creek within Penrith City local government area (LGA), partially on land which is subject to the Penrith Local Environmental Plan 2010 (Penrith LEP). The relevant LEP zones are described in Table 4-1.

Table 4-1: Relevant Penrith LEP zone objectives

Zone	Objectives
SP2 - Infrastructure	• To provide for infrastructure and related uses • To prevent development that is not compatible with or that may detract from the provision of infrastructure.
RU4 – Primary Production Small Lots	• To enable sustainable primary industry and other compatible land uses • To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature • To minimise conflict between land uses within this zone and land uses within adjoining zones • To ensure land uses are of a scale and nature that is compatible with the environmental capabilities of the land • To preserve and improve natural resources through appropriate land management practices • To maintain the rural landscape character of the land • To ensure that development does not unreasonably increase the demand for public services or facilities.

The proposed modification has considered the objectives in the Penrith LEP and has sought to be consistent with them.

The impacts to land use are discussed in Chapter 6.10. Roads are permissible with development consent under all of the zonings. However, as discussed in Chapter 4.1, the proposed modification is permitted without the consent of Council under the SEPP (Transport and Infrastructure). Therefore, the consent requirements of the LEP do not apply and the proposed modification may be determined under Division 5.1 of the EP&A Act.

Transport for NSW has consulted with Penrith City Council. Details of the consultation are provided in Chapter 5.

Hawkesbury Local Environmental Plan 2012

The stockpile area (AS3) is located north of South Creek within Hawkesbury City LGA, partly on land which is subject to the Hawkesbury Local Environmental Plan 2012 (Hawkesbury LEP) (remaining land is subject to Penrith LEP zoning as described above). The relevant LEP zones are described in Table 4-2.

Table 4-2: Relevant Hawkesbury LEP zone objectives

Zone	Objectives
R5 – Larger Lot Residential	• To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality • To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future • To ensure that development in the area does not unreasonably increase the demand for public services or public facilities • To minimise conflict between land uses within this zone and land uses within adjoining zones • To provide primarily for low density residential housing and associated facilities.

The proposed modification has considered the objectives in the Hawkesbury LEP and has sought to be consistent with them.

The impacts to land use are discussed in Chapter 6.10. Roads are permissible with development consent under all of the zonings. However, as discussed in Chapter 4.1 the proposed modification is permitted without the consent of Council under the SEPP (Transport and Infrastructure). Therefore, the consent requirements of the LEP do not apply and the proposed modification may be determined under Division 5.1 of the EP&A Act.

Transport for NSW has consulted with Hawkesbury City Council. Details of the consultation are provided in Chapter 5.

4.2 Other relevant NSW legislation

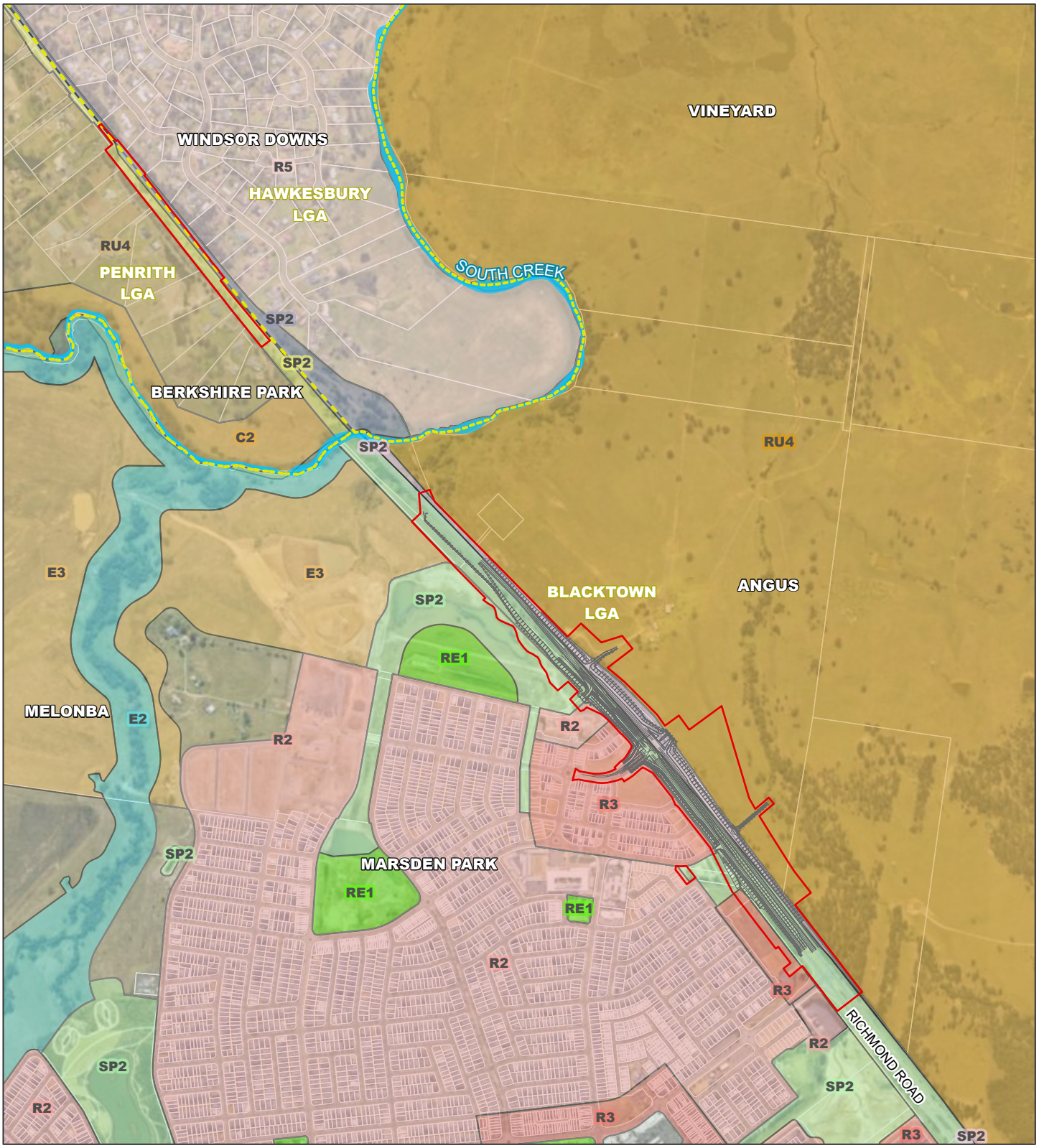
4.2.1 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (BC Act) provides a legal framework for the protection and sustainable management of biodiversity across NSW.

Requirements to conduct a species impact statement (SIS) or Biodiversity Development Assessment Report (BDAR) where a significant impact is likely to occur remains consistent as outlined in the project REF. Requirements regarding biodiversity certification order also remain consistent.

The proposal area falls within biodiversity certified and non-certified lands, with parts of the proposed modification area not biodiversity certified. Based on the biodiversity certification process for areas marked for development at the strategic planning stage, development may proceed in biodiversity certified areas without the usual requirement under the EP&A Act for threatened species assessments. Non-biodiversity certified areas are those outside of biodiversity certified areas where biodiversity impact assessment is required. Impacts to land within these areas are summarised in Section 6.4.

The biodiversity assessment conducted for this proposed modification is summarised in Section 6.4. The proposed modification would not have a significant impact on threatened species or ecological communities or critical habitat and therefore a SIS has not been prepared.



LEGEND

- Proposed modification area
- Richmond Road Upgrade design

State Environmental Planning Policy (Precincts - Central River City) 2021 Land Zoning

- E2 - Environmental Conservation
- E3 - Environmental Management
- R2 - Low Density Residential
- R3 - Medium Density Residential
- RE1 - Public Recreation
- SP2 - Infrastructure

Hawkesbury Local Environmental Plan (2012) Land Zoning

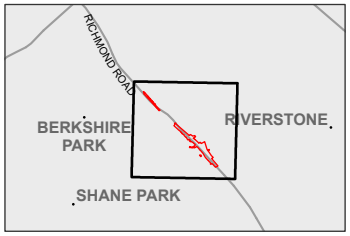
- R5 - Large Lot Residential
- SP2 - Infrastructure

Penrith Local Environmental Plan (2010) Land Zoning

- C2 - Environmental Conservation
- RU4 - Primary Production Small Lots
- SP2 - Infrastructure

Blacktown Local Environmental Plan (2015) Land Zoning

- RU4 - Primary Production Small Lots
- SP2 - Infrastructure
- Cadastre
- Local government area
- Watercourse
- Water body



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GDA 1994 MGA Zone 56

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Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

4.2.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for Aboriginal cultural heritage in NSW.

There have been minor amendments made to the NPW Act since 2020, however there are no changes that applies to the proposed modification regarding the requirement of an Aboriginal Heritage Impact Permit (AHIP) for unavoidable impacts to Aboriginal objects and/or places protected under the NPW Act.

An assessment prepared in accordance with Stage 2 of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) has been included as Appendix J. A summary of the assessment is included in Section 6.7.

4.2.3 Biosecurity Act 2015

Under the *Biosecurity Act 2015* (Biosecurity Act), all plants, including weeds are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose.

As outlined in Section 6.4, the area surrounding the proposed modification contains substantial weed growth. Several priority weeds were recorded in the proposed modification area, including *Anredera cordifolia* (Madeira vine) and *Senecio madagascariensis* (Fireweed). Weed mitigation measures to manage these weed species in accordance with the requirements of the Biosecurity Act are consistent with the project REF.

4.2.4 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides the legal framework for the management of air, noise, water and waste pollution.

Section 45 (Matters to be taken into consideration in licensing functions) of the POEO Act sets out the matters that must be considered when exercising licensing functions and undertaking environmental assessments, including:

- The pollution that will be caused and its impact on the environment (Section 45(c))
- Practical measures that can be taken to prevent, control, abate or mitigate the pollution and protect the environment from harm (Section 45(d))
- The environmental values of water affected by the proposed discharge and the practical measures that can be taken to restore or maintain those values (Section 45(f1)).

The matters outlined above have been considered in the assessments presented in Chapter 6.

4.2.5 Western Parkland City Authority Act 2018

The *Western Parkland City Authority Act 2018* (WPCA Act) came into effect in October 2018 and oversees the development and management of the Western Sydney Aerotropolis and the rest of the Western City. The WPCA Act constitutes and confers functions on the Western Parkland City Authority (now Bradfield Development Authority). The Bradfield Development Authority has functions over land in the Western City operational areas.

The Penrith and Hawkesbury LGA is part of the Western City operational areas. Under Schedule 2 of the WPCA Act, AS3 falls under the Western City operational area boundary.

The Bradfield Development Authority has been consulted under Section 2.15 of the SEPP (Transport and Infrastructure), as discussed in Chapter 5 of this AREF.

4.3 Confirmation of statutory position

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 2.108 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 EP&A Act. Consent from Council is not required.

5. Consultation

5.1 Consultation strategy

A Community and Stakeholder Engagement Plan (CSEP) has been prepared for the project, describing the communication and consultation approach and activities for the proposal. Further detail about the strategy is provided in Section 5.1 of the project REF. The CSEP strategy applies to the proposed modification.

5.2 Consultation outcomes

Consultation outcomes are summarised in Table 5-1.

Table 5-1: Issues raised through Aboriginal community consultation

Group	Issue raised	Response / where addressed in addendum REF
Deerubbin Local Aboriginal Land Council	No issues raised during site inspection on 2 October 2024	Section 6.7 discusses the outcomes of the process carried out in accordance with Stage 2 of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation for the proposed modification.

Blacktown, Hawkesbury and Penrith City Councils, the State Emergency Service (SES), and DPHI were consulted in December 2024 and January 2025, and the Bradfield Development Authority in March 2025 about the proposed modification. Consultation was undertaken as per the requirements of sections 2.10, 2.12, 2.13 and 2.15 of the SEPP (Transport and Infrastructure) and section 3.24 of the SEPP (Precincts – Central River City). Appendix B contains a consultation checklist that documents how SEPP (Transport and Infrastructure) consultation requirements have been identified.

Issues that have been raised as a result of this consultation are outlined below in Table 5-2.

Table 5-2: Issues raised through SEPP (Transport and Infrastructure) and SEPP (Precincts – Central River City) consultation

Agency	Issue raised	Response / where addressed in addendum REF
Penrith City Council	No traffic matter concerns regarding the proposed use of site AS3 for stockpiling.	Noted.
	The traffic effects of using site AS3 on the existing Clydesdale Rural Estate entry road residential access is to be clarified.	An assessment of the traffic effects of the proposed modification are provided in Section 6.1.
	Confirmation that the Clydesdale Rural Estate entry is proposed for construction access to AS3.	The use of the intersection of Richmond Road with Clydesdale Rural Estate Road is proposed to be used for access to AS3. The use of Clydesdale Rural Estate for AS3 access is not part of the proposed modification. The proposed modification will be limited to the road reserve. Further details on the traffic effects of the proposed modification are provided in Section 6.1.
	Potential for impacts on local residents on Clydesdale Rural estate road by construction traffic accessing AS3.	Consultation with landowners would be carried out prior to the use of AS3. Works would be limited to within the road reserve. An assessment of the traffic effects of the proposed modification are provided in Section 6.1. An assessment of construction traffic noise is provided in Section 6.2.

Agency	Issue raised	Response / where addressed in addendum REF
	A separate construction access to the proposed AS3 stockpile to be undertaken as an alternative to using the existing Clydesdale Rural Estate entry road.	The use of the existing intersection of Richmond Road with Clydesdale Estate Road is preferred to access AS3. Construction of a new temporary intersection will be redundant when construction is complete. It is not proposed to use the Clydesdale Rural Estate Road for access to AS3
	Council to be provided with a traffic assessment report.	An assessment of the traffic effects of the proposed modification are provided in Section 6.1. The traffic report is provided in Appendix C.
	The proposed modification for AS3 are partially on flood liable land. Roadside swale drains should not be blocked during construction as they act as an overland flow path in minor storms.	Construction Staging plans, Soil and Water Management Plan and Erosion and Sediment Control Plans are to be undertaken prior to construction. These are to plan for drainage and overland flow during the construction period. No construction materials or equipment are to be stored in stormwater drainage lines.
	Parts of the proposed AS3 stockpile area is in areas that are mapped as flood affected.	No long-term materials stockpiles are to be located in flood susceptible areas of AS3.
	Council to be provided with a flood assessment report.	Flooding issues and mitigation measures are addressed in Section 6.5. The flood assessment report is provided in Appendix G.
SES	Flood impacts are considered for flood events up the PMF and including effects of climate change on flood risks.	Flooding issues and mitigation measures are addressed in Section 6.5. The effects of climate change on flood risk have been considered as part of the flood assessment. The flood assessment report is provided in Appendix G.
	Stormwater design and site management that reduces flood impacts and risks to the community are to be pursued.	The proposal, as described in the project REF, and proposed modification will reduce impact and risks to the community. The design has been undertaken in accordance with Transport for NSW design standards for stormwater and flood. This includes: • The Pavement drainage design standard is 10% AEP • Cross drainage culvert design standard is for 0.2% AEP. This consistent with the Hawkesbury Nepean Valley flood evacuation strategy. Flooding issues and mitigation measures are addressed in Section 6.5. The flood assessment report is provided in Appendix G.
	Improvements to flood resilience will benefit the community.	Noted. The proposal provides greatly improved flood immunity to Richmond Road. The proposed modification sets the road level at a minimum of RL 20.0 m AHD. This ensures the upgraded section is elevated above the 0.2% AEP flood level of the Hawkesbury-Nepean River.

Agency	Issue raised	Response / where addressed in addendum REF
	Ensure that workers and road users are aware of flood risks.	Construction management plans and inductions will include incident management and evacuation plans. Workers will be inducted in site incident evacuation procedures. Flood risk signage and markers will be provided as appropriate in the design. Flooding issues and mitigation measures are addressed in Section 6.5.
	Closure of the worksite to be considered and materials and equipment to be secured where there is a risk of local flooding.	Construction phase Flood Management Plan is to be prepared which will include actions to monitor, avoid and mitigate flood risks during construction. Flooding issues and mitigation measures are addressed in Section 6.5.
	Recommend that all lanes remain open in the event of riverine flooding.	Subject to construction staging and the timing of a flood event, it may not be feasible for all lanes to fully open. Lanes may be under construction. A Flood Management Plan is to be prepared which will outline actions to monitor, avoid and mitigate flood risks during construction. Flooding issues and mitigation measures are addressed in Section 6.5.
	Request that notification be provided where there are likely to be significant delays to emergency services routes and local road access.	Traffic management plan is to provide access for emergency service vehicles to local roads during construction. CSEP to include traffic change notifications to emergency services. This includes local SES, Fire, Police and Ambulance.
Bradfield Development Authority	Supportive of Transport for NSW delivering infrastructure for Western Sydney. No comments on the project.	Noted.
Hawkesbury City Council	No response received.	Not applicable
Blacktown City Council	No response received.	Not applicable
DPHI	No response received.	Not applicable

Appendix B contains a consultation checklist that documents how the consultation requirements under SEPP (Precincts – Central River City) and SEPP (Precincts – Western Parkland City) have been identified.

Various government agencies and stakeholders have been consulted about the proposed modification including:

- Blacktown City Council
- Penrith City Council
- Hawkesbury City Council.

Issues that have been raised as a result of consultation with these agencies and stakeholders are outlined below in Table 5-3.

Table 5-3: Issues raised through stakeholder consultation

Agency	Issue raised	Response / where addressed in addendum REF
Blacktown City Council design review panel	The design review panel raised safety concerns for pedestrians and cyclists, as well as potential impacts to bus routes.	Section 6.9
Stockland	Discussion on plans to reinstate the Clydesdale Farm 1980 Heritage Wall and Gate further away from proposed modification area.	Section 6.3

5.3 Ongoing or future consultation

This AREF will be placed on the project webpage for information.

Ongoing consultation activities with key stakeholders additional to those listed in Section 5.7 of the project REF include consultation with respect to:

- Land acquisition
- Flood assessment report
- Traffic assessment report
- Heritage and related permit
- Emergency service access through roadworks and access to local roads during construction.

Ongoing consultation would take place in accordance with the Community and Stakeholder Engagement Plan (CSEP).

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 Richmond Road Upgrade, Marsden Park. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the guidelines Roads and Related Facilities EIS Guideline (DUAP, 1996) and Is an EIS required? (DUAP, 1999) 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.

Environmental factors that will be addressed in the addendum REF are listed in Table 6-1.

Table 6-1: Environmental factors addressed in the addendum REF

Factors	Change in environmental impacts	Additional assessment required? REF reference
Traffic and transport	• Change in traffic impacts due to new ancillary site and road design.	Yes – Assessed in Section 6.1.
Noise and vibration	• New impacts during construction due to new ancillary sites and expansion of construction footprint • New impacts during operation due to increase in road level. • Change in sensitive receivers and distance from the proposed modification.	Yes – Assessed in Section 6.2.
Non-Aboriginal heritage	• New impacts to previously unassessed areas.	Yes – Assessed in Section 6.3.
Biodiversity	• New impacts to previously unassessed areas.	Yes – Assessed in Section 6.4.
Hydrology, flooding and water quality	• New hydrology, flooding and water quality impacts during construction due to new ancillary sites, drainage changes and expansion of construction footprint. • New flooding effects with design and drainage changes and removal of flood storage volume • New water quality impacts during operation due to increase in impervious services.	Yes – Assessed in Section 6.5.
Topography, geology, soils and contamination	• Changes to topography • Changes to soil disturbance.	Yes – Assessed in Section 6.6.
Aboriginal heritage	• New impacts to previously unassessed areas.	Yes – Assessed in Section 6.7.
Landscape character and visual impacts	• Change in receiving environment due to an increase in sensitive receivers • Change in design with higher elevation • New impacts during construction due to new ancillary sites and expansion of construction footprint.	Yes – Assessed in Section 6.8.
Property, land use and socio-economic	• Change in property acquisition.	Yes – Assessed in Section 6.9.
Air quality	• Increased impact due to change in volume of fill.	Yes – Assessed in table form in Section 6.10.
Resource and waste management	• Construction and operation impacts remains consistent with project REF.	No – Confirmation included in table form in Section 6.10.
Cumulative impacts	• Impacts associated with new developments within ten kilometres of the proposed modification area	Yes – assessed in Section 6.11

6.1 Traffic and transport

The potential impacts of the proposed modification on traffic and transport are assessed in the Richmond Road Upgrade – Construction Traffic Impact Assessment (Jacobs, 2025a), provided in Appendix C. A summary of the assessment is presented in this section.

6.1.1 Methodology

Base scenario modelling

The base network Signalised Intersection Design and Research Aid (SIDRA) models for the Richmond Road / Elara Boulevard and Richmond Road / Garfield Road intersections were provided by Transport for NSW. Existing traffic volumes for SIDRA input were based on traffic survey counts provided for the Richmond Road / Elara Boulevard and Richmond Road / Garfield Road intersections for 9 March 2023. The traffic volumes were scaled for the construction years (2025 – 2027) using an annual background growth rate of 2.1% derived from AECOM's *Richmond Road Upgrade between Elara Boulevard and Heritage Road – Traffic Impact Assessment Report*.

The Richmond Road / AS3 intersection has also been identified as a key intersection. This intersection was modelled and assessed as a new isolated site in SIDRA. Existing north/south through traffic volumes on Richmond Road were assumed to be equivalent to the downstream volumes at the Richmond Road / Elara Boulevard intersection, given that there are no other major intersections between Elara Boulevard and AS3. Turning movements were calculated on the basis of seven properties being near the intersection. For the AM/PM peaks, the properties were assumed to generate one trip per hour.

Construction trip generation and distribution

Construction trip generation and traffic volumes were provided by MI Engineers. Table 6-2 summarises the forecast of average peak volumes of construction vehicles per hour by type and stage.

Table 6-2: Summary of forecast peak volumes of construction vehicles

Average hourly vehicle movement	Stage 0 (2025 – 2026)	Stage 1 (2026 – 2027)	Stage 2 (2027)	Stage 3 (2027)
Heavy vehicle deliveries (including imported fill and pavement materials)	9	27	27	11
Internal heavy vehicle movements (from stockpile to site)	6	24	24	6
Light vehicle movements (staff and workers)	17	30	30	17

Trip distributions have been assumed based on a general understanding of construction trips in the surrounding area and directionality of key residential areas relative to the proposed modification area, as shown in Appendix C.

Intersection performance

Intersection performances were evaluated based on the following criteria

- Degree of saturation (DoS)
- Average delay (seconds)
- Level of service (LoS)
- Queue lengths (metres) for Richmond Rd / AS3 intersection.

DoS is defined as the ratio of demand flow to capacity and evaluates lane or movement traffic performance. A DoS greater than 1.0 signifies oversaturated conditions where extended delays and queuing could be expected. A DoS less than 1.0 signifies that capacity is not yet reached. The target practical DoS for a signalised intersection is 0.90, and 0.80 for an unsignalised intersection.

The RTA NSW (Roads and Maritime) LoS method was applied, which uses average delay (seconds per vehicle) to determine a LoS ranging from A (good operation) to F (excessive queuing). Generally, a target LOS D is considered acceptable, however additional factors such as value for money and physical limitations should be considered to evaluate if a LOS D is feasible for the project.

Queue lengths were assessed using the 95th percentile queue length (metres) output in SIDRA. This represents the value below which 95% of all observed queue lengths fall, or alternatively the length which 5% of all observed queues exceed.

6.1.2 Existing environment

Existing road network

Traffic counts were carried out on 9 March 2023. The number and direction of vehicle movements that were observed along Richmond Road during the AM peak (7:30 am to 8:30 am) PM peak (3:15 pm to 4:15 pm) are shown in Figure 6-1 and Figure 6-2.

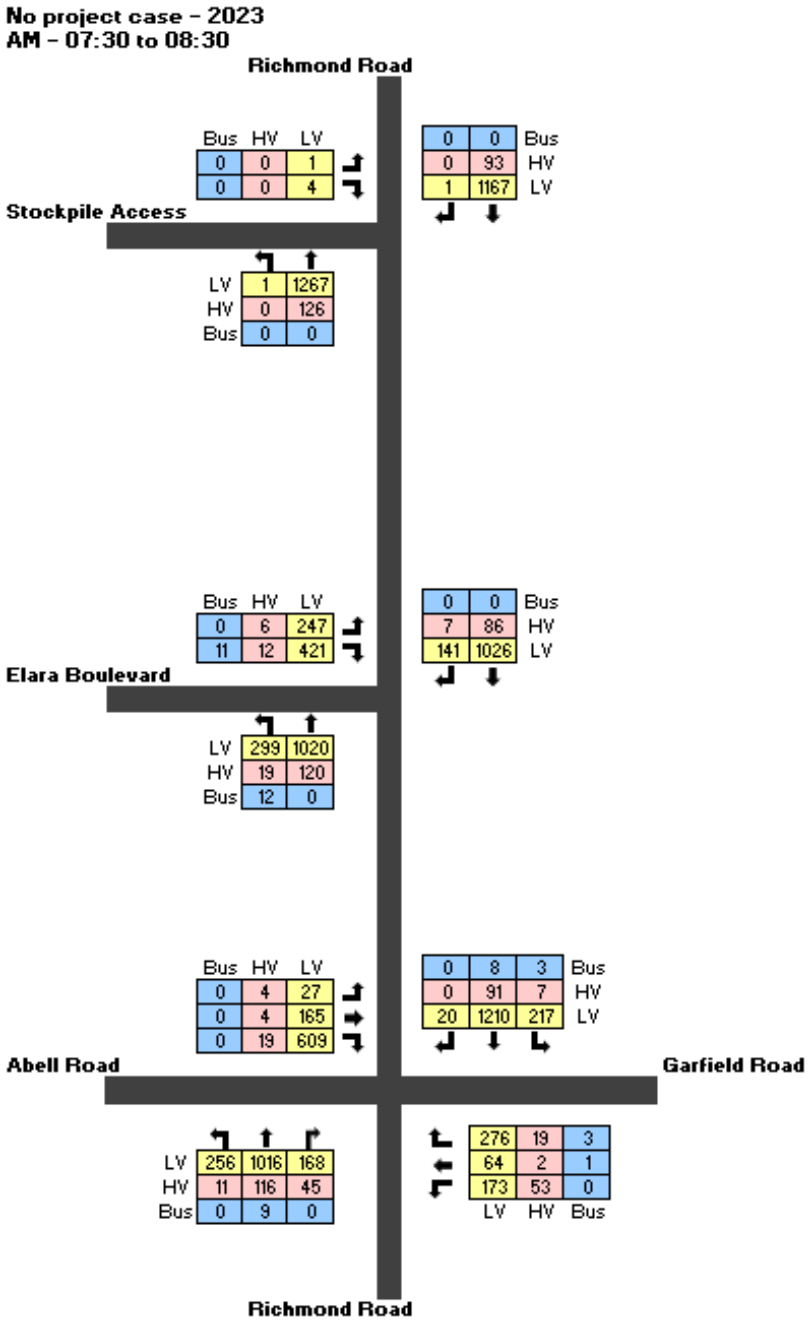


Figure 6-1: Existing traffic movements on Richmond Road in 2023

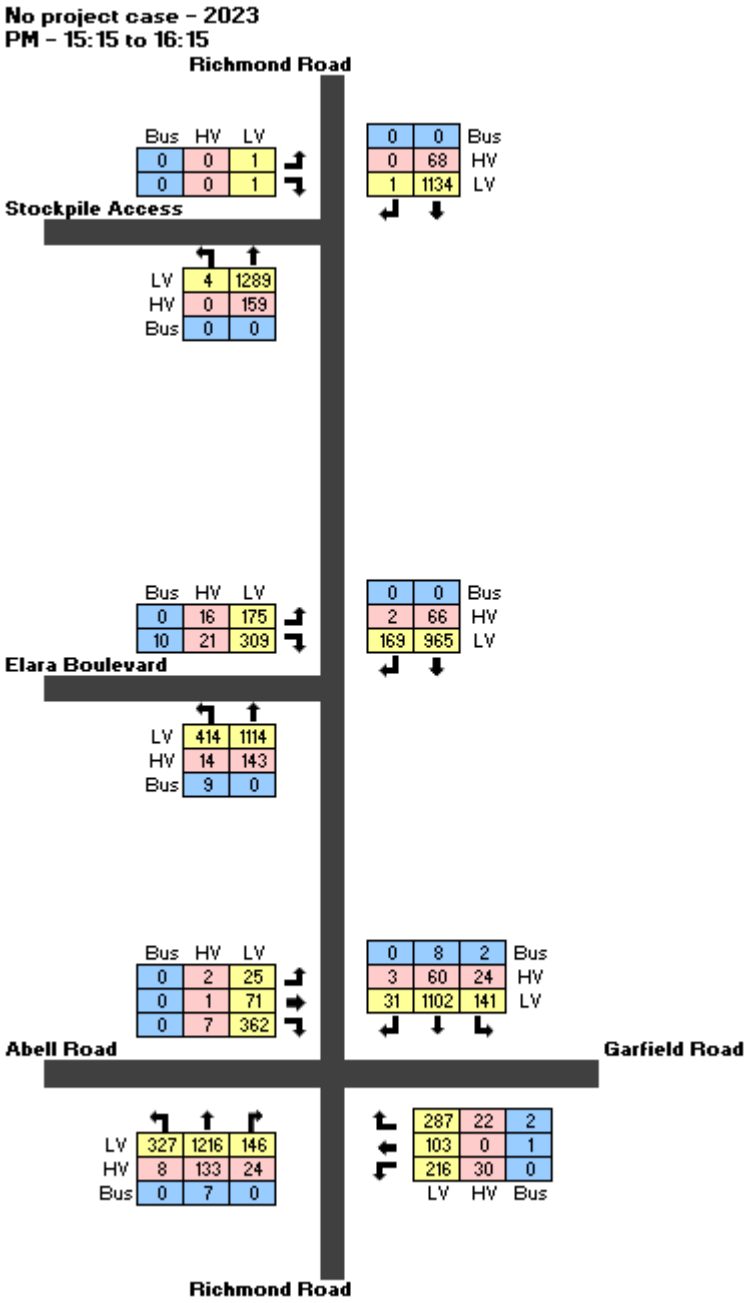


Figure 6-2: Existing traffic movements on Richmond Road in 2023

Intersection performance

Modelled intersection LoS and DoS for key intersections during the base case are provided in Table 6-3.

The northbound and southbound approaches to the AS3 intersection would operate at LoS A during AM and PM peak periods, whereas the eastbound approach from AS3 would operate at LoS F during both periods.

The northbound approach to the Richmond Road / Elara Boulevard intersection would operate at Los A during AM and PM periods while the southbound approach would operate at LoS B during both periods. The eastbound approach would operate at Los D during the AM peak period and Los F during the PM peak period.

Table 6-3: Peak period traffic numbers

Intersection	Approach	2026 AM peak hour			2026 PM peak hour		
		DoS	Average delay (seconds per vehicle)	LoS	DoS	Average delay (seconds per vehicle)	LoS
Richmond Road / AS3	Northbound through lane	0.84	0	A	0.88	2	A
	Southbound through lane	0.72	9	A	0.70	5	A
	AS3 eastbound approach	1.00	15	F	1.00	>300	F
Richmond Road / Elara Boulevard	Northbound	0.66	13	A	0.60	14	A
	Eastbound	0.76	48	D	1.03	110	F
	Southbound	1.01	24	B	0.86	16	B

6.1.3 Potential impacts

Construction

The results of the traffic modelling are shown in in Appendix C.

Without intersection treatment, the AS3 intersection is expected to experience a LoS F, with delays and oversaturation at the AS3 eastbound approach and Richmond Road southbound right turn. LoS F is expected to persist throughout all construction stages for these approaches. Due to minimal gaps in traffic for right-turning vehicles out of AS3, additional construction traffic would increase intersection delays. Queuing of southbound traffic up to one kilometre may occur, affecting the Richmond Road / St Marys intersection, north of AS3. AS3 would likely impact property access as the access and egress road to AS3 is shared with seven residences.

In contrast, construction traffic would have a negligible impact to the operation of the Richmond Road / Elara Boulevard intersection. LoS and delays remain consistent with and without construction traffic, as shown in Appendix C.

Construction traffic would have a minor impact to the operation of the Richmond Road / Garfield Road intersection, with the LoS of the northbound and southbound approaches degrading slightly during the AM peak of construction stages 1 and 2. The average delay on the southbound approach would be 75 seconds, while the average delay on the northbound approach would be 52 seconds. This is an eight second increase to the average delay on the southbound approach and a 14 second increase on the northbound approach compared to the 2027 base case.

Staff and worker parking will be located primarily at AS1. However, some light vehicle parking may occur along Bolwarra Drive close to AS2.

There would be no additional impacts to the public transport and active transport network.

The construction phase intersection treatment of AS3 onto Richmond Road would be subject to traffic modelling of intersection operations. Treatment would be developed in coordination with Transport for NSW Customer Journey Planning and in accordance with the Road Occupancy Licence.

Operation

Operational impacts would be consistent with Section 6.1.3 of the project REF.

6.1.4 Safeguards and management measures

Table 6-4 provides the changes to traffic and transport safeguards and management measures. New and modified management measures to those presented in the REF are in ***bold italics*** and deleted measures have been struck out.

Table 6-4: Revised environmental management measures for traffic and transport

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Construction Traffic Management Plan (CTMP) would be prepared by the construction contractor in consultation with relevant local councils and in accordance with relevant guidelines, ***Transport for NSW contract requirements and specifications, and Road Occupancy License conditions as applicable.*** The CTMP would outline: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • 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 • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • Parking arrangements for construction staff • 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	Contractor	Pre-construction	Section 4.8 of QA G36 *Environment Protection*
Traffic and transport	***A Road Occupancy License would be required prior to construction activities that impact on road operations.***	***Contractor***	***Construction***	***Additional safeguard***
Parking	~~All staff parking will be provided on-site and not on surrounding local streets.~~ ***Staff parking will be limited to the ancillary sites and Bolwarra Drive.***	***Transport for NSW and Contractor***	***Construction***	***Additional standard safeguard***
AS3 construction traffic.	***Consultation with landowners on Clydesdale Rural Estate road to be undertaken prior to the use of AS3.***	***Transport for NSW***	***Pre-construction***	***Additional***
AS3 construction traffic	***Construction vehicles are not to use the Clydesdale Rural Estate Road.***	***Contractor***	***Construction***	***Additional safeguard***

6.2 Noise and vibration

The potential noise and vibration impact of the proposed modification on sensitive receivers are assessed in the Richmond Road Upgrade – Noise and Vibration Impact Assessment (NVIA) (Jacobs, 2025b), provided in Appendix . A summary of the assessment is presented in this section.

6.2.1 Methodology

The methodology included undertaking a review of changes between the proposed modification and project REF and assessing the noise and vibration effects of the proposed modification changes. This has included:

- Identifying noise and vibration sensitive receivers in the study area and considering any changes arising from the proposed modification
- Undertaking noise monitoring to determine the existing environment
- Establishing noise and vibration assessment criteria
- Modelling predicted construction and operational noise levels of the proposed modification
- Assessing predicted noise and vibration levels against the criteria to determine potential impacts
- Comparing the noise and vibration effects of the proposed modification with those as at the project REF
- Providing revised and updated safeguards and mitigation measures to minimise the impacts of the proposed modification from the project REF.

Noise and Vibration assessment guidelines, policy and standards

Noise and vibration assessment was undertaken in accordance with the following noise and vibration policies, guidelines and standards for construction and operational phases:

- Construction noise and vibration
  - Interim Construction Noise Guideline (ICNG) (DEECCW, 2009)
  - EMF-NV-GD-0056 Construction Noise and Vibration Guideline (Roads) (CNVG) (Transport for NSW, 2024)
  - Road Noise Policy (RNP) (DEECCW, 2011)
  - Noise Policy for Industry (NPfI) (NSW EPA, 2017)
  - Assessing Vibration: A technical guideline (NSW DEECCW, 2006)
  - Australian Standard AS2187.2 – 2006 Explosives – Storage and use Part 2: Use of explosives
  - DIN 4150-3 Vibrations in buildings – Part 3: Effects on structures
- Operational noise and vibration
  - Road Noise Policy (RNP) (NSW DCCEEW, 2011)
  - EMF-NV-GD-0025 Road Noise Criteria Guideline (RNCG) (Transport for NSW, 2023)
  - EMF-NV-GD-0024 Road Noise Mitigation Guideline (RNMG) (Transport for NSW, 2022)
  - EMF-NV-GD-0026 Road Noise Model Validation Guideline (RNMVG) (Transport for NSW, 2022)
  - EMF-NV-PR-0083 Noise and vibration assessment procedure (Transport for New South Wales, 2023).

Noise models

Noise modelling has been undertaken using the SoundPLAN 9.0 noise modelling software. The noise model used for the project REF and Submissions Report was further developed for the assessment of the proposed modification.

The receivers used in the noise model for the project REF were used to compare noise effects between the project REF and the proposed modification.

Construction noise

The construction noise impact has assessed:

- The change in predicted noise impacts associated with the work scenarios in the proposed modification, and

- The impacts associated with the new works scenarios introduced by the proposed modification including AS2, AS3 and the intersection works at AS3.

Construction scenario and timings

The timings of the construction scenarios were identical to those of the project REF NVIA. Where a scenario was introduced in the proposed modification the most similar scenario from the project REF NVIA was adopted.

Noise levels of the construction scenarios were retained from the project REF NVIA. Construction activities taking place at AS1 have been assumed to take place at AS2 and AS3. At the AS3 intersection entry it has been assumed that any of the Richmond Road construction activities for road widening and upgrade could take place. The construction scenarios for construction noise modelling are summarised in Table 6-5.

Table 6-5: Construction noise scenarios and timing showing proposed modification changes from project REF NVIA

Scenario ID	Scenario name	Change from OREF NVIA	Location	Timing		
				SH[1]	OOHW1[1]	OOHW2[1]
W.01	Early Works / Utilities - Noise Intensive Works	Construction extent updated	Main Works	✓		
W.02	Early Works / Utilities - Typical Works	Construction extent updated	Main Works	✓		
W.03	Early Works / Utilities – OOHWs Noise Intensive Works	Construction extent updated	Main Works		✓	✓
W.04	Early Works / Utilities – OOHWs Typical Works	Construction extent updated	Main Works		✓	✓
W.05a	Compound – Site Establishment	Construction extent updated	AS1	✓		✓
W.05b	Compound – Site Establishment	Additional stage not previously assessed	AS2	✓		✓
W.06	Vegetation Clearing	Construction extent updated	Main Works	✓		
W.07 & W.08	Road Works - Northbound & Southbound	Construction extent updated	Main Works – Road Surface	✓		
W.09	Road Works - Pavement Works - Noise Intensive Works	Construction extent updated	Main Works – Road Surface	✓	✓	✓
W.10	Road Works - Pavement Works – Typical Works	Construction extent updated	Main Works – Road Surface	✓	✓	✓
W.11	Finishing Works	Construction extent updated	Main Works	✓	✓	✓
W.12a	Compound - Operation	Additional stage not previously assessed	AS1	✓	✓	✓
W.12b	Compound - Operation	Additional stage not previously assessed	AS2	✓	✓	✓
AW.01	Early Works / Utilities - Noise Intensive Works	Additional stage not previously assessed	AS3 Intersection	✓		
AW.02	Early Works / Utilities - Typical Works	Additional stage not previously assessed	AS3 Intersection	✓		
AW.03	Early Works / Utilities – OOHWs Noise Intensive Works	Additional stage not previously assessed	AS3 Intersection		✓	✓
AW.04	Early Works / Utilities – OOHWs Typical Works	Additional stage not previously assessed	AS3 Intersection		✓	✓
AW.05	Compounds – Site Establishment	Additional stage not previously assessed	AS3	✓		✓
AW.06	Vegetation Clearing	Additional stage not previously assessed	AS3 Intersection	✓		
AW.07	Road Works - Northbound & Southbound	Additional stage not previously assessed	AS3 Intersection	✓		

Scenario ID	Scenario name	Change from OREF NVIA	Location	Timing		
				SH[1]	OOHW1[1]	OOHW2[1]
AW.08	Road Works - Pavement Works - Noise Intensive Works	Additional stage not previously assessed	AS3 Intersection	✓	✓	✓
AW.09	Road Works - Pavement Works – Typical Works	Additional stage not previously assessed	AS3 Intersection	✓	✓	✓
AW.10	Finishing Works	Additional stage not previously assessed	AS3 Intersection	✓	✓	✓
AW.11	Compound - Operation	Additional stage not previously assessed	AS3	✓	✓	✓
Note 1: SH = Standard Hours, OOHW1 = Out of Hours Works Period 1, OOHW2 = Out of Hours Works Period 2						

Construction noise inventory

Sound power levels of individual equipment and the equipment used in each construction stage scenario were based on the data provided in Appendix C of the project REF NVIA. Additional sound power level data was derived from the DEFRA Noise Database, Transport for NSW's EMF-NV-TT-0067 Construction and Maintenance Noise Estimator (Roads) (Transport for NSW, 2022) (CMNE(R)) as well as from other relevant guidelines and databases where necessary.

The final noise inventory including work scenarios, the locations and equipment associated with each scenario, and the estimated overall source noise levels, are detailed in Appendix D.

Construction traffic noise

Some construction traffic noise would be generated due the movement of material and equipment in and out of the project area. Noise from the construction traffic movements has been assessed using the CMNE(R) tool. The primary routes to access the project area (based on the proposed modification) would be:

- Richmond Road (approaching from the north)
- Richmond Road (approaching from the south)
- Garfield Road West
- Bolwarra Drive between Richmond Road and AS2
- Clydesdale estate road entry between Richmond Road and AS3.

Construction vehicle volumes have been updated based on the proposed modification. Existing traffic volumes on Richmond Road were based on the traffic volumes measured as part of the proposed modification assessment. Traffic volumes on Garfield West Road were adopted from volumes measured as part of the Denmark Link Road Project Operational and Construction Noise and Vibration Assessment (Muller Acoustic Consulting, 2020). Both Bolwarra Drive and the unnamed road between Richmond Road and AS3 have been assumed to carry negligible existing traffic due to their nature as small residential access roads.

Predicted existing traffic volumes alongside construction vehicle movements are provided in Table 6-6. As a conservative assumption, it has been assumed that all deliveries could occur either in the day or night RNP periods.

Table 6-6: Construction traffic inventory

Road	Time	Direction	Traffic speed	Existing traffic		Construction traffic	
				Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Richmond Road (north of Elara Boulevard)	Day	Northbound	80	10546	3015	30	41
		Southbound		12307	2091	30	41
	Night	Northbound		1608	542	30	41
		Southbound		2660	783	30	41
Richmond Road (south of Elara Boulevard)	Day	Eastbound	80	16530	2122	30	41
		Westbound		14557	2663	30	41
	Night	Eastbound		2674	318	30	41
		Westbound		3585	1022	30	41
Garfield Road West	Day	Eastbound	70	3428	968	30	41
		Westbound		3802	1074	30	41
	Night	Eastbound		596	156	30	41
		Westbound		518	236	30	41
Bolwarra Road / Unnamed Road	Day	Eastbound	50	1	0	30	41
		Westbound		1	0	30	41
	Night	Eastbound		1	0	30	41
		Westbound		1	0	30	41

Time periods as per the RNP: Day – 7am to 10pm; Night – 10pm to 7am

Construction Vibration

The vibration setbacks utilised in the CNVG(R) used as screening assessment of the potential for construction vibration impacts. The 13-18 tonne vibratory roller and large hydraulic hammer have been identified as vibration-intensive equipment used during construction. The locations in which the construction work would take place, and the associated safe working distances are given in Table 6-7. Vibration impacts of the proposed modification have been compared against those at the project REF.

Table 6-7: Vibration intensive equipment inventory

Equipment	Construction activity	Human comfort setback distance (m)	Cosmetic damage setback distance (m)	Heritage (m)
>300 kN (typically 13-18 tonne) Vibratory Roller	Main Works, AS3 Intersection Works	100 m	20 m	40 m
Large hydraulic hammer	Main Works, AS3 Intersection Works	73 m	22 m	44 m

Operational assessment methodology

The operational noise assessment methodology uses four assessment scenarios to identify operational traffic impacts. These are

- Year of Opening (2026) Traffic Volumes:
  - No Build – utilising the existing road alignment geometry, with all existing structures and features within the road corridor included
  - Build – utilising the proposed modification road alignment, including all modification to the road, all project-related structures and changes to existing ground levels such as cuttings and embankments
- Design Year (2036) Traffic Volumes:
  - No Build – utilising the existing road alignment geometry, with all existing structures and features within the road corridor included

- Build – utilising the proposed modification road alignment, including all modifications to the road, all project-related structures and changes to existing ground levels such as cuttings and embankments.

Build and no-build scenarios in each of the above years are compared to each other as part of the assessment. Noise levels during both the Year of Opening and Design Year have been modelled. The Design Year noise levels have been used in the identification of noise impacts and the application of noise mitigation.

Roads have been divided into 'Project' and 'Non-Project' roads for the consideration of cumulative and acute noise impacts. In alignment with the OREF NVIA and the design assessed under the AREF, the Project Roads are the sections of Richmond Road where design changes have occurred (and the same chainages of Richmond Road in the no-build scenario). All other segments of Richmond Road, alongside Elara Boulevard and Bandon Road (2036 only) are considered 'Non-Project' roads.

Modelled traffic volumes in the project REF have been used to provide traffic inputs into the operational noise models.

6.2.2 Existing environment

Noise Catchment Areas

Noise catchment areas (NCAs) for the proposed modification were previously established in the project REF NVIA. The same NCAs have been adopted for this NVIA as land use has not materially changed. The NCAs are described in Table 6-8 and shown in Figure 6-3.

Table 6-8: Noise catchment areas adopted for the proposed modification

NCA	Distance from the proposed modification area to the nearest receiver	Description
NCA01	30 m	NCA01 covers Marsden Park Precinct which is to the west of Richmond Road and is mostly residential. Sections of the precinct are still under development and it has been necessary to estimate the location of future receivers which may be affected by the proposal using the masterplan of the precinct. NCA01 includes the new Marsden Park Public School to west of Richmond Road.
NCA02	130 m	NCA02 covers the future Marsden Park North Precinct to the east of Richmond Road. No details of the future receivers are currently available for this precinct. The existing receivers are mostly sparsely distributed residential properties to the east of Richmond Road and to the south of Garfield Road West. This catchment also includes Marsden Park Public School which is also to the south of Garfield Road West.
NCA03	30 m	NCA03 is to the north of the study area and consists of sparsely distributed residential receivers on either side of Richmond Road near St Marys Road.

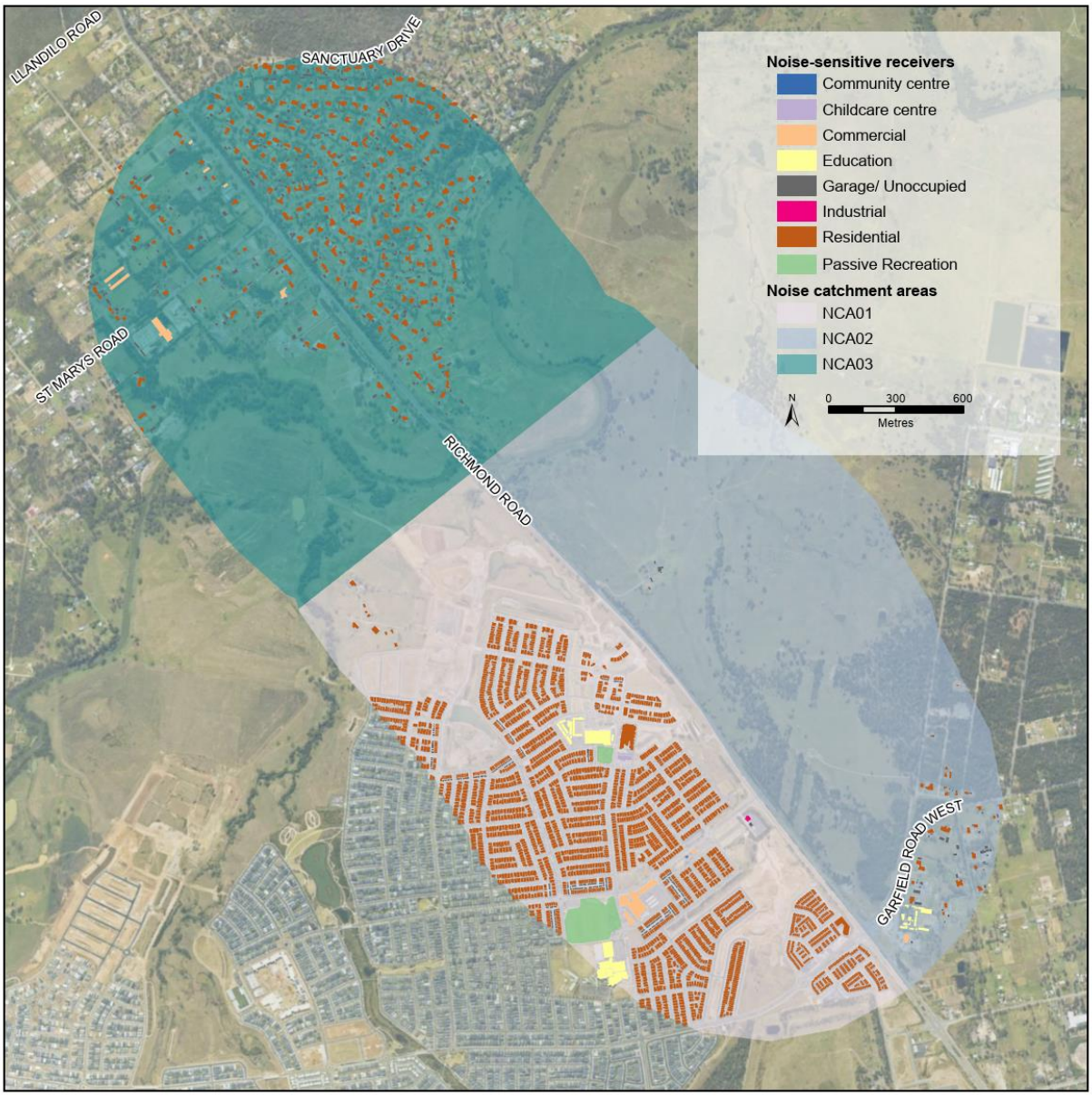


Figure 6-3: Noise catchment areas (NCA) adopted for the assessment

Noise monitoring

Background and traffic noise monitoring was performed over a two-week period from 26 November to 10 December 2024. Two noise monitors (NM1 and NM2) were positioned to measure background noise (in NCA01 and NCA03) while two noise monitors (NM1 and NM2) were positioned to measure traffic noise at two locations adjacent to Richmond Road.

Background noise levels

Monitored background noise levels are in Table 6-9. The table shows the equivalent noise level (LAeq) and 'Rating Background Level' (RBL). LAeq represents the continuous A-weighted sound pressure level over 15 minutes, while the RBL represents the lowest 10th percentile of LA90 noise (the A-weighted noise level that is exceeded for 90% of the time). NM2 has been used as representative for both NCA02 and NCA03. While monitoring in NCA02 was undertaken at NM4, the location of the logger was selected for traffic noise measurements. As NCA02 and NCA03 are similar (rural, low-density settings with an acoustic influence from Richmond Road), NM2 was deemed suitable as a representative of NCA02.

Table 6-9: Background noise levels

Monitor ID / Noise Catchment Area (NCA) / Monitoring location / Monitoring duration / Measurement					Measured Noise Level – $L_{Aeq,15min}$ dB(A)		
					Standard Hours[1]	OOHW[2] Period 1[1]	OOHW[2] Period 2[1]
NM1	NCA01	35 Ellison St, Marsden Park	26/11/24 – 10/12/2024	L_{Aeq}	61	54	51
				RBL	46	46[3]	37
NM2	NCA02 & NCA03	190 Willeroo Dr, Windsor Downs	26/11/24 – 10/12/2024	L_{Aeq}	54	53	52
				RBL	45	44	35

Note 1: Time periods for based on guidance within the ICNG and CNVG(R)

- *Standard Hours: Monday to Friday 7am – 6pm, Saturday 8am – 1pm, Nil Sunday and Public Holidays*
- *OOHW Period 1: Monday to Friday 6pm – 10pm, Saturday 7am – 8am & 1pm – 10pm, Sunday and Public Holidays 8am – 6pm*
- *OOHW Period 2: Monday to Friday 10pm – 7am, Saturday 10pm – 8am, Sunday and Public Holidays 6pm – 7am*

Note 2: Out of Hours Works

Note 3: Measured noise level reduced to not be greater than preceding noise period

Traffic noise

Monitored traffic noise levels have been summarised in Table 6-10. LAeq measurement in the table represents the continuous A-weighted traffic-based sound pressure level over one hour.

Table 6-10: Traffic noise levels

Monitor ID	Monitoring location	Monitoring duration	Measured Noise Level – dB(A)	
			$L_{Aeq,15hr}$ Day (7am – 10pm)[1]	$L_{Aeq,9hr}$ Night (10pm – 7am)[1]
NM3[2]	Chambers Street park	26/11/24 – 10/12/2024	59	57
NM4	1271 Richmond Road	26/11/24 – 10/12/2024	70	69

Note 1: Time periods as defined in the RNP.

Note 2: Microphone positioned at 2.9m to provide line of sight to roads over local fences.

Maximum noise levels

Maximum noise levels should be considered for the purposes of developing mitigation and management measures. A maximum noise level event, in accordance with the methodology within the project REF NVIA and based on guidance within the above documents, was defined as being any pass by where:

- The maximum noise level of the event is greater than 65 dBA L_{AFmax} ;and
- The $L_{AFmax} – L_{Aeq(1hour)}$ is greater than or equal to 15 dB.

Table 6-11: Summary of measured maximum noise level events

ID	Monitoring location	Total night-time events	Measured maximum noise levels – L_{AMax} dB(A)	
			Range	Median
NM3	Chambers Street park	61	65 – 84	72
NM4	1271 Richmond Road	49	76 – 94	82

Vibration sensitive items

All occupied buildings susceptible to vibration impacts that can affect human comfort. However, specific buildings and structures, such as precision industry, medical centres and heritage items can be particularly vibration sensitive due to their nature of operations or structural conditions.

A review of land use surrounding the Project site found no precision industry within 1 km of the Project. A single medical centre at 101 Elara Boulevard, Marsden Park has been identified approximately 550 – 600 metres from the nearest proposed construction extent. This is outside the typical distance of construction vibration impacts. Heritage items within the study area are listed in Table 6-12 and shown in Figure 6-7.

Table 6-12: Heritage items identified within one km of project

Heritage item	Item No.	Address	Distance from works (m)
Clydesdale entry gate[1]	00674	1270 Richmond Road, Marsden Park	0 m (within Project area)
Site of Berkshire Park homestead (archaeological site)	A662	844–848 Richmond Road, Berkshire Park	30 m (to border of property)
St Phillip's Anglican Church Cemetery	I37	Richmond Road, Angus	130 m
Clydesdale grand house, barn and cottage group	00674	1270 Richmond Road, Marsden Park	710 m[2]
School house	I36	Marsden Park High School, 363 Garfield Rd West, Marsden Park	720 m

Note 1: The entry gates will be relocated prior to the commencement of construction and hence are not considered a vibration receiver.
Note 2: Distance to nearest structure within building group.

6.2.3 Criteria – Construction Noise

Construction Noise Criteria - Residential receivers

Construction is considered to have the potential to cause a noise impact if the predicted noise exceeds the applicable noise management level (NMLs). The NMLs for residential receivers for the proposed modification have been established in accordance with the ICNG and are shown in Table 6-13 following.

Table 6-13: Construction noise management levels for residential receivers

Receiver	NML $L_{eq\ 15min}$ dB(A)		
	Standard Hours[1]	OOHW[2] Period 1[1]	OOHW[2] Period 2[1]
NCA01	56	51	42
NCA02[3]	55	49	40
NCA03	55	49	40

Note 1: Time periods for based on guidance within the ICNG and CNVG(R)
- *Standard Hours: Monday to Friday 7am – 6pm, Saturday 8am – 1pm, Nil Sunday and Public Holidays*
- *OOHW Period 1: Monday to Friday 6pm – 10pm, Saturday 7am – 8am & 1pm – 10pm, Sunday and Public Holidays 8am – 6pm*
- *OOHW Period 2: Monday to Friday 10pm – 7am, Saturday 10pm – 8am, Sunday and Public Holidays 6pm – 7am*

Note 2: Out of Hours Works (OOHW)
Note 3: Background noise levels (and hence NMLs) for NCA03 adopted at NCA02.

Construction Noise Criteria -Non-residential receivers

The ICNG NMLs for non-residential land uses are provided in Table 6-14.

Table 6-14: ICNG NMLs for non-residential receivers

Non-residential receiver type	Noise management level, $L_{Aeq(15min)}$ (applies when properties are occupied and are in use)
Commercial	External Noise Level – 70 dB(A)
Industrial	External Noise Level – 75 dB(A)
Educational facilities	Internal Noise Level – 45 dB(A)
Hospital / Medical	Internal Noise Level – 45 dB(A)
Place of Worship	Internal Noise Level – 45 dB(A)
Passive Recreation	External Noise Level – 60 dB(A)
Active Recreation	External Noise Level – 65 dB(A)

Construction Noise Criteria -Sleep disturbance

The potential for noise levels to lead to sleep disturbance is considered for premises where night construction occurs. A night-time sleep disturbance 'screening criterion' noise goal of RBL +15 dB(A) has been used to identify the receivers where there is potential for sleep disturbance. Sleep disturbance levels for the proposed modification are shown in Table 6-15.

Table 6-15: Sleep disturbance screening levels

Receiver	L_{AMax} Sleep disturbance screening level	L_{AMax} Awakening reaction screening level
NCA 1	52	65
NCA 2[1]	50	65
NCA 3	50	65

Note 1: Background noise levels (and hence screening levels) for NCA03 adopted at NCA02.

Construction Noise Criteria - 'Annoying' noise characteristics

A +5 dB(A) penalty has been applied to the assumed Sound Power Level (SWL) of activities which are annoying to residents. These activities include:

- Use of 'beeper' style reversing or movement alarms, particularly at night-time
- Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
- Grinding metal, concrete or masonry
- Rock drilling
- Line drilling
- Vibratory rolling
- Rail tamping and regulating
- Bitumen milling or profiling
- Jackhammering, rock hammering or rock breaking
- Impact piling.

Construction Noise Criteria -Construction traffic noise

The ICNG advises that road traffic noise impacts due to the construction traffic are assessed against the RNP. RNP criteria are provided in Table 6-16.

Table 6-16: Relevant road noise policy assessment criteria

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq, (15\ hour)}$ 60 dB(A)	$L_{Aeq, (9\ hour)}$ 55 dB(A)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, (1\ hour)}$ 55 dB(A)	$L_{Aeq, (1\ hour)}$ 50 dB(A)

6.2.4 Criteria – Construction Vibration

Human comfort

Vibration arising from construction activities must comply with criteria presented in "*Assessing Vibration: a technical guideline*", (NSW DCCEEW, February 2006) and *British Standard 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting* [BS 6472-1: 2008]. Assessing Vibration: a technical guideline (NSW DCCEEW, 2006) identifies three different forms of vibration associated with construction activities:

- Continuous: uninterrupted vibration occurring over a defined period
- Impulsive: short-term (typically less than two seconds) bursts of vibration which occurs up to three times over an assessment period
- Intermittent: interrupted periods of continuous or repeated impulsive vibration, or continuous vibration that varies significantly in magnitude.

Preferred and maximum values of human exposure for continuous and impulsive vibrations are listed in Table 6-17 for relevant receivers to this proposed modification. Preferred and maximum VDVs for intermittent vibration for different types of receivers have been reproduced in Table 6-18 for relative receivers.

Table 6-17: Human comfort continuous and impulsive vibration criteria. Preferred and maximum weighted Root Mean Square (RMS) values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz (from *Assessing Vibration: a technical guideline* (DEECCW, 2006))

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis[2]	X and y axis[2]	z-axis	x and y axis
Continuous vibration					
Residences	Day	0.010	0.0071	0.020	0.014
	Night	0.007	0.005	0.014	0.010
Impulsive vibration					
Residences	Day	0.30	0.21	0.60	0.42
	Night	0.10	0.071	0.20	0.14

[1] *Daytime is 7:00 am to 10:00 pm. Night-time is 10:00 pm to 7:00 am*
[2] *z-axis refers to vertical vibration, while the x and y axes refer to horizontal vibration.*

Table 6-18: Human comfort intermittent vibration criteria. Preferred and maximum VDVs for intermittent vibration (m/s$^{1.75}$) (from *Assessing Vibration: a technical guideline* (DEECCW, 2006))

Location	Day time (7:00 am to 10:00 pm)		Night time (10:00 pm to 7:00 am)	
	Preferred VDV	Maximum VDV	Preferred VDV	Maximum VDV
Residences	0.20	0.40	0.13	0.26

Building and structures

Guidelines for cosmetic damage to structures arising from vibration is provided in Table 6-19. Values are derived from Section J4.4.3 of *Australian Standard AS2187.2 – 2006 Explosives – Storage and use Part 2: Use of explosives.*

Table 6-19: Transient vibration guideline values for cosmetic damage

Type of building	Peak particle velocity (PPV) mm/s		
	4 to 15 Hz	15 to 40 Hz	40 Hz and above
Reinforced or framed structures industrial and heavy commercial buildings		50	
Un-reinforced or light-framed structures residential or light commercial type buildings	15 to 20	20 to 50	50

Guidance for more sensitive structures is presented in the German standard, DIN 4150-3 Vibrations in buildings – Part 3: Effects on structures (DIN 4150-3: 2016). Guideline criteria are shown in Table 6-20 following.

Table 6-20: Building and structure (DIN 4150-3:2016) guideline values for short term vibration velocity

Type of building	Guideline values for velocity (mm/s)[1]		
	Vibration at the foundation at a frequency of:		
	1 Hz to 10 Hz[2]	10 Hz to 50 Hz	50 Hz to 100 Hz[3]
Offices and industrial premises	20	20 – 40	40 – 50
Domestic houses and similar construction	5	5 – 15	15 – 20
Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g., listed buildings under preservation order)	3	3 – 8	8 – 10

Note 1: Values referred to are at the base of the building.

Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Note 3: At frequencies above 100 Hz the values given in this column may be used as minimum values.

Key plant and equipment construction vibration criteria

Section 6 of *EMF-NA-GD-0056 Construction Noise and Vibration Guideline (Roads)* (CNVG(R)), (Transport for New South Wales, 2023) provides guidance for safe working distances to achieve human comfort (*Assessing Vibration: a technical guideline*, (DCCEEW, 2006)) and cosmetic building damage (BS7385-2:1993) criteria for a range of different plant and equipment. These safe working distances are relevant for some plant and equipment that may be used during construction of the Project.

Table 6-21: Recommended safe setback distances

Plant	Rating / description	Safe working distance (metres)		
		Cosmetic damage		Human response (Ref: NSW EPA guidelines)
		Residential and light commercial (Ref: BS7385-2: 1993)	Heritage items (Ref: DIN 4150, Group 3)	
Vibratory roller	<50 kN (typically 1-2 tonne)	5 m	14 m	15 m to 20 m
	<100 kN (typically 2-4 tonne)	6 m	16 m	20 m
	<200 kN (typically 4-6 tonne)	12 m	33 m	40 m
	<300 kN (typically 7-13 tonne)	15 m	41 m	100 m
	>300 kN (typically 13-18 tonne)	20 m	54 m	100 m
	>300 kN (> 18 tonne)	25 m	68 m	100 m
Small hydraulic hammer	300 kg – 5 to 12 tonne excavator	2 m	5 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18 tonne excavator	7 m	19 m	23 m
Large hydraulic hammer	1600 kg – 18 to 34 tonne excavator	22 m	60 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	50 m	20 m
Pile boring	≤800 mm	2 m (nominal)	5 m	4 m
Jackhammer	Handheld	1 m (nominal)	2 m	2 m

6.2.5 Criteria – Operational Traffic Noise

Operational Traffic noise criteria

The proposed modification involves the 'redevelopment' of Richmond Road. A road is 'redeveloped' where works are in an existing road corridor and the existing road is not substantially realigned. The relevant noise criteria for residential receivers are shown in Table 6-22. The RNP and RNCG also use separate noise goals for 'other sensitive' receivers. These are detailed in Table 6-23.

Table 6-22: Target noise levels for roads subject to redevelopment (RNP Table 3)

Road category	Type of project / land use	Target noise level – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/arterial/sub-arterial road	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	$L_{Aeq,\ 15\text{-}hour}$ 60 dB(A) (external)	$L_{Aeq,\ 9\text{-}hour}$ 55 dB(A) (external)
Local road	5. Existing residences affected by noise from redevelopment of existing local roads	$L_{Aeq,\ 1\text{-}hour}$ 55 dB(A) (external)	$L_{Aeq,\ 1\text{-}hour}$ 50 dB(A) (external)

Table 6-23: Target noise levels for 'Other Sensitive' Receivers (RNP Table 4)

Existing sensitive land use	Target noise level – dB(A)		Additional considerations
	Day (7am – 10pm)	Day (7am – 10pm)	
1. School classrooms	$L_{Aeq(1hour)}$ 40 (internal)	-	In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia 2000).
2. Hospital wards	$L_{Aeq(1hour)}$ 35 (internal)	$L_{Aeq(1hour)}$ 35 (internal)	-
3. Places of worship	$L_{Aeq(1hour)}$ 40 (internal)	$L_{Aeq(1hour)}$ 40 (internal)	The criteria are internal, i.e. the inside of a church. Areas outside the place of worship, such as a churchyard or cemetery, may also be a place of worship. Therefore, in determining appropriate criteria for such external areas, it should be established what is in these areas that may be affected by road traffic noise.
4. Open space (active use)	$L_{Aeq(1hour)}$ 60 (external) when in use	-	Active recreation is characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion. Passive recreation is characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. playing chess, reading.
5. Open space (passive use)	$L_{Aeq(1hour)}$ 55 (external) when in use	-	In determining whether areas are used for active or passive recreation, the type of activity that occurs in that area and its sensitivity to noise intrusion should be established. For areas where there may be a mix of passive and active recreation, e.g., school playgrounds, the more stringent criteria apply. Open space may also be used as a buffer zone for more sensitive land uses.
6. Isolated residences in commercial or industrial zones	-	-	For isolated residences in industrial or commercial zones, the external ambient noise levels can be higher than those in residential areas. Internal noise levels in such residences are likely to be more appropriate in assessing any road traffic noise impacts, and the proponent should determine suitable internal noise level targets, taking guidance from Australian Standard 2107:2000 (Standards Australia 2000).
7. Mixed use development	-	-	Each component of use in a mixed-use development should be considered separately.

Existing sensitive land use	Target noise level – dB(A)		Additional considerations
	Day (7am – 10pm)	Day (7am – 10pm)	
8. Mixed use development	Sleeping rooms $L_{Aeq(1hour)}$ 35 (internal) Indoor play areas $L_{Aeq(1hour)}$ 40(internal) Outdoor play areas $L_{Aeq(1hour)}$ 55 (external)	-	For example, in a mixed-use development containing residences and a child care facility, the residential component should be assessed against the appropriate criteria for residences and the child care component should be assessed against the appropriate criteria for child care facilities.
9. Aged care facilities	-	-	Multipurpose spaces, e.g., shared indoor play / sleeping rooms should meet the lower of the respective criteria.

Operational traffic noise criteria - Mitigation triggers

The RNMG provides guidance in managing and controlling road traffic noise and describes the principles to be applied when reviewing noise mitigation. The RNMG recognises that the RNCG criteria are not always practicable and that it is not always feasible or reasonable to expect that they are achieved.

The RNMG provides three triggers where a receiver may qualify for consideration of 'additional noise mitigation' (beyond the use of 'integrated noise reduction measures'). These are:

- Trigger 1 – the predicted 'Build' noise level exceeds the RNCG controlling criterion and the noise level increase due to the project (ie the noise predictions for the 'Build' minus the 'No Build') is greater than 2.0 dB
- Trigger 2 – the predicted 'Build' noise level is 5 dB or more above the RNCG controlling criterion it is considered to have exceeded the Cumulative Limit and the receiver is significantly influenced by project road noise. The cumulative limit defines as where the contribution from the road project at the affected facade adds 2.0dBA or more to the total noise level in the build year, regardless of the incremental impact of the project'
- Trigger 3 – the noise level contribution from the road project is acute (daytime LAeq(15hour) 65 dBA or higher, or night-time LAeq(9hour) 60 dBA or higher) even if noise levels are controlled by a non-project road.

In line with the assessment approach adopted in the project REF NVIA, noise from the proposed modification has been assessed against the triggers, in addition to the target levels in the RNP/RNCG.

6.2.6 Potential impacts – Construction noise and vibration

Construction noise impacts - residential receivers

Estimated noise levels at the nearest receivers were predicted from the anticipated noise levels generated during each construction works activity. The adopted assessment approach considered a "worst-case" scenario which assumed all plant and equipment for each works activity was operated closest to the respective receiver within their respective construction extent. This is a conservative approach and while this may provide for the determination of conservative noise levels, actual construction noise levels should be lower than predicted in this assessment.

Predicted construction noise impacts during have been categorised against the CNVG(R)'s perception categories, which are based on the noise level over the respective NMLs. These are provided in Table 6-24.

Table 6-24: CNVG construction noise perception categories

CNVG Perception Category	Noise level above NML	
	Standard hours	Out of hours works
Noticeable	-	Up to 5 dB(A)
Clearly audible	Up to 10 dB(A)	5 – 15 dB(A)
Moderately intrusive	10 – 20 dB(A)	15 – 25 dB(A)
Highly intrusive	Over 20 dB(A)	Over 25 dB(A)

Construction noise impacts at the most affected receivers within each NCA, and a comparison against the same scenario presented in the project REF NVIA have been provided in Table 6-25. Receivers which are further away from the works and/or shielded from view would have lower impacts.

Table 6-25: Predicted worst-case construction noise exceedances - residential receivers

Period	Stage	NCA01		NCA02		NCA03	
		Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact
Standard Hours	W.01	Highly Intrusive	Moderately Intrusive	Highly Intrusive	Clearly Audible	-	-
	W.02	Moderately Intrusive	Clearly Audible	Clearly Audible	-	-	-
	W.05a	Clearly Audible	Moderately Intrusive	Clearly Audible	-	-	-
	W.05b	Highly Intrusive	N/A	-	N/A	-	-
	W.06	Highly Intrusive	Moderately Intrusive	Highly Intrusive	Clearly Audible	-	-
	W.07 & W.08	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Clearly Audible	-	-
	W.09	Moderately Intrusive	Moderately Intrusive	Clearly Audible	-	-	-
	W.10	Moderately Intrusive	Clearly Audible	Clearly Audible	-	-	-
	W.11	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	-	-	-
	W.12a	-	-	-	-	-	-
	W.12b	Highly Intrusive	N/A	-	N/A	-	N/A
	AW.01	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.02	-	N/A	-	N/A	Clearly Audible	N/A
	AW.05	-	N/A	-	N/A	Highly Intrusive	N/A
	AW.06	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.07	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.08	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.09	-	N/A	-	N/A	Clearly Audible	N/A
	AW.10	-	N/A	-	N/A	Clearly Audible	N/A
	AW.11	-	N/A	-	N/A	Moderately Intrusive	N/A
OOHW1	W.03	Highly Intrusive	Moderately Intrusive	Highly Intrusive	Clearly Audible	Clearly Audible	-
	W.04	Moderately Intrusive	Clearly Audible	Moderately Intrusive	-	-	-
	W.09	Moderately Intrusive	Moderately Intrusive	Clearly Audible	Clearly Audible	-	-
	W.10	Moderately Intrusive	Moderately Intrusive	Clearly Audible	Noticeable	-	-

Period	Stage	NCA01		NCA02		NCA03	
		Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact
	W.11	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Noticeable	-	-
	W.12a	Noticeable	Noticeable	Noticeable	-	-	-
	W.12b	Highly Intrusive	N/A	-	N/A	-	N/A
	AW.03	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.04	-	N/A	-	N/A	Clearly Audible	N/A
	AW.08	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.09	-	N/A	-	N/A	Clearly Audible	N/A
	AW.10	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.11	-	N/A	-	N/A	Moderately Intrusive	N/A
OOHW2	W.03	Highly Intrusive	Highly Intrusive	Highly Intrusive	Moderately Intrusive	Clearly Audible	Clearly Audible
	W.04	Highly Intrusive	Moderately Intrusive	Highlyly Intrusive	Clearly Audible	Noticeable	-
	W.05a	Moderately Intrusive	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	-	Clearly Audible
	W.05b	Highly Intrusive	N/A	Clearly Audible	N/A	-	N/A
	W.09	Highly Intrusive	Highly Intrusive	Moderately Intrusive	Moderately Intrusive	Noticeable	Clearly Audible
	W.10	Highly Intrusive	Highly Intrusive	Moderately Intrusive	Clearly Audible	-	Noticeable
	W.11	Highly Intrusive	Highly Intrusive	Highly Intrusive	Clearly Audible	Noticeable	Noticeable
	W.12a	Clearly Audible	Clearly Audible	Clearly Audible	-	-	-
	W.12b	Highly Intrusive	N/A	Noticeable	N/A	-	N/A
	AW.03	-	N/A	-	N/A	Highly Intrusive	N/A
	AW.04	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.05	-	N/A	-	N/A	Highly Intrusive	N/A
	AW.08	-	N/A	-	N/A	Highly Intrusive	N/A
	AW.09	-	N/A	-	N/A	Moderately Intrusive	N/A
	AW.10	-	N/A	-	N/A	Moderately Intrusive	N/A

Period	Stage	NCA01		NCA02		NCA03	
		Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact	Proposed Modification NVIA impact	Project REF NVIA impact
	AW.11	-	N/A	-	N/A	Highly Intrusive	N/A

The following points are highlighted for the construction noise assessment:

- Worst-case noise levels and impacts at NCA01 generally increased between the project REF NVIA and the proposed modification NVIA. A number of stages now result in 'highly intrusive' noise impacts at the most affected receivers. This is expected as the proposed modification assessment area generally extends further than the project REF area, particularly towards the west and hence is closer to the receivers in this NCA.
- Noise impacts predicted during the establishment of AS1 have decreased from the project REF due to the relocation of the compound from the western to the eastern side of the proposed modification area. Noise levels resulting in receivers being 'highly noise affected' during the most noise-intensive stages were anticipated in both the NVIA for the proposed modification and the project REF NVIA in NCA01.
- Worst-case noise levels and impacts at NCA02 increase significantly from the project REF NVIA, due to the new works boundary becoming significantly closer to 1271 Richmond Road compared to the Project REF area. This receiver may also now noise loud enough for it to be 'highly noise affected' during the noise-intensive early works and vegetation clearance. Noise levels at other receivers in NCA02 remain similar between the proposed modification NVIA and the project REF NVIA.
- Worst-case noise levels and impacts at NCA03 were similar between the project REF NVIA and proposed modification NVIA, due to the distance between the NCA and the works.

In relation to the new work scenarios, the construction noise assessment above found that:

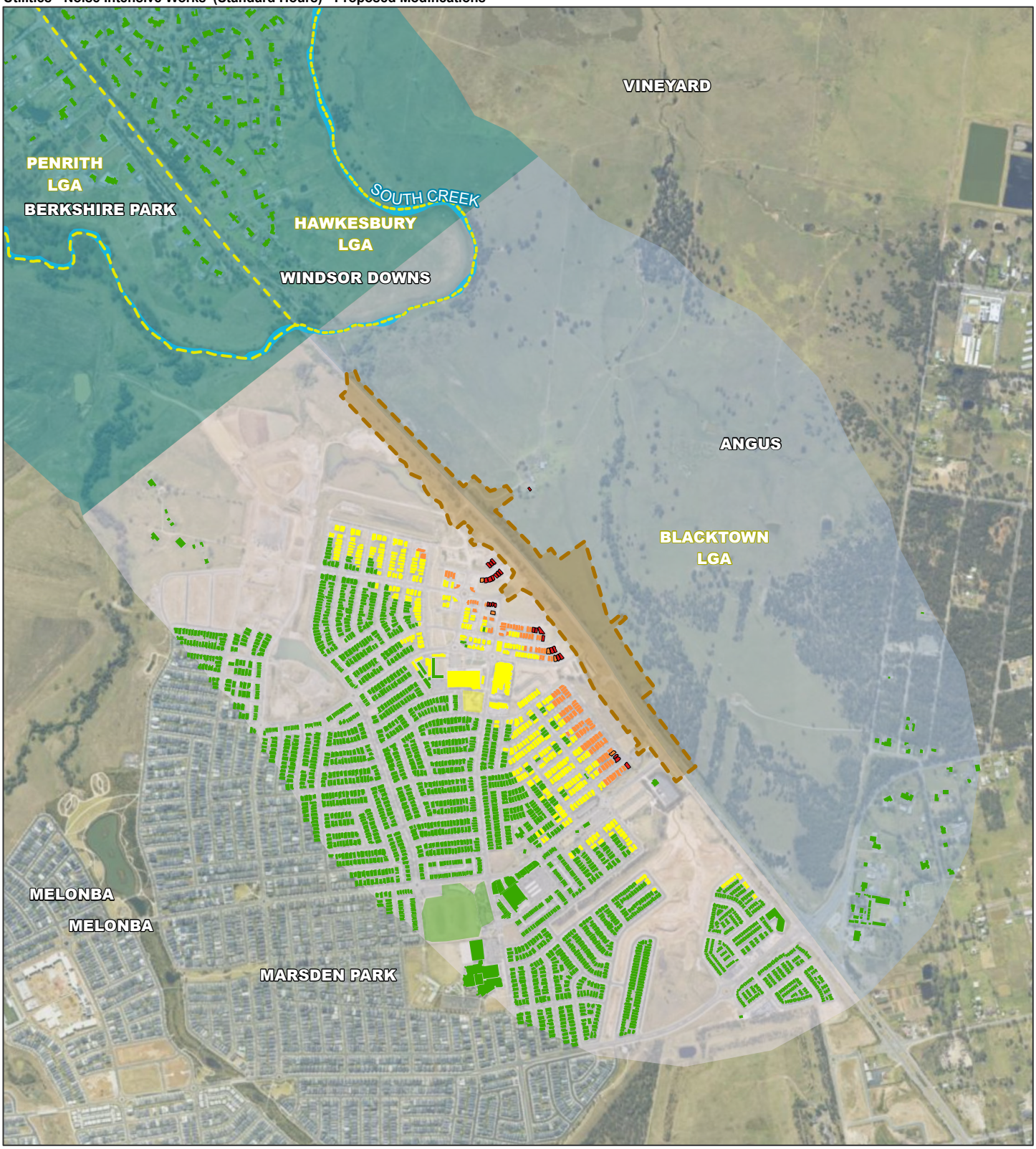
- Worst-case noise levels and impacts for work scenarios relating to AS2 were greatest at NCA01, due to the proximity of the ancillary site to the nearest receivers. Hence, noise impacts could be up to 'highly intrusive' and 'highly noise affected' at the nearest receivers. Noise impacts from works at AS2 at other NCAs may be up to 'noticeable' during Out of Hours Period 2, primarily due to the distance between these works and the NCAs.
- Similarly, due to the proximity of AS3 and the intersection works to the nearest receivers within NCA03, noise impacts at NCA03 during those works range primarily between 'moderately intrusive' and 'highly intrusive', with two receivers potentially being 'highly noise affected'. Impacts from these works at NCA01 and NCA02 are not anticipated due to the proximity of these works to receivers within those NCAs.

Figure 6-4 and Figure 6-5 show the predicted impact for construction noise impacts for stages W.01 and W.03. These stages have been shown as they shown as they have been assessed as the stages with the greatest impacts.

For construction stage W.01 'Highly intrusive' and 'Highly noise affected' noise impacts have been predicted at receivers closest to the works north of Bolwarra Drive, as well as receivers along Chambers Street near where the construction extent approaches the Donald Street carpark. 'Moderately intrusive' noise impacts generally only extend a few houses beyond the 'highly intrusive' noise impacted receivers and the 'Clearly Audible' noise impacted receivers extend approximately 200 m from the 'moderately intrusive' noise impacted receivers. This is shown in Figure 6-4. Construction noise impacts for this construction stage are a similar distance from that in the project REF NVIA. Noise impacts at NCA02 and NCA03 were not identified, except for 1271 Richmond Road.

For construction stage W.03 'highly intrusive' and 'moderately intrusive' impacts in NCA01 generally extended a couple of rows of houses further than those in the project REF NVIA. The extents of 'clearly audible' and 'noticeable' impacts generally remain consistent with the Project REF NVIA. Impacts at 1271 Richmond Road have been predicted to be 'moderately intrusive.' Impacts at NCA02 and NCA03 are consistent with the project REF NVIA. Assessed noise impacts for construction stage W.03 are shown in Figure 6-5.

Figure 6-3: Predicted Construction Noise Impacts 'W.01 - Early Works and Utilities - Noise Intensive Works' (Standard Hours) - Proposed Modifications



LEGEND

- Main Works

Noise catchment areas

- NCA01
- NCA02
- NCA03

Predicted impact at receiver

Recreational receivers are shown with slight transparency

- Noise below standard hours NML
- Clearly Audible (0 - 10 dB(A) above SH NML)
- Moderately Intrusive (10 - 20 dB(A) above SH NML)
- Highly Intrusive (>20 dB(A) above SH NML)
- Highly Noise Affected

- Local government area
- Watercourse
- Water body

N

A4 1:19,000

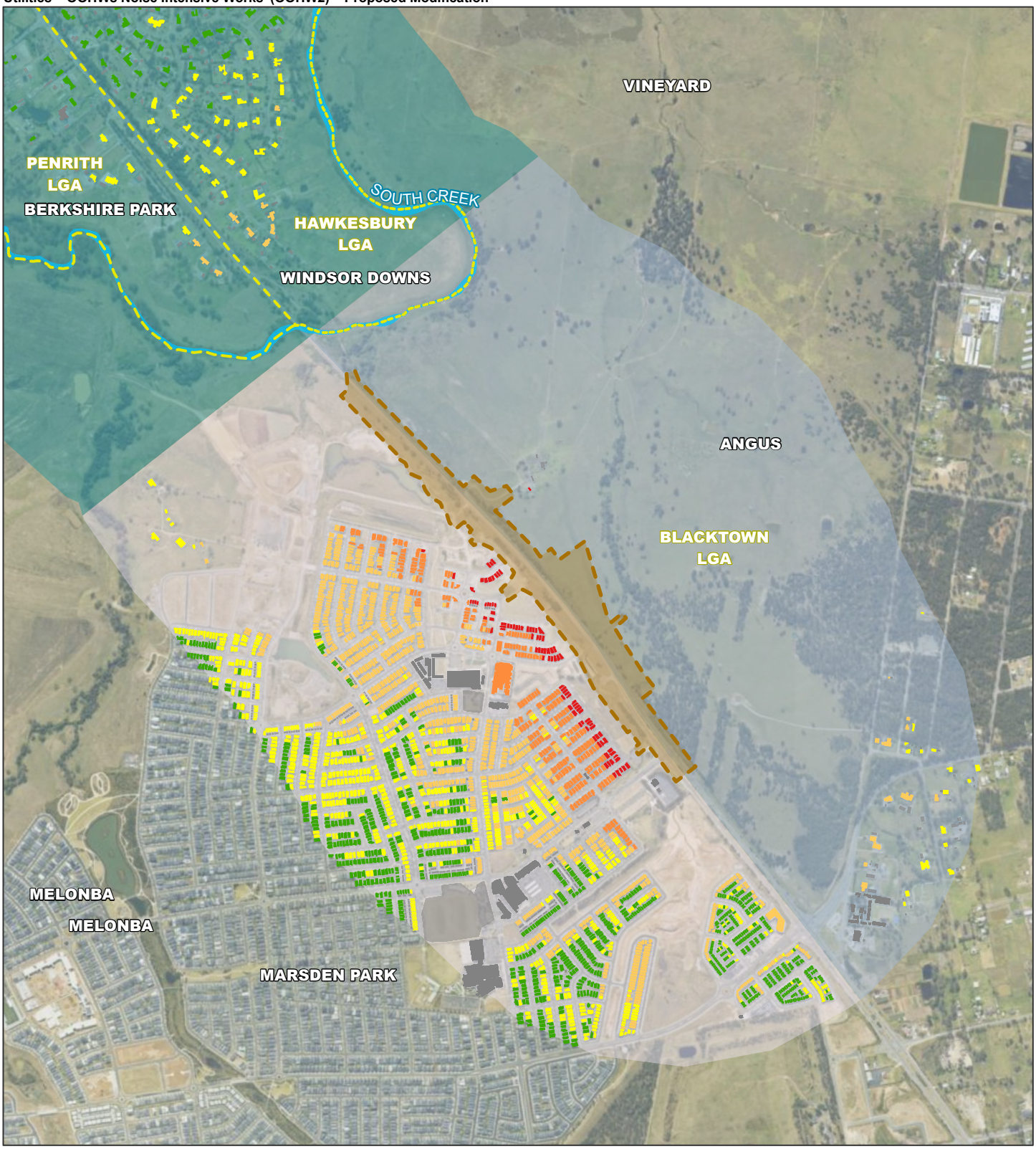
GDA2020 MGA Zone 56

0 150 300

Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

Figure 6.4: Predicted Construction Noise Impacts 'W.03 – Early Works and Utilities – OOHWs Noise Intensive Works' (OOHW2) – Proposed Modification



LEGEND

Main Works

Noise catchment areas

NCA01

NCA02

NCA03

Recreational receivers are shown with slight transparency

Non-residential receivers

Predicted impact at residential receiver

Noise below OOHW2 NML

Noticeable (0 - 5 dB(A) above OOHW2 NML)

Clearly Audible (5 - 15 dB(A) above OOHW2 NML)

Moderately Intrusive (15 - 25 dB(A) above OOHW2 NML)

Highly Intrusive (>25 dB(A) above OOHW2 NML)

Local government area

Watercourse

Water body

N

A4 1:19,000

GDA2020 MGA Zone 56

0 100 200

Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

Construction noise impacts -non-residential receivers

Construction noise impacts greater than NMLs are predicted at educational receivers (associated with Northbourne Public School) and the nearby Donnelly Street Park.

One education receiver, Northbourne Public School, was predicted to be impacted in project REF. The increase in non-residential predicted noise impacts from the project REF is due to due to the construction of new non-residential receivers in the vicinity of the proposed modification. This includes:

- A Goodstart Early Learning childcare centre constructed in the vicinity of the school since the project REF
- Donelly Street Park was established adjacent to the school following the completion of the project REF.

Construction sleep disturbance

A large number of receivers may be impacted during the OOHWs Noise Intensive Works. A lesser, but still notable, number of receivers may be impacted during other night work scenarios. The predicted number of receivers with sleep disturbance effects from the proposed modification remains consistent with those as at the project REF.

Night works will require management to minimise sleep disturbance impacts.

Construction Traffic noise impacts

Construction traffic noise from the proposed modification was assessed through Transport for New South Wales' *EMF-NV-TT-0067 Construction and Maintenance Noise Estimator (Roads)* (CMNE(R)) (Transport for NSW, 2022).

The predicted impacts for the proposed modification are mostly consistent with the those at the project REF. The predicted contribution of the Construction traffic is predicted to remain well below the 2 dB increase criteria, and hence construction traffic noise impacts at these receivers have not been predicted.

The proposed modification includes two stockpiles AS2 and AS3. Potential construction traffic noise on Bolwarra Road (AS2) and the Clydesedale Estate at AS3 was not previously assessed. A worse case assessment has been undertaken assuming that all deliveries would take place during peak construction hour. The results of this worse case assessment are provided in Table 6-26. Note that Richmond Road traffic noise is expected to mask construction traffic noise impacts.

Table 6-26: Predicted construction traffic noise levels at nearest noise sensitive receiver

Road	Time	Existing traffic noise level (dB(A))	Construction traffic noise level (dB(A))	Change in noise level (dB)	Traffic noise criteria (dB(A))	Exceedance of criteria?
Bolwarra Road AS2	AM Peak	-	66.4 LAeq,1hr	-	55	Yes – Construction traffic noise exceeds assessment criteria
	PM Peak	-	68.1 LAeq,1hr	-	50	Yes – Construction traffic noise exceeds assessment criteria
Unnamed Road Entry to AS3	AM Peak	-	63.5 LAeq,1hr	-	55	Yes – Construction traffic noise exceeds assessment criteria
	PM Peak	-	65.2 LAeq,1hr	-	50	Yes – Construction traffic noise exceeds assessment criteria

Construction Vibration assessment

The number of applicable receivers that fall within each vibration setback distance category has been identified based on the equipment and setback distances provided in Table 6-27. A vibration assessment for the Large excavator - rock breaker is shown in Figure 6-6. There are no receivers within setback distances for cosmetic damage and heritage and sensitive structures. The proposed modification results in a reduction in receivers in "Human Comfort" from that identified in the project REF

The assessment is conservative. The typical operation of the equipment is intermittent and (in the case of the vibratory roller) continually moving. The accumulated vibration energy over the course of the day at these receivers is unlikely to exceed the recommended targets defined for the duration of a Day.

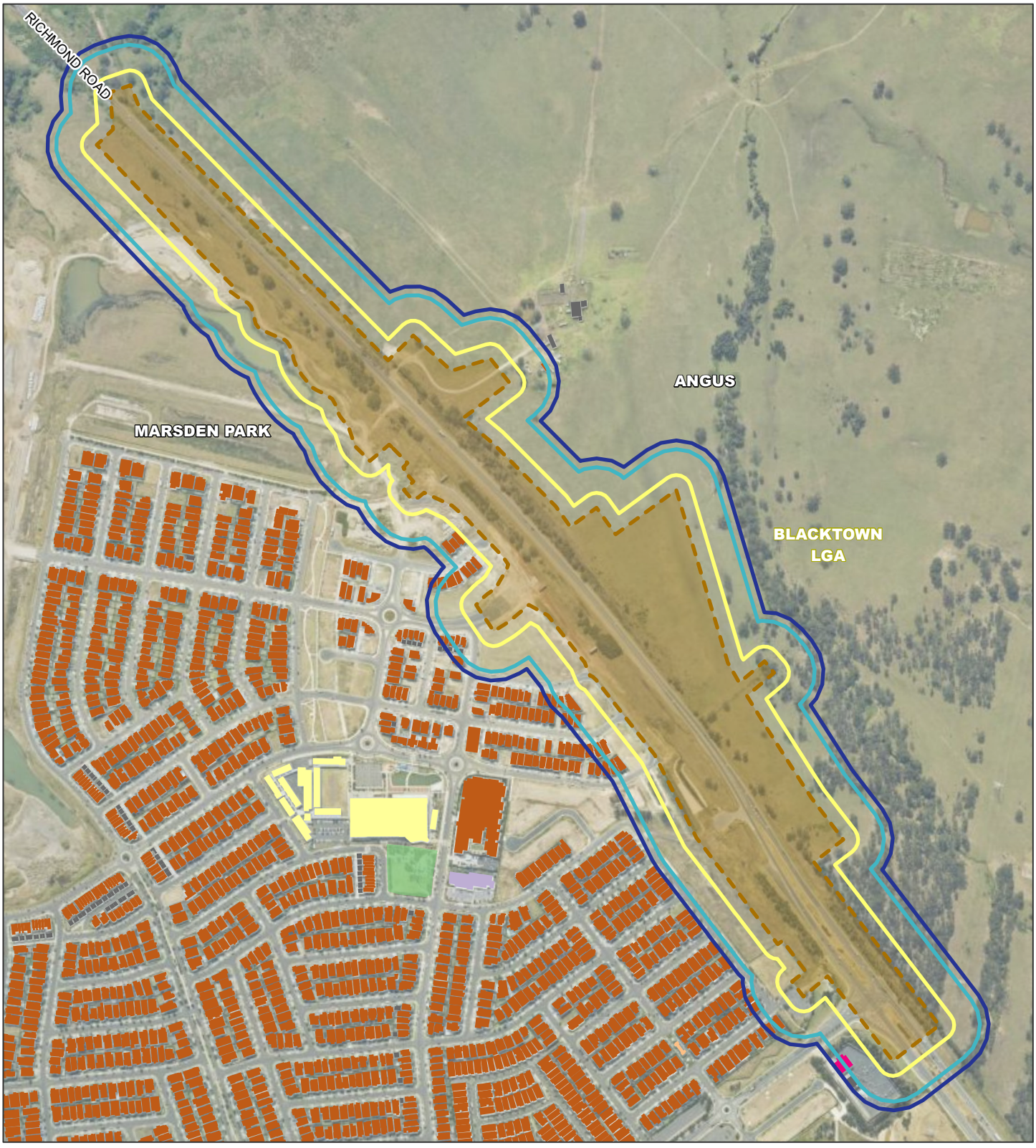
Table 6-27: Summary of construction vibration impacts from proposed modification and Project REF

Vibration source	Location	Number of impacted receivers					
		Cosmetic damage		Heritage and sensitive structures		Human comfort	
		Proposed Modification	Project REF	Proposed Modification	Project REF	Proposed Modification	Project REF
Large excavator breaker	Main Works	0	-	-	-	38	48
	AS3 intersection	1 (shed)	N/A	Site of Berkshire Park homestead (within boundary)	N/A	3	N/A
13 - 18t Vibratory roller	Main Works	0	Not presented[1]	-	Not presented[1]	43	Not presented[1]
	AS3 intersection	0	N/A	Site of Berkshire Park homestead (within boundary)	N/A	7	N/A

Note 1: Vibration results and maps were not presented in the Project REF NVIA and hence could not be compared to the Proposed modification results.

Figure 6.5: Construction Vibration – Large excavator Rockbreaker in main works

IA309800/ Addendum REF



LEGEND

- Main works
- Passive Recreation
- Local government area

Noise-sensitive receivers

- Childcare centre
- Commercial
- Education
- Garage/ Unoccupied
- Industrial
- Residential

Vibration setback distances

- Cosmetic damage vibration impact - 22m
- Heritage and sensitive structure vibration impact - 60m
- Human comfort vibration impact - 73m

N

A4 1:8,000

GDA2020 MGA Zone 56

0 170 340

Metres

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

6.2.7 Potential impacts – Operational noise

The predicted operational noise impacts at nearby existing residential receivers during the Year of Opening and Design Year has been determined. The number of receivers impacted by noise greater than both the RNCG target level and at least one of the RNMG trigger levels have been identified.

Worse case predicted operational noise levels

The worst-case noise levels at a receiver was calculated for each NCA. The worse case is typically the nearest to the upgraded road. A comparison of loudest predicted noise levels between the proposed modification NVIA and project REF is provided in Table 6-28.

Table 6-29 shows the predicted differences in noise levels at the nearest residential receivers between AREF and OREF. Generally the worse-case predicted noise levels of proposed modification are less than that predicted for the project REF.

Table 6-28: Predicted noise levels at the nearest residential receivers

NCA	Worst-case predicted noise level, dB(A)															
	Year of Opening (2026)								Future Design (2036)							
	No-Build				Build				No-Build				Build			
	Day		Night		Day		Night		Day		Night		Day		Night	
	AREF	OREF	AREF	OREF	AREF	OREF	AREF	OREF	AREF	OREF	AREF	OREF	AREF	OREF	AREF	OREF
NCA01	64	70	60	66	68	70	63	66	64	70	60	66	69	70	64	66
NCA02	58	60	54	56	60	60	55	56	58	60	54	57	60	61	56	57

Note: Noise at NCA03 not assessed as the NCA is beyond the extent of the assessed non-project roads.

Table 6-29: Predicted differences in noise levels at the nearest residential receivers.

NCA	Worst-case predicted noise level, Difference between AREF and project REF, dB(A)							
	Year of Opening (2026)				Future Design (2036)			
	No-Build		Build		No-Build		Build	
	Day	Night	Day	Night	Day	Night	Day	Night
NCA01	-6	-6	-2	-3	-6	-6	-1	-2
NCA02	-2	-2	0	-1	-2	-3	-1	-1

Receivers with predicted operational noise impacts

The number of receivers impacted by noise greater than the RNCG target levels and RNMG trigger levels are shown in Table 6-30. The predicted number of impacted receivers has been compared to the predicted levels presented in the project REF NVIA. The assessment considers each floor of a building to be a residential 'receiver'. When assessing impacts on a 'per building' basis, up to 50 residential buildings have been identified as impacted.

As shown in Table 6-30 the total number of sensitive residential receivers with predicted noise impacts is similar between for the proposed modification (75 receivers) and the project REF (74 receivers). The proposed modification has a predicted increase in properties affected by >2dB(A) triggers criteria and reduction in cumulative and acute triggers from the project REF

Predicted impacts on "Other sensitive' receivers is shown in Table 6-31. Two 'Other Sensitive' Receivers have been impacted by noise greater than the RNCG target levels and RNMG trigger(s), namely Northbourne Public School and Goodstart Early Learning. Northbourne Public School was identified in the project REF. Goodstart Early Learning was constructed after the project REF NVIA. The noise target level for educational receivers is an internal level. Further investigation is required to determine whether the external to internal transmission loss of the existing building is sufficient to achieve the criteria before mitigation is considered.

Table 6-30: Predicted noise impacts at residential receivers

NCA	Receivers[1] above RNCG target level and RNMG Trigger:							
	Proposed modification NVIA				**Project REF NVIA**			
	Trigger 1 >2 dB(A)	**Trigger 2 Cumulative**	**Trigger 3 Acute**	**Total**	**Trigger 1 >2 dB(A)**	**Trigger 2 Cumulative**	**Trigger 3 Acute**	**Total**
NCA01	65	22	12	75	38	50	44	74
NCA02	0	0	0	0	0	0	0	0
Total				75				74

Note 1: For the purposes of assessment, a 'receiver' in this context is the individual floor of each building.

Note 2: Noise at NCA03 not assessed as the NCA is beyond the extent of the assessed non-project roads.

Noise impacts at 'Other Sensitive' receivers have also been identified. These are provided in Table 6-31.

Table 6-31: 'Other Sensitive' Receiver impacts

NCA	Receiver	Type	Receivers above RNCG target level and RNMG Trigger:		
			Trigger 1 >2 dB(A)	**Trigger 2 Cumulative**	**Trigger 3 Acute**
NCA01	Northbourne Public School	Educational	Yes	-	-
NCA01	Goodstart Early Learning	Childcare	-	Yes	Yes

Operational noise mitigation

The process for Transport for NSW providing mitigation for receivers with predicted noise impacts is provided in the project submissions report. This includes:

- Receivers approved and built after the Project determination date (13 August 2021) would not be Transport for NSW's responsibility to mitigate as responsibility would fall on the developer
- Residences at 1, 3, 5, 7, 13, 15, 17 and 19 Chambers Street as well as No. 35 Ellison Street and No. 36 Feiney Street are not being considered for noise mitigation. These houses are currently being used as display houses. They are not expected to become available to the public until after the new houses located between Chambers Steet and Richmond Road are constructed which will provide noise shielding from Richmond Road
- Northbourne High School is of masonry construction, which in a worst-case scenario would provide an external to internal noise reduction of 20 dB(A).

Table 6-32 contains a summary of buildings that would be considered for operational noise mitigation. Of the receivers which were identified as above the RNCG noise target and the RNMG mitigation triggers, only around six meet the criteria for Transport for NSW.to provide mitigation. Of the six, five are receivers along Chambers Street, while one (Goodstart Early Learning) was located in northern Marsden Park and was approved for construction shortly before Project approval. In comparison, all ten of the receivers identified as Transport for NSW's responsibility were along Chambers Street (23 to 41 Chambers Street).

Note that while the project submissions report indicated that the display properties along Chambers Street would be repurposed for residential use following the construction of new houses between Chambers Street and Richmond Road. As at December 2024, the display property site has ceased function. These properties are being converted for residential use. Should the houses between these receivers and Richmond Road not be built before the commencement of Project construction, Transport for NSW may become responsible for the mitigation of those receivers.

Table 6-32: Summary of number of buildings which are Transport for NSW responsibility and comparison between proposed modification and Project REF NVIA.

Identified buildings	Proposed modification	Project REF NVIA
Total	52	75
Approved after Project determination – not Transport for NSW responsibility	41	64
Currently used for display, pending construction of houses between receiver and Richmond Road – not Transport for NSW responsibility	4	0[1]
Façade suitable to achieve required external to internal noise reduction – not Transport for NSW responsibility	1	1
None of the above – Transport for NSW responsibility	6	10

Note 1: The Project REF NVIA did not show these receivers as impacted as the modelling assumed the houses that would provide shielding were already built.

6.2.8 Safeguard and management measures

Table 6-33 provides the changes to noise and vibration safeguards and management measures. New and modified management measures to those presented in the REF are in ***bold italics*** and deleted measures have been struck out.

Table 6-33: Revised environmental management measures for Noise and Vibration

Impact	Environmental safeguards	Responsibility	Timing	Reference
Vibration	Where practical, schedule the use of vibration intensive equipment during standard construction hours Avoid multiple vibration intensive activities occurring at the same time. ***Apply, where reasonable and feasible, the standard mitigation measures contained within Assessing Vibration: A technical guideline (DCCEEW, 2006).***	Construction contractor	Construction	Updated safeguard
Monitoring	Monitoring should be carried out at the start of new noise and vibration intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented. ***Vibration monitoring should be carried out at nearest receivers within human comfort setback distances when a vibratory roller is proposed to be used to confirm vibration levels.***	Construction contractor	Construction	Updated safeguard
Operational Noise mitigation	~~Further assessment of reasonable and feasible operational noise mitigation will be assessed and determined when information regarding the location and size of the future buildings in Marsden Park Precinct is better understood.~~ ***Investigate receivers eligible for noise mitigation to determine the appropriate at-property treatments to be applied to address the predicted operational traffic noise impacts.***	Transport for New South Wales	***Construction***	Updated safeguard
Construction traffic noise	***Apply, where reasonable and feasible, the standard mitigation measures***	***Construction contractor***	***Construction***	***Additional safeguard***

Impact	Environmental safeguards	Responsibility	Timing	Reference
	contained within Appendix B of the CNVG(R).			
Construction traffic noise	*Ahead of works where works anticipated to produce significant noise and vibration impacts, apply the 'Additional Mitigation Measures' provided in Appendix C of the CNVG(R).*	*Construction contractor*	*Construction*	*Additional safeguard*
Construction traffic noise	• *Schedule construction traffic movements to avoid night periods and other sensitive times* • *Revising vehicle routes and scheduling to reduce heavy vehicle traffic along roads predicted to experience construction traffic noise impacts* • *Avoiding the use of compression brakes* • *Ensuring vehicles are adequately silenced before leaving or accessing the Project area*	*Construction contractor*	*Construction*	*Additional safeguard*

6.3 Non-Aboriginal heritage

The potential impacts of the proposed modification on non-Aboriginal heritage are assessed in the Addendum Statement of Heritage Impact (Addendum SoHI) (Artefact, 2025), provided in Appendix E. A summary of the assessment is presented in this section.

6.3.1 Methodology

Preparation of the Addendum SoHI involved searching statutory and non-statutory heritage registers, including:

- National Heritage List
- State Heritage Register
- Section 170 Heritage and Conservation Registers
- NSW State Heritage Inventory database
- Blacktown LEP
- Penrith LEP
- Register of the National Estate
- National Trust of Australia (NSW) register.

A site inspection was carried out on 3 October 2024 by qualified archaeologists.

An assessment of significance was carried out by using criteria outlined in *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Department of Planning, 2009).

6.3.2 Existing environment

Historical context

AS3 is located next to the Berkshire Park Estate. This estate was originally purchased by Richard Rouse in 1819, on which a ten-roomed house and brick cottage was later built. The property was substantially cleared and used for farming livestock and dairying. The Berkshire Park house and part of the estate were destroyed by fire in December 1944. AS3 is also located near Jericho House. Although the house was destroyed in a severe bushfire in a severe bushfire in 1896, remnants of the homestead are found in the north-eastern portion of the original land grant near South Creek. Nevertheless, there is no evidence that structural remains associated with Jericho are located within the proposed modification area.

The historical context of the proposed modification area is otherwise consistent with Section 6.3.2 of the project REF. Further detail on historical context is also available in Appendix E.

Listed non-Aboriginal heritage items

Changes to listed non-Aboriginal heritage items identified in the project REF are summarised in Table 6-34, with all heritage items shown in Figure 6-7.

Table 6-34: Changes to listed heritage items within 500 metres of the project

Name	Source	Number	Location	Change from project REF
Clydesdale – House, Barn, Cottage, and Farm Landscape	State Heritage Register National Trust Heritage Register	SHR 00674 NHTR 7063	Within the proposed modification area	This item is no longer listed on the State Heritage Inventory as SHI 5045540.
Clydesdale House – farmers cottage and barn	State Environmental Planning Policy (Precincts – Central River City) 2021	N/A	Within the proposed modification area	The State Environmental Planning Policy (Sydney Region Growth Centres) 2006 has been superseded.

Name	Source	Number	Location	Change from project REF
Cemetery – St Phillip's	Blacktown LEP	I37	Within 100 metres of the proposed modification area	This item is no longer listed on the State Heritage Inventory as SHI 1140032. It is now only locally listed.
Site of Berkshire Park Homestead	Penrith LEP	A662	Within 100 metres of the proposed modification area	New item due to the proposed modification.

Archaeological potential and significance

The proposed modification area now extends further west into Clydesdale Farm (SHR item number 00674). However, this portion of the Clydesdale Farm has limited potential to demonstrate state significant values.

Overall, there is mostly nil to low potential for historical, archaeological remains of low significance, including original driveways, property boundary fence lines and remnant entranceways to historical properties to be present within the proposed modification area. However, there is a high potential of survival of remains from the occupation of Clydesdale by the Royal Australian Air Force from the 1940s. These include sewerage system components, and electrical and telecommunications infrastructure remnants.

Most areas within the proposed modification area do not meet the threshold for State significance for NSW heritage criteria for assessing significance. However, the Richmond Road corridor holds archaeological potential related to the early adoption of the macadam technique, a road construction method. Potential for uncovering the existing macadam road is low but, if found, would provide research potential in understanding early attempts at implementing the construction technique. This would add to knowledge about significant roads of NSW I the early colonial period.

Heritage values

The Clydesdale Estate has Historical, Associative, Aesthetic, and Social heritage significance, as well as heritage value in its Rarity and Representativeness. The Clydesdale Estate derives its Historical, Aesthetic, and Representative significance in part from the views it has over the rural setting in which it sits, and the integrity of its remaining curtilage.

St Phillips Church Cemetery has Historical, Associative, Aesthetic, and Social heritage significance, as well as value in its Research Potential, Rarity, and Representativeness.

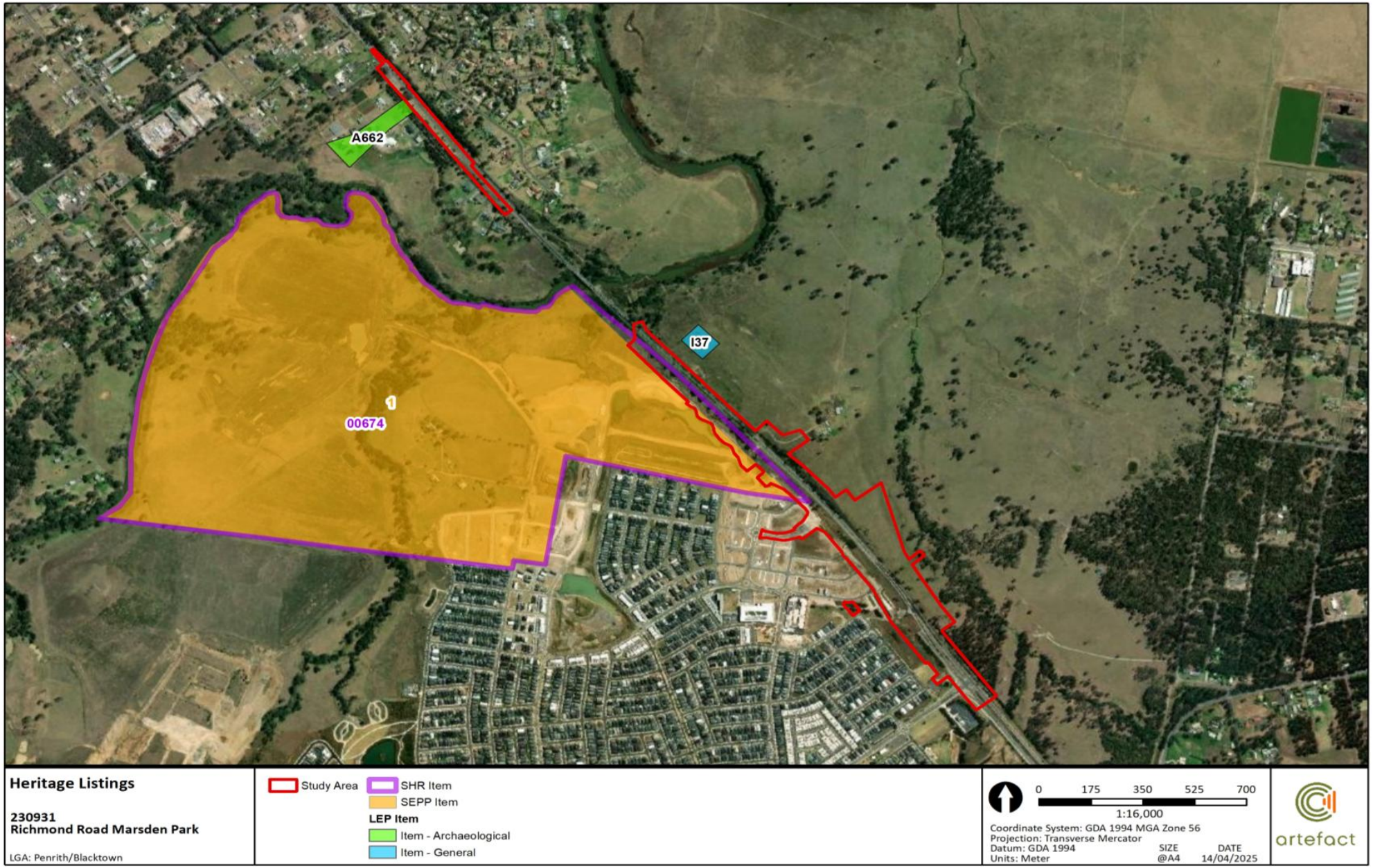


Figure 6-7: Heritage curtilages at Richmond Road, Marsden Park (Artefact, 2025)

6.3.3 Potential impacts

Construction

Construction of the proposed modification would alter the significant rural setting and fabric of the Clydesdale Estate. This would cause minor adverse impacts to the historic, aesthetic, and representative significance values of the Clydesdale Estate. However, the relocation of AS1 to the eastern side of Richmond Road reduces the potential heritage impacts compared to the project.

Little to no adverse physical and visual impacts are expected to the Berkshire Park Homestead Site (Penrith LEP #A662).

The construction impacts of the proposed modification are otherwise consistent with Section 6.3.3 of the project REF.

Operation

New drainage infrastructure would physically alter the landscape of the Clydesdale Estate. However, this section of the heritage item's fabric is not particularly important to the heritage significance of the estate. Therefore, little to no further adverse impacts are expected from the drainage infrastructure.

The increase in road height by an additional metre would impact the rural setting of Clydesdale by making Richmond Road a more noticeable and intrusive element when viewed from the heritage curtilage. Nevertheless, the scale of visual impact to the Clydesdale State Heritage Register item remains moderate. This is consistent with the project REF.

Similarly, the raising and widening Richmond Road is expected to alter the rural setting from which St Phillips Church Cemetery derives part of its heritage significance. There would therefore likely be minor adverse impacts to the historical and aesthetic heritage significance of St Phillips Church Cemetery as a result of the proposed modification.

The operational impacts of the proposed modification are otherwise consistent with Section 6.3.3 of the project REF.

6.3.4 Safeguards and management measures

Changes to safeguards and management measures are summarised in Table 6-35.

Table 6-35: Revised environmental management measures for non-Aboriginal heritage

Impact	Environmental safeguards	Responsibility	Timing	Reference
Screen planting	New vegetation plantings along Richmond Road ***must be consistent with*** ~~must take into consideration~~ the vegetation management policies of the 2017 Conservation Management Plan (CMP) and the 2016 Marsden Park Development Control Plan (DCP). This includes ensuring that new plantings within the road corridor do not restrict the significant view corridor from Richmond Road back towards Clydesdale House, whilst being sympathetic to view lines from Homestead yard and working hub across the floodplain towards Richmond Road.			
Screen planting	Replanting or regeneration of native extant vegetation and grasses should occur along the road alignment ~~and around the floodplain offset area~~ to mitigate impact on the views and setting within the study area	Transport for NSW	Pre-construction	Additional safeguard
Access 2 design	Design of the new entrance to Clydesdale 'Heritage Road', ***should align with existing approvals and be consistent with*** ~~should consider~~ design elements sympathetic to the	Transport for NSW	Pre-construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
	significance values of Precinct 3, including timber fences and tubular metal gates. New vegetation plantings along Heritage Road must take into consideration the vegetation management policies of the CMP and the Marsden Park DCP, including significant view lines from Richmond Road across the floodplain to Clydesdale House and views along Entrance Drive and from Entrance Drive across surrounding paddocks.			
~~**Lookout**~~	~~Further design for the proposed modification should consider the feasibility of safely and effectively integrating a lookout and interpretation point on the southern side of Richmond Road overlooking the floodplain setting.~~	~~Transport for NSW~~	~~Pre-construction~~	~~Additional safeguard~~
Impacts to heritage items	***Develop a comprehensive Heritage Interpretation Strategy that incorporates information about all heritage items in the proposed modification area, including Clydesdale Estate, St Phillips Cemetery, and Berkshire Park Homestead. This HIS should consider existing interpretative elements being delivered by adjacent projects to support understanding of these places, but not replicate, content or approaches employed. The HIS also needs to ensure that the options presented for Clydesdale are consistent with CMP policies for interpretation, with those developed enhancing understanding of the significance of the cultural landscape.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
Impacts to heritage items	***Implement 70 metre buffer zones around St Phillips Cemetery to protect any potential archaeological remains associated with the former church site.***	***Construction contractor***	***Construction***	***Additional safeguard***
Management of potential archaeological resources	***Consult with relevant stakeholders regarding the management of potential archaeological resources at all heritage sites.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
Heritage induction	***Conduct a heritage induction for workers before commencing construction, covering all heritage items within 100 metres of the proposed modification area, including Clydesdale Estate, St Phillips Cemetery, and the Site of Berkshire Park Homestead. Include procedures for reporting unexpected archaeological finds.***	***Construction contractor***	***Construction***	***Additional safeguard***

6.4 Biodiversity

The potential impacts of the proposed modification on biodiversity are assessed in the Addendum Biodiversity Assessment (Jacobs, 2025c), provided in Appendix F. A summary of the assessment is presented in this section.

6.4.1 Methodology

A background review of existing information was undertaken to identify the existing environment within a search area of ten kilometres surrounding the proposed modification area. The desktop assessment comprised reviewing:

- NSW State Vegetation Type Map (SVTM), vC2.0M2.0 (DPE 2023b)
- Spatial mapping and spatial data pertaining to the proposed modification area and surrounds (NSW DCCEEW 2024a)
- Soil type mapping (NSW DCCEEW 2024b)
- Records of all threatened species, populations, and ecological communities (collectively known as threatened entities) within a ten kilometre buffer of the proposed modification area, comprising:
  - NSW Bionet Atlas (NSW DCCEEW 2024c)
  - NSW Bionet Vegetation Classification (NSW DCCEEW 2024d)
  - NSW Fisheries NSW Spatial Data Portal (DPI 2024)
  - EPBC Protected Matters Search Tool (PMST) (DCCEEW 2024a)
  - NSW Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024e)
  - National flying-fox monitoring viewer (DCCEEW 2024b)
  - Groundwater Dependent Ecosystem (GDE) Atlas (BOM, 2024)
- Areas of outstanding biodiversity value (AOBV) (NSW DCCEEW 2024f)
- Nationally listed weeds (Weeds Australia 2021, LLS 2022)

A habitat assessment was conducted to identify whether the proposed modification area contains suitable habitat features to support threatened species, populations, or ecological communities. A shortlist of potential terrestrial and aquatic species with potential to occur, or have suitable habitat, within ten kilometres of the proposed modification area was generated and a likelihood of occurrence assessment was undertaken for these species.

Following the outcomes of the likelihood of occurrence assessment, assessments of significance were prepared for threatened species, populations and ecological communities that were identified as being moderately or highly likely to occur within the proposed modification area and that are at risk of being impacted by the proposed modification.

A field survey was undertaken by a qualified ecologist on 2 and 3 October 2024 to validate the results of the desktop assessment and to identify biodiversity values within the proposed modification area. Surveys included random search and meander across the entirety of the proposed modification area, with collection of rapid points to assess vegetation and identify potential fauna habitat features.

Based on outcomes of the likelihood of occurrence assessment, targeted flora surveys were completed within the proposed modification area for flora species identified as having moderate to high likelihood of occurrence. Targeted fauna surveys were undertaken across the proposed modification area for the Cumberland Plain Land Snail. A habitat assessment was undertaken to identify habitat suitability for threatened fauna, with key habitat features recorded.

6.4.2 Existing environment

The proposed modification area is located within the Sydney Basin bioregion, and Cumberland subregion. The area is predominantly rural landscape that has been extensively, historically cleared of native vegetation, with more recent native vegetation clearance for residential development of surrounding areas. As such, connectivity between patches of remaining native vegetation within the proposed modification area is limited. The largest expanses of vegetation nearest to the proposed modification area are located to the to the northeast, with Yiraaldiya National Park and Wianamatta Regional Park further to the southwest.

South Creek and several of its tributaries are mapped as key fish habitat. Whilst not located within the proposed modification area, surface water run-off from across the proposed modification area is likely to drain into South Creek. No biodiversity values, AOBV, or other protected lands are mapped within the proposed modification area.

The GDE Atlas (BOM, 2024) identified small portions of the proposed modification area as having moderate to high potential GDEs. However, the field survey confirms these vegetation types are not present. Instead, patches of PCT 3320, a low potential terrestrial GDE, are present and unlikely to interact with groundwater.

Certified areas

The proposed modification is located within the NWGC and includes portions of both biodiversity certified and non-certified land. Based on the biodiversity certification process for areas marked for development at the strategic planning stage, development may proceed in biodiversity certified areas without the usual requirement under the EP&A Act for threatened species assessments. Additional approvals under the EPBC Act are also not required for all actions associated with the development the Growth Centres.

Non-biodiversity certified areas are those outside of biodiversity certified areas where biodiversity impact assessment is required. As such, assessment of impacts resulting from the proposed modification have been completed for non-certified lands only. About an additional 3.96 hectares of certified land and about an additional 6.68 hectares of non-certified land are present within the proposed modification area, as shown in Figure 6-7. An additional 2.11 hectares of the proposed modification is located outside of the Growth Centre and is also included for assessment of impacts.

Additionally, about 0.25 hectares of existing native vegetation (ENV) is located within the proposed modification area, as shown in Figure 6-7, and are likely impacted by the proposed modification works.

Vegetation communities

Following field surveys, the following vegetation types were identified within the proposed modification area, as shown in Figure 6-8:

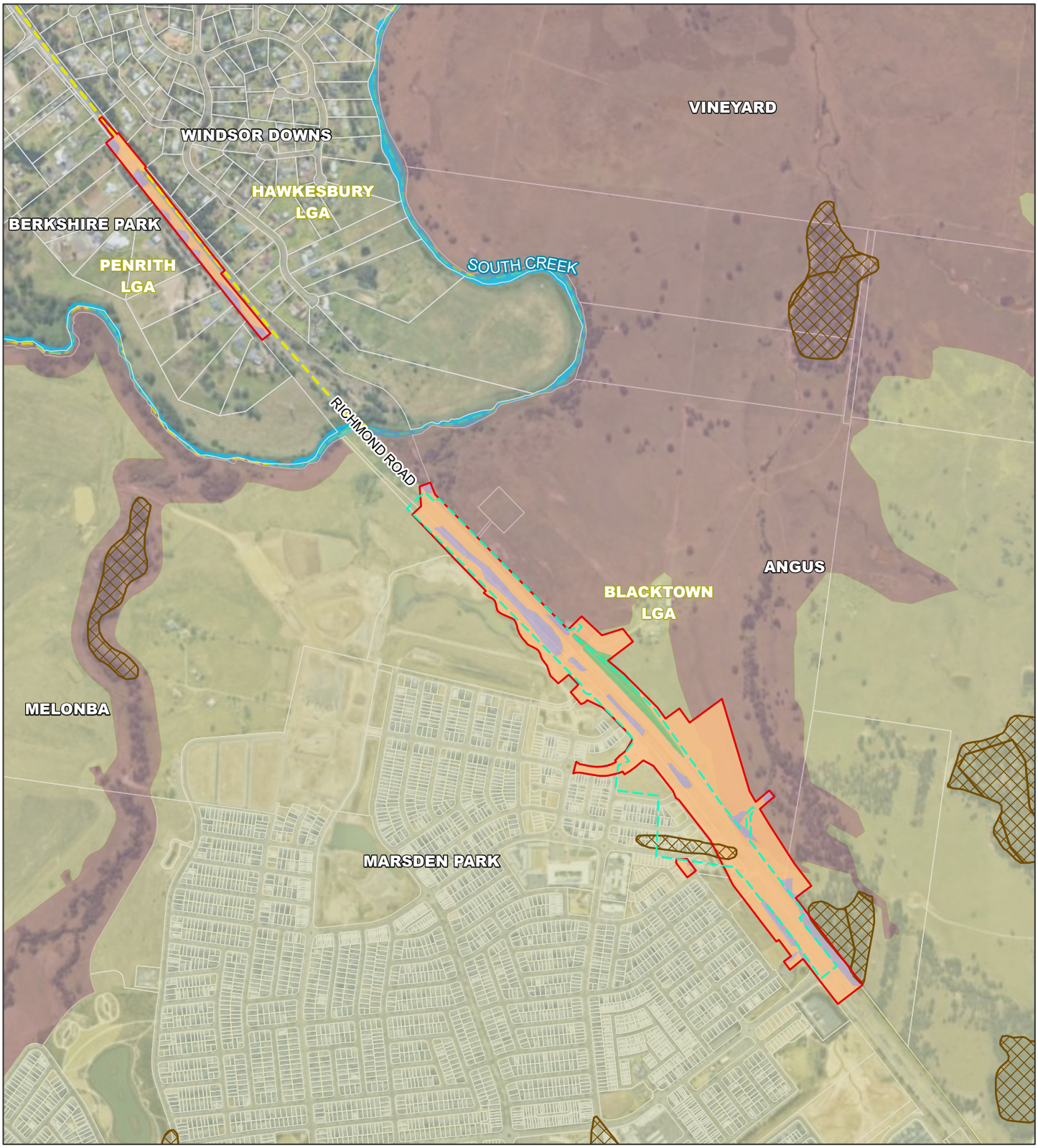
- PCT 3320 Cumberland Shale Plains Woodland (previously mapped as PCT 849 'Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion')
- Mix of mature, native tree species (predominantly planted, including Eucalyptus moluccana, Eucalyptus crebra, Acacia decurrens, Eucalyptus amplifolia, Angophora floribunda, Eucalyptus tereticornis and Casuarina cunninghamiana, not consistent with a PCT)
- Non-native highly disturbed areas (includes cleared paddocks, road verges, road embankments, grazed paddocks, not consistent with a PCT).

Past and present land use activities such as land clearing, agricultural practices, weed and pest invasion, residential development, rubbish dumping, and human disturbance have highly modified the extent and condition of native vegetation in the proposed modification area and locality, resulting in widespread fragmentation of existing native vegetation patches.

Threatened ecological communities

One threatened ecological community (TEC) was identified within the proposed modification area. The 'Cumberland Plain Woodland in the Sydney Basin Bioregion' TEC is listed as Critically Endangered under the *Biodiversity Conservation Act 2016* (BC Act) and located to the north of Richmond Road, along road verge and next to residential property.

The vegetation within the proposed modification area does not meet the key diagnostic features and condition thresholds to meet listing criteria for the critically endangered 'Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).



LEGEND

- Proposed modification area
- Project area
- Sydney Growth Centre Existing Native Vegetation

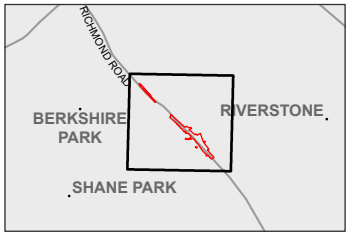
Land certification

- Existing Certified
- Existing Non Certified

Vegetation

- PCT 3320 Cumberland Shale Plains Woodland
- Mix of mature, native tree species
- Non-native highly disturbed area

- Watercourse
- Local government area
- Water body
- Cadastre



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GDA2020 MGA Zone 56

0 250 500

Metres

Jacobs

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

Threatened fauna

No threatened fauna species were observed during field surveys. Despite previous observations of the Cumberland Plain Land Snail within the project area and suitable habitat present across areas of PCT 3320 in the proposed modification area, no individuals were observed during the October 2024 surveys. However, areas of PCT 3320 within the proposed modification area are considered suitable foraging and sheltering habitat for the species.

The proposed modification area may provide potential foraging habitat for several threatened microbat species, including Eastern False Pipistrelle, Eastern Coastal Freetail-bat, Little Bent-wing Bat, Large Bent-winged Bat, Southern Myotis, Yellow-bellied Sheathtail-bat, Greater Broad-nosed Bat (all listed as vulnerable under the BC Act) and Large-eared Pied Bat (listed as Endangered under the EPBC Act and BC Act). Some suitable foraging and roosting habitat is likely present across the proposed modification area and surroundings given the proximity of South Creek. Three hollow-bearing trees (HBTs) were also recorded within the proposed modification area but were relatively isolated within a patch of mature trees within roadside verge as shown in Figure 6-9. Given the location of HBTs within isolated patches and regular disturbance of surrounding areas, they are unlikely to provide preferred habitat for roosting microbats or birds.

The Grey-headed Flying-fox (listed as Vulnerable under the BC Act and EPBC Act) is considered moderately likely to forage in the mature Eucalypt and Melaleuca trees within the proposed modification area. The nearest Grey-headed Flying-fox camp is the Windsor camp, located about 7.9 kilometres to the north.

Several threatened bird species have a moderate likelihood of opportunistically foraging across the proposed modification area, which includes Swift Parrot (listed as critically endangered under the EPBC Act and endangered under the BC Act). Species may pass through the proposed modification area during movements between larger foraging habitats in the wider locality. However, the proposed modification area is considered unlikely to form suitable breeding habitat for these bird species given fragmentation and disturbance. Therefore, habitat use would be intermittent and minimal.

Threatened flora species

Following targeted flora surveys, one threatened flora species was observed within the proposed modification area. *Grevillea juniperina* subsp. *juniperina* is listed as vulnerable under the BC Act and shown in Figure 6-9. A total area of about 1.17 hectares was mapped as *Grevillea juniperina* subsp. *juniperina* extent, 0.44 hectares of which is located within non-certified land. This area largely corresponded with the mapped PCT 3320 across the road verge and residential property to the north of Richmond Road.

Priority weeds

Priority weeds within the proposed modification area are consistent with Section 6.4.2 of the project REF.

LEGEND

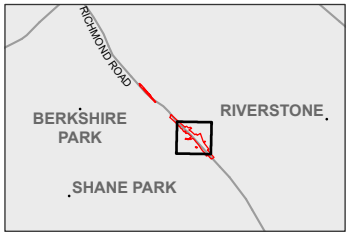
- Proposed modification area
- Project area

Land certification

- Existing Certified
- Existing Non Certified
- Hollow bearing tree points

Vegetation

- PCT 3320 Cumberland Shale Plains Woodland
- Grevillea juniperina subsp juniperina
- Grevillea juniperina subsp. juniperina buffer (2m)
- Local government area
- Cadastre



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GDA2020 MGA Zone 56

0 100 200

Metres

Jacobs

Data Sources: Jacobs (2024), Department of Customer Service (2024); Imagery Sources: MetroMap (Aerometrex)

6.4.3 Potential impacts

Construction

Removal of vegetation

Table 6-36 summarises the areas of vegetation clearance required for the proposed modification.

Table 6-36: Vegetation clearance areas for the proposed modification

Vegetation type	Total clearance in proposed modification area (ha)	Non-certified area impact* (ha)	Certified area impact (ha)
PCT 3320 (Cumberland Plain Woodland Critically Endangered Ecological Community (CEEC) under BC Act)	0.21	0.03	0.18
Non-native highly disturbed areas (cleared paddocks, road verges, road embankments, grazed paddocks, etc., not consistent with a PCT)	10.76	5.11	5.65
Mix of mature, native tree species (predominantly planted, not consistent with a PCT)	2.0	0.93	1.08

*Includes areas outside of the North West Growth Centre, where biodiversity certification has not been assessed.

The total direct impacts associated with vegetation clearing from the project, including the proposed modification, is summarised in Table 6-37.

Table 6-37: Total direct vegetation impacts

Vegetation type	Total clearance (ha)	Non-certified area impact* (ha)	Certified area impact (ha)
PCT 3320 (Cumberland Plain Woodland CEEC under BC Act)	1.04	0.03	1.01
Non-native highly disturbed areas (cleared paddocks, road verges, road embankments, grazed paddocks, etc., not consistent with a PCT)	34.35	6.57	27.78
Mix of mature, native tree species (predominantly planted, not consistent with a PCT)	2.41	1.06	1.35

*Includes areas outside of the North West Growth Centre, where biodiversity certification has not been assessed.

Removal of threatened fauna habitat

Suitable foraging habitat for a range of highly mobile threatened fauna species listed under the BC Act and EPBC Act would be removed as part of the proposed modification. The extent of these impacts is summarised in Table 6-38.

Table 6-38: Impacts on threatened fauna habitat in non-certified areas

Scientific Name	Common Name	BC Act	EPBC Act	Habitat in proposed modification area (ha) (non-certified land)*
Artamus cyanopterus	Dusky Woodswallow	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Glossopsitta pusilla	Little Lorikeet	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)

Scientific Name	Common Name	BC Act	EPBC Act	Habitat in proposed modification area (ha) (non-certified land)*
Lathamus discolor	Swift Parrot	E	CE	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Meridolum corneovirens	Cumberland Plain Land Snail	E	-	About 0.03 ha of suitable foraging habitat (PCT 3320)
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Miniopterus australis	Little Bent-wing Bat	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species).
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Myotis macropus	Southern Myotis	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	About 0.96 ha of suitable foraging habitat (PCT 3320 and native, mature tree species)

*As identified by associated PCTs in the TBDC (NSW DCCEEW, 2024e)

Three HBTs within the proposed modification area may be impacted by the proposed modification. They are located within certified land to the southwest of Richmond Road (see Figure 6-9).

Within non-certified land, no habitat features, including hollow bearing trees, decorticating bark, or stick nests will be impacted by the proposed modification.

Removal of threatened flora

The proposed modification would potentially impact about 1.17 hectares of land occupied by *Grevillea juniperina* subsp. *Juniperina*. About 0.44 hectares of this land is located on non-certified land in the proposed modification area. The loss of plants from the non-certified areas is considered large in the context of the local population, as such, an assessment of significance has been completed and is provided in Appendix F.

Operation

Potential operational impacts of the proposed modification are consistent with Section 6.4.3 of the project REF.

Cumulative impacts

The proposed modification contributes to the broader cumulative impacts to biodiversity in a region already affected by extensive native vegetation clearance. The project would remove an additional 1.04 hectares of native vegetation, including 0.21 hectares for the proposed modification.

While the impact is minor individually, it contributes to increasing cumulative impacts across the region. However, given the highly fragmented landscape, historical over-clearing, the distance to major developments and the limited presence of recognised PCTs within the proposed modification area, the vegetation clearance is not likely to significantly contribute to the cumulative impacts on biodiversity in the region.

Conclusion on significance of impacts

Assessments of significance have been conducted for threatened species, or ecological communities that have been positively identified within the proposed modification area or that are considered to have a moderate or high likelihood of occurring in the proposed modification area due to the presence of suitable habitat. Assessments of significance have also been completed for total cumulative impacts to threatened flora and fauna habitat.

The proposed 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 SIS is not required.

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

6.4.4 Safeguards and management measures

The design of the proposed modification has been developed to avoid areas of native vegetation.

Safeguards and management measures remain consistent with Section 6.4.5 of the project REF and Section 4.1.4 of the project submissions report, noting changes to Transport for NSW guidelines.

Changes to safeguards and management measures are summarised in Table 6-39.

Table 6-39: Revised environmental management measures for biodiversity

Impact	Environmental safeguards	Responsibility	Timing	Reference
Removal of vegetation	A Flora and Fauna Management Plan will be prepared in accordance with ~~*Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011)*~~ ***relevant Transport for NSW biodiversity guidelines*** and implemented as part of the CEMP. It will include, but not be limited to: • Pre-clearing survey • Unexpected find procedure • Inductions • Vegetation removal protocols Exclusion zones.	Construction contractor	Detailed design/pre-construction	Section 4.8 of QA G36 Environment Protection
Unexpected finds	The unexpected species find procedure is to be followed under ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)*~~ ***relevant Transport for NSW biodiversity guidelines*** if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	Construction contractor	Construction	Additional safeguard
Vegetation removal	Vegetation removal will be undertaken 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)~~ ***relevant Transport for NSW biodiversity guidelines***.	Construction contractor	Construction	Additional safeguard
Pre-clearance surveys	Pre-clearing surveys will be undertaken in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Construction contractor	Construction	Additional safeguard
Weeds and pathogens	Weed species will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Construction contractor	Construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Pathogens will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).~~	Construction contractor	Construction	Additional safeguard
Exclusion zones	Exclusion zones will be set up at the limit of clearing (i.e. the edge of the impact area) in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).~~	Construction contractor	Construction	Additional safeguard
Aquatic habitat	Aquatic habitat will be protected in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~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
Fauna injury	Fauna will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Contractor	Construction	Additional safeguard

6.4.5 Biodiversity offsets

Transport for NSW would commit to offsetting biodiversity impacts, or where offsets are not reasonable or feasible, supplementary measures for impacts that exceed the thresholds as outlined within the Guideline for Biodiversity Offsets (RMS, 2016).

Relevant thresholds for threatened entities likely impacted by the proposed works are outlined in Table 6-40. Total cumulative project impacts have been applied to relevant thresholds.

Table 6-40: Vegetation clearance areas for the proposed modification

Threatened entity impacted	Impact	Threshold	Triggered?
Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered under BC Act)	Clearing of a CEEC.	Where there is any clearing of an CEEC in 'moderate to good' condition.	Yes. Overall, within non-certified land, the project would impact about 0.03 ha of the CEEC.
***Grevillea juniperina* subsp. *juniperina* (Vulnerable under BC Act)**	Works involving clearing of NSW listed threatened species habitat where the species is a species credit species as defined in the TBDC.	Where clearing >1 ha or where the species is the subject of a SIS.	No. Overall, within non-certified land, the project would impact approximately 0.44 ha of *Grevillea juniperina* subsp. *juniperina*, remaining below the threshold of 1 ha.

Threatened entity impacted	Impact	Threshold	Triggered?
Cumberland Plain Land Snail *(Meridolum corneovirens)* (Endangered under BC Act)	Works involving clearing of NSW listed threatened species habitat where the species is a species credit species as defined in the TBDC.	Where clearing >1 ha or where the species is the subject of a SIS.	Yes. Overall, within non-certified land, the project would impact about 1.41 ha of suitable habitat for the species.

6.5 Hydrology, flooding and water quality

The potential impacts of the proposed modification on hydrology and flooding are assessed in the Flood Impact and Risk Assessment (Lyall & Associates, 2024) provided in Appendix G, The potential impacts of the proposed modification on water quality are provided in the Discharge Impact Assessment for Richmond Road (Jacobs, 2025d) in Appendix H. A summary of the assessments is presented in this section.

6.5.1 Methodology

Hydrology and flooding

The hydrology and flooding assessment of the proposed modification consisted of the following steps:

- Review the flooding and drainage investigations and designs that have been prepared as part of the recent development within the Marsden Park Precinct
- Update the present day (pre-project) hydrologic and hydraulic models (flood models) that were relied upon in the project REF (Lyall & Associates, 2020) to incorporate detailed road corridor survey data, as well as changes that have occurred in the Marsden Park Precinct
- Assess the impact that the proposed modification would have on flood behaviour both upstream and downstream of the road corridor, including any changes in existing flood risk.

The hydrologic and hydraulic models that were relied upon for the flood assessment for the Project REF were updated as part of the flood impact assessment for the proposed modification. The proposed modification flood model incorporated details of the recent development that has occurred adjacent to the project corridor within the Melrose Park Precinct. The transverse and longitudinal drainage for the proposed modification incorporates the altered flooding and drainage patterns that are present within the Melrose Park Precinct where it borders the project corridor. The flood modelling for the proposed modification more accurately defines the change in flood risk that would be attributable to the project within the Melrose Park Precinct where it borders the project corridor.

The scope of the proposed modification flood impact includes an assessment of the impact that the construction of an engineered reach of channel which would extend downstream of the project corridor to Marsden Creek would have on flood behaviour.

Water quality

Background water quality available from Blacktown City Council and the project REF was reviewed. Four temporary sediment basins were sized and located, and a discharge assessment was undertaken to determine the downstream water quality impacts of sediment basin discharges.

Water quality has been compared to applicable ANZG (2018) Water Quality Guideline default guidelines value (DGVs) to determine whether waterways are meeting relevant water quality objectives (WQOs). The ANZG (2018) DGVs for the protection of aquatic ecosystems has been applied. Due to the disturbed and modified nature of South Creek and Marsden Creek, these waterways have been classified as 'slightly to moderately disturbed ecosystems'. Therefore, a 95 per cent level of species protection has been adopted for relevant metals and toxicants as shown in Table 6-41.

Table 6-41: ANZG (2018) Water quality indicators and associated default guideline values for protection of slightly to moderately disturbed lowland river aquatic ecosystems

Indicator	Default Guideline Value
Electrical conductivity (µS/cm)	125-2200

Indicator	Default Guideline Value
pH (units)	6.5-8.5
Turbidity (nephelometric turbidity units - NTU)	6-50
Dissolved oxygen (% saturation)	80-110
Temperature (°C)	-
Total suspended solids (mg/L)	-
Total nitrogen (mg/L)	0.35
Ammonia (mg/L)	0.9
Oxidised nitrogen (mg/L)	0.04
Total Kjeldahl Nitrogen (mg/L)	-
Total phosphorus	0.025
Chlorophyll-a (mg/m3)	3

The design criteria for the temporary water quality treatment controls used during the construction phase are aimed at achieving the requirements of the Blue Book (Landcom, 2004 and DECC, 2008). The sediment basins have been designed as Type D basins, based on various parameters as described in Appendix H.

The sizing of the basins has been carried out using the design methodology outlined in *Managing Urban Stormwater, Soils and Construction Guidelines, Volume 1* (Landcom 2004) and *Volume 2D: Main Road Construction* (DECC 2008). The required volume of each sediment basin was determined according to the maximum catchment area that would drain to the basin during the various stages of construction, the appropriate design rainfall depth and catchment areas and the Revised Universal Soil Loss Equation (RUSLE). Temporary sediment basin sizes are presented in Table 6-42.

Table 6-42: Sizes of temporary sediment basins

Sediment Basin number and name	Receiving waterway	Catchment area (ha)	Sediment basin water volume (m^3)	Location
No 1 - B440L - East	South Creek	3.5	611	In AS1
No 2 - B510L - East	South Creek	3.2	558	In AS1
No 3 - B720L - East	South Creek	2.6	432	In AS1
No 4 - B1500R- West	South Creek	5.2	864	At Northern end of project area

A water quality assessment tool was developed to assess the impact of dewatering discharge from the sediment basins required during the construction phase of the project. The tool uses an equation supplied in the *Water Pollution Discharge Assessments: Guideline for Licensed Projects* (Transport for NSW, 2024) and ultimately provides the water quality of the waterway after mixing with the discharge. This result was compared with the ambient (80th percentile) water quality of the receiving waterway before discharge occurs, which is the recommended approach for slightly to moderately disturbed ecosystems (Transport for NSW 2022, ANZG 2018). Further detail on inputs to this equation are provided in Appendix H.

Water quality results from the Marsden Creek monitoring site MA1 were used for basins B440L, B510L, and B720L. Water quality readings from the South Creek monitoring site S01 were used for basins B1500R. Turbidity data from the last five years were used to consider the relevance of any change in catchment conditions over time. The median readings (50th percentile) were used as the background water quality conditions and the 80th percentile readings were used as the ambient water quality conditions.

The following design approach for operational water quality treatment controls for pavement runoff has been adopted:

- During operation, water quality controls will treat runoff from the project area, where diffuse or point source discharge is within 500 metres of a sensitive receiving environment, which includes South Creek
- The water quality treatment will be provided through vegetated swales located at the toe of the batters.

MUSIC water quality modelling was undertaken to determine if the proposed water quality controls would meet and comply with the project design objectives and project REF requirements. Total suspended solids, total nitrogen and total phosphorous were modelled. Models of the vegetated swales were created by adopting the sub-catchment areas estimated in the catchment analysis. The MUSIC models of the sub-catchments and the swales were run to determine the minimum controls required.

6.5.2 Existing environment

Drainage and waterways

The proposed modification is located within the catchments of South Creek and Marsden Creek to its east.

The drainage structures within the vicinity of the proposed modification include EXD01, EXD02 and EXD03. Transverse drainage structure EXD01 is located about 480 metres north of Elara Boulevard and controls runoff from an urbanised area that forms part of Marsden Park Precinct development.

Transverse drainage structures EXD02 and EXD03 are located near the northern end of the proposed modification. Where EXD02 once controlled runoff from a previously undeveloped portion of the Marsden Park Precinct, the construction of a large raingarden as part of the Clydesdale development (Clydesdale Ultimate Raingarden) has resulted in its catchment being reduced to principally the road corridor. The Clydesdale Ultimate Raingarden direct flow to the drainage line along which EXD03 is located. The Clydesdale Ultimate Raingarden has changed how water flows in the area. Most of the water that previously drained to EXD02 is now directed to EXD03.

Since 2020, most residential and commercial development in the Marsden Park Precinct has been completed. Most developments within the catchments contribute to these drainage structures.

Figure 6-10 shows the layout of the existing drainage system and waterways in the vicinity of the proposed modification. The specification of the existing transverse drainage structures is provided in Appendix G.

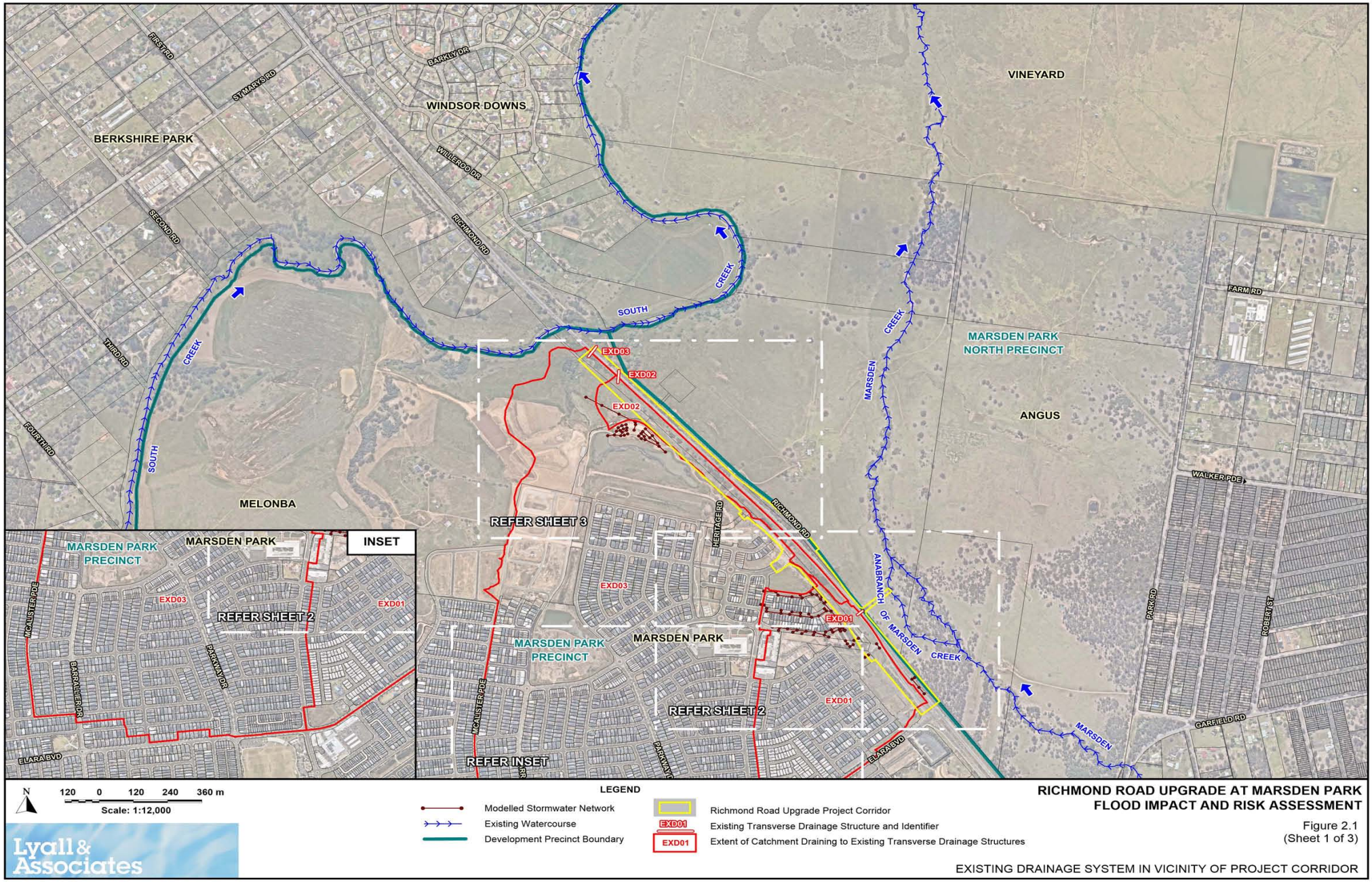

Figure 6-10: Existing drainage system in the vicinity of the proposed modification (Lyall & Associates, 2024)

Water quality

Monitoring data collected by Blacktown City Council since the submission of the project REF is presented in Table 6-43 for:

- MA1: Marsden Creek, downstream of Richmond and Park Road (29 samples)
- SO1: South Creek, upstream of Stony Creek Road Crossing (29 samples)
- SO2: South Creek, under bridge at 900-918 Richmond Road (28 samples).

Marsden Creek and South Creek could be considered eutrophic due to elevated nutrients (total nitrogen, oxidised nitrogen and total phosphorus) with median concentrations exceeding the recommended ANZG (2018) limit for protection of aquatic ecosystems. Median dissolved oxygen concentrations fell below the lower recommended limit of 80 per cent saturation at all sites and chlorophyll-a was elevated in Marsden Creek, supporting the findings of the project REF. All other indicators met the respective guideline values for protection of aquatic ecosystems.

Table 6-43: Median water quality Marsden and South creeks comparison to ANZG (2018)

Indicator	Default Guideline Value	Marsden Creek (MA1)	South Creek (SO1)	South Creek (SO2)
Electrical conductivity (µS/cm)	125-2200	810	713	711.5
pH (units)	6.5-8.5	7.63	7.92	7.815
Turbidity (NTU)	6-50	24.58	25.8	26.4
Dissolved oxygen (% saturation)	80-110	53.7	67.425	65.4
Temperature (°C)	-	18.4	20.3	19.85
Total suspended solids (mg/L)	-	27	32	46
Total nitrogen (mg/L)	0.35	1.2	2.1	2
Ammonia (mg/L)*	0.9	0.03	0.055	0.05
Oxidised nitrogen (mg/L)	0.04	0.16	0.97	0.875
Total Kjeldahl Nitrogen (mg/L)	-	1	1.1	1
Total phosphorus	0.025	0.16	0.15	0.13
Chlorophyll-a (mg/m3)	3	6	2	2.5

* For the purposes of estimating median values, when the concentration was below the detection limit (DL), a value of half the DL was used

Red text indicates that the value is outside the ANZG (2018) guideline value.

Hydrology and flooding

The mechanisms of flooding which influence flood behaviour along the proposed modification area remains consistent with the project REF.

Hawkesbury-Nepean River backwater flooding affects the proposed modification area. When the Hawkesbury-Nepean River floods at Windsor, the water level backs up South Creek and floods Richmond Road.

For minor tributary flooding, due to recent changes in catchment conditions, the existing two-lane road experiences mild flooding for all storms up to 0.2% annual exceedance probability (AEP). During a probable maximum flood (PMF) event, intense flooding would occur south of EXD01. Within the vicinity of EXD02 and EXD03, the section of Richmond Road which runs along the eastern side of the Clydesdale Ultimate Raingarden and extends north to the southern abutment of the bridge over South Creek remains flood free for all events up to the PMF (refer to Appendix G).

6.5.3 Potential impacts

Construction

Water quality

Up to four temporary sediment basins would be built for the construction phase to capture and treat runoff from disturbed areas of the project before discharging into the receiving waterways of Marsden Creek and South Creek. Discharges with a turbidity of up to 50 NTU from controlled releases would not increase the ambient concentrations in South Creek and

Marsden Creek for individual basin discharges and under worst-case discharge conditions. The discharges would also meet the recommended guideline limit for protection for aquatic ecosystems, visual amenity, and primary and secondary contact recreation.

Discharges with turbidity exceeding 50 NTU from controlled releases into Marsden Creek would initially exceed ambient concentrations at the discharge point in individual and worst-case scenarios. Assuming a channel width of five metres and depth of 500 millimetres, decant discharge with a turbidity greater than 50 NTU is estimated to be fully mixed up to 280 metres downstream of the initial discharge point. A mixing zone of 280 metres is undesirable given the potential to compromise the water quality and environmental values downstream. Therefore, it is recommended that the turbidity into Marsden Creek should be less than 50 NTU. In contrast, there is sufficient flow in South Creek such that controlled releases of decant turbidity of both 60 NTU and 70 NTU into South Creek would meet ambient water quality at the discharge point.

Stockpiling of material may increase pollutants such as sediments, nutrients and contaminants being transferred to downstream waterways via wind and stormwater runoff. This could result in increased sedimentation, thereby increasing turbidity, nutrient and toxicant concentrations. Without appropriate mitigation measures, this could lead to an increased risk of algal blooms, reduction in dissolved oxygen and smothering of aquatic organisms, poor water quality and reduced visual amenity. Mitigation measures to prevent these impacts are described in Section 6.5.4.

AS1 has been relocated from about 300 metres away from an unnamed tributary of Marsden Creek, to about 70 metres away at its closest point. This presents a greater risk to surface water quality as there is less natural filtration of runoff from the compound area before it enters the tributary. The realignment of the drainage infrastructure within AS1 also increases the risk of impacts to the unnamed tributary due to the additional cutting required and extension by 50 metres closer to the waterway.

Movement of construction vehicles presents the risk of leakage and spills, which could be transported downstream to the existing stormwater drainage system and receiving waterways. Mitigation measures to prevent these impacts are described in Section 6.5.4.

Flooding The proposed modification includes a new construction compound site AS3. AS3 includes a small area which is within the 1% AEP Flood mapped extent. The portion of AS3 within the 1% AEP mapped area will be avoided for long term stockpiles, equipment storage and construction offices.

Operation

Flooding

The effects of the proposed modification on flood behavior and changes from the project REF are described in detail in Appendix G. In summary:

- The upgraded Richmond Road provides an improved evacuation route in times of flood. A minimum road level of RL 20.0 m AHD has been adopted in the proposed modification. The upgraded section of Richmond road would have a minimum elevation which approximates a 0.2% AEP flood on the Hawkesbury-Nepean River.
- Due to the need to manage the flood risk in the existing Marsden Park precinct residential development it was necessary to size the transverse drainage to convey peak flows generated by the upstream catchment for all storms up to the PMF without overtopping of the road.
- New transverse drainage structures (PXD01, PXD02 and PXD03) are proposed as part of the proposed modification (refer to Appendix G for details of the three proposed transverse drainage structures).
- The displacement of floodplain storage associated with the construction of the project would result in less than a 1 mm increase in peak flood levels resulting from Hawkesbury - Nepean River Flooding.
- The displacement of floodplain storage associated with the construction of the project in combination with several other proposed major road upgrade projects would result in a 2 mm increase in peak flood levels resulting from Hawkesbury-Nepean River Flooding.
- The need for compensatory floodplain storage considered in the project REF has been removed. This has been removed following discussions with key agencies. The proposed modification will provide an improved flood evacuation route to the community with minimal changes in flood behaviour and flood risk.
- The project would not impact Major Tributary Flooding as it relates to flow which surcharges the bank area of South Creek.

- While the project would result in minor increases in peak flood levels within the Marsden Park Precinct during a 1% AEP storm event, it would not reduce the available freeboard to finished surface levels within individual allotments to less than 500 mm.
- While the project would also result in minor increases in peak flood levels within the Marsden Park Precinct during a 0.2% AEP storm event, it would not result in adverse flooding conditions being experienced in existing development. This finding indicates that the project would not adversely impact flooding conditions in existing development should 1% AEP rainfall intensities increase from future climate change.
- While the project would increase both the extent and depth of inundation experienced in existing development that is located in the Marsden Park Precinct during a PMF event, it does not significantly change the flood hazard vulnerability within the developable portion of the affected allotments, noting that it does not generally exceed H1 conditions.
- The project would result in a minor increase in both peak flood levels and flows, as well as flow velocities in the reach of Marsden Creek where it runs to the north of the project corridor. As development is proposed within the Marsden Park North Precinct through which Marsden Creek runs, the minor changes could be accommodated by these future works. Transport for NSW has advised the owners of the affected properties of the flood impact assessment outcomes.

The key changes between flood impact assessment undertaken for the project REF and for the proposed modification include:

- The project would displace about 8,000 m3 less of floodplain storage at the peak 1% AEP Hawkesbury-Nepean River flood level of RL 17.3 m AHD (i.e. 74,460 m3 versus 82,460 m3).
- Transport for NSW are not proposing to provide compensatory excavation to offset the floodplain storage that would be displaced by the project. This is noting that a study has demonstrated that the project would increase peak flood levels on the Hawkesbury-Nepean River floodplain by a maximum of 1 mm.
- While the project would result in minor increases in peak water levels in the existing detention basins that are located adjacent to the project corridor, the available freeboard to the residential allotments would not be reduced to less than 500 mm in a localised 1% AEP storm event.
- While there are minor differences in the impact that the project would have on flood behaviour in the Marsden Park North Precinct, these do not represent a constraint on future development within the adjacent land.
- Refer to Appendix G for mapping showing the impact of the proposed modification on the indicative extent and depth of inundation and peak flows at key locations when compared to the existing flooding conditions.

Overall, the proposed modification would result in a minimal change in flood behavior and flood risk whilst providing a major benefit in providing an improved flood evacuation route.

Water quality

During operation, the new culverts may cause increased flow velocities to the downstream receiving channels which are typically grassed lined and therefore may be susceptible to erosion. The proposed modification also increases impervious surface area, which would increase pavement runoff and pollutant loads within the downstream environment. Without appropriate treatment this could impact on the aquatic environment. To mitigate these impacts five vegetated swales of varying length are proposed to provide treatment of runoff prior to discharge to South Creek or a tributary of South Creek. MUSIC modelling of these proposed controls indicates that there would be no adverse impacts as the pollutant loads following treatment by the swales would be below existing levels.

An increased portion of the road pavement is now nearer to South Creek. Consequently, any spill events during operation could result in discharge of polluted water via stormwater runoff into the drainage system and impact on aquatic ecosystems due to increased concentration of pollutants and can result in oily surface films which reduce visual amenity.

6.5.4 Safeguards and management measures

Table 6-44 provides the changes to surface water quality safeguards and management measures. New and modified management measures to those presented in the REF are in ***bold italics*** and deleted measures have been struck out.

Table 6-44: Revised environmental management measures for surface water quality

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water management plan	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and designer how these risks will be addressed during construction. ***Culvert and scour protection to be installed at all new culvert and pavement drainage pipes.***	Construction Contractor	Pre-construction	
Sediment basins	~~For the catchment located between the proposed intersection and the northern end of the limit of work towards South Creek, one sediment basin of 220 cubic metres will be required.~~ ~~The maximum allowable area to be disturbed at any one time within this catchment is about 1.3 hectares. If it is found to be not practical by the contractor, then a supplementary basin could be located within the construction footprint at about Chainage 1300m with an approximate size of 250 cubic metres. These sediment basins will be located as far downslope as possible to maximise the catchment area that they treat.~~ ***Up to four (4) temporary sediment basins will be located to capture and treat runoff from all disturbed areas of the project before discharging to the receiving environment. Basins are proposed to be located at the northern end of the project site and 3 basins located on the eastern side of Richmond Road within the construction compound.***	Construction contractor	Sediment basins	
Contaminants entering receiving environments during construction	Control measures to minimise the risk of water pollution will be included in the ESCP. The following measures will be included to limit sediment and other contaminants entering receiving waterways: • No stockpiles of materials or storage of fuels or chemicals will be located adjacent to the existing culverts • Vehicles and machinery will be properly maintained to	Construction contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	minimise the risk of fuel/oil leaks • Routine inspections of all construction vehicles and equipment will be undertaken for evidence of fuel/oil leaks • All fuels, chemicals and hazardous liquids will be stored within an impervious bunded area in accordance with Australian standards and NSW EPA Guidelines • All water discharges will be undertaken in accordance with Transport for NSW's Water Discharge and Re-use Guideline • Emergency spill kits will be kept on-site at all times. All staff will be made aware of the location of the spill kit and be trained in its use • ***Provision of sandbag at five locations on the drainage plans so that stormwater channel can be temporarily bunded to contain any accidental spills and protect downstream sensitive receiving environments*** • Construction plant, vehicles and equipment will be refuelled off-site, or in designated re-fuelling areas located at a minimum distance of 50 metres from drainage lines or waterways • Groundwater encountered during the construction of the proposal will be managed in accordance with the requirements of the Waste Classification Guidelines (DECCW 2009) and Transport for NSW's Water Discharge and Re-use Guideline • Stabilised surfaces will be reinstated as quickly as practicable after construction • Material transport from site to surrounding pavement surfaces will be minimised Soil and water management measures will be identified in consultation with relevant government agencies and Councils and will be consistent with the principles and practices detailed in Managing Urban Stormwater: Soils and Construction, 2004 (known as the blue book).			

Impact	Environmental safeguards	Responsibility	Timing	Reference
Flood management during construction	*A Flood Management Plan will be prepared before construction. This plan will include:* • *Review and coordination with existing local flood plans and evacuation procedures* • *Flood emergency preparation, response, and recovery measures which will be implemented during construction* • *Procedure for daily review of the Bureau of Meteorology website* • *Site protection measures to be implemented before and in the event of flooding.*	*Construction contractor*	*Pre-construction/ construction*	*Additional safeguard*
AS3 stockpiles site	*No long-term material stockpiles, equipment storage or construction buildings are to be located with the 1% AEP flood level at site AS3 and swale drainage system.*	*Construction contractor*	*Construction*	*Additional safeguard*

6.6 Topography, geology, soils and contamination

The potential impacts of the proposed modification on contamination are assessed in the Memorandum – Contamination Assessment (Jacobs, 2025e), provided in Appendix I. A summary of the contamination assessment as well as a qualitative assessment for topography, geology and soils is presented in this section.

6.6.1 Methodology

A desktop review was carried out to determine changes to topography, drainage, geology, soils, salinity and contamination. Sources reviewed included:

- Contamination findings of the Preliminary Site Investigation (Jacobs, 2020)
- Historical aerial photography
- Published geological, hydrogeological, topographic, soil and acid sulfate soil maps
- Available registers and known areas of potential and actual contaminating current and past activities
- Any other relevant information pertaining to potential contamination as detailed in Lotsearch (2024).

A site walkover was carried out on 2 October 2024 to assess potential contamination within and surrounding the proposed modification area.

6.6.2 Existing environment

Topography and drainage

The topography and elevation of the proposed modification remains consistent with Section 6.6.2 of the project REF.

AS3 is relatively flat and varies in elevation from 16 metres Australian Height Datum (AHD) in the southeastern portion to 22 metres in the northwestern portion.

Rainfall on unsealed areas likely infiltrates into the soil, while rain on sealed areas drains into formal and natural drainage systems, primarily flowing towards South Creek. A formal drain is located at the southeast end of the proposed modification area, and a non-formal drainage line is located towards the northwest.

Geology and soils

The geology and soil landscape of the proposed modification remains consistent with Section 6.6.2 of the project REF. The stockpile area traverses two soil landscapes. It is expected that the southeastern half of the stockpile area would comprise the South Creek (Alsc) soil unit and the northwestern half would comprise the Berkshire Park (Albp) soil unit (DCCEEW, 2024).

Acid sulfate soils

Acid sulfate soils (ASS) are soils and sediments containing irone sulfides (commonly pyrite) that, when disturbed and exposed to oxygen, generate sulfuric acid and toxic quantities of aluminium and other heavy metals.

The ASS risk across the proposed modification remains consistent with Section 6.6.2 of the project REF. The ASS risk in the stockpile area has been assessed as a low probability of occurrence based on acid sulfate soil mapping.

Salinity

Salinity is the accumulation of salts in soil and water to levels that impact on human and natural assets (e.g., plants, animals, aquatic ecosystems, water supplies, agriculture and infrastructure).

The area to the east of the proposed modification have been mapped to have moderate salinity potential, which means that the land has a medium likelihood of developing salinity issues under certain conditions. The area to the west of the stockpile location has no salting evident (NSW Office of Environment and Heritage, 2012).

Contamination

Two licensed activities within and next to the proposed modification area were identified, including:

- Environmental Protection Licence (EPL) 21381 assigned to Western Earthmoving Pty Ltd at 1270 Richmond Road, Marsden Park NSW (on-site) for contaminated soil treatment
- EPL 5190 assigned to Evergreen Garden Care Australia Pty Ltd at 52 St Marys Road, Berkshire Park NSW (530 m northwest) for composting.

Fly-tipped household waste was observed within the proposed modification area during the site walkover, including furniture, whitegoods, metal, plastic, and car body parts. These were scattered on the ground surface mainly near the road alignment. Fragments of potential asbestos containing material were observed immediately next to the eastern side of Richmond Road, north of the existing driveway. Laboratory analysis confirmed that these fragments did not contain asbestos. Landforming, vegetated stockpiles and smaller, residual stockpiles were observed on both sides of Richmond Road within the proposed modification area. From these site observations, the contamination risk from imported fill, wastes and surface water has been reassessed to be moderate instead of low.

6.6.3 Potential impacts

The proposed modification is only expected to change topography impacts. Earthworks would result in a minor change to the topography as the proposed modification raises the road level by one additional metre.

6.6.4 Safeguards and management measures

Safeguards and management measures remain consistent with Section 6.6.4 of the project REF, noting changes to guidelines. This has been summarised in Table 6-46.

Table 6-45: Revised environmental management measures for contamination

Impact	Environmental safeguards	Responsibility	Timing	Reference
Accidental spill	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the ~~Roads and Maritime Code of Practice for Water Management (RTA, 1999) and~~ relevant ***Transport for NSW*** and EPA guidelines. The plan will 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).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA G36 Environment Protection
Stockpile management	Stockpiles will be designed, established, operated and decommissioned in accordance with the ***relevant Transport for NSW guidelines.*** ~~Roads and Maritime Stockpile Site Management Guideline 2015.~~	Construction contractor	Construction	Additional standard safeguard
Soil stabilisation and restoration	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with: • Landcom's Managing Urban Stormwater: Soils and Construction series • ***Relevant Transport for NSW landscape and batter stabilisation guidelines*** • ~~RTA Landscape Guideline~~ • ~~Roads and Maritimes' Guideline for Batter Stabilisation Using Vegetation (2015).~~	Construction contractor	Construction	Additional standard safeguard

6.7 Aboriginal heritage

The potential impacts of the proposed modification on Aboriginal heritage have been assessed in the Richmond Road Upgrade Aboriginal Archaeological Assessment Addendum to Stage 2 PACHCI Report (Kelleher Nightingale Consulting, 2025), provided in Appendix J. This chapter presents a summary of the assessment.

6.7.1 Methodology

Desktop investigations were carried out to identify known Aboriginal sites or declared Aboriginal places within or next to the proposed modification area. This included a review of previous archaeological investigations and a search of the Aboriginal Heritage Information Management System (AHIMS). The following heritage registers for Aboriginal heritage items were also searched:

- State Heritage Register and State Heritage Inventory
- Blacktown LEP 2015
- Hawkesbury LEP 2012
- Penrith LEP 2010
- Section 170 Heritage and Conservation Registers

- National Heritage List
- Commonwealth Heritage List
- Australian Heritage Database (Register of the National Estate – Non-statutory archive)
- Australian Heritage Places Inventory (Register of the National Estate – Non-statutory archive).

The proposed modification area was inspected and assessed on 2 October 2024 by a qualified archaeologist and a representative of the Deerubbin Local Aboriginal Land Council. The aim of the inspection was to determine if any Aboriginal archaeological sites or areas of archaeological sensitivity were situated within the proposed modification area. Existing site boundaries for previously registered sites in close proximity to the proposed modification area were also assessed.

Significance assessments were carried out in accordance with the Australia International Council on Monuments and Sites (ICOMOS) Burra Charter, 1999 (Australia ICOMOS 1999).

6.7.2 Existing environment

Landscape context

The landscape context remains consistent with Section 6.7.2 of the project REF.

Existing Aboriginal heritage sites

The AHIMS search identified an additional 34 Aboriginal sites, resulting in a total of 105 Aboriginal heritage sites for the proposed modification area. These sites are shown in Figure 6-11 and described in Table 6-46.

Table 6-46: Site features and site context from AHIMS database search

Site context	Site feature	Number
Open site	Artefact	96
	Artefact; Modified Tree (Scarred or Carved)	1
	Artefact; Potential Archaeological Deposit	2
	Artefact; Stone Quarry	1
	Modified Tree (Scarred or Carved	1
	Potential Archaeological Deposit	4

One known Aboriginal archaeological site (C-ST-1, AHIMS 45-5-2753) and one newly recorded site (Richmond Road Angus IF 1) were identified within the proposed modification area. The location of these sites is shown on Figure 6-11. C-ST-1 was reinspected during the site visit, with the scar tree confirmed to be dead and in poor condition with insect borer holes, cracks present, and a termite nest inside. This site exhibits moderate archaeological significance as it provides evidence of Aboriginal occupation and is a tangible expression of Aboriginal culture. Richmond Road Angus IF 1 was an isolated surface artefact, with a large, yellow silcrete core which retained 40-60% of cortex. This site exhibits low archaeological significance as it is unlikely that further investigation of the site would improve understanding of Aboriginal landscape use in the region or local area.

Two known sites (MPAS6 and Marsden Park Echo Vale No 2 Riverstone Meatworks), one newly recorded site (Richmond Road South Creek IF 1) and several areas of archaeological sensitivity were identified bordering the proposed modification area, as shown in Figure 6-12.

The remainder of the proposed modification area has been subject to ground surface disturbance related to road construction, drainage and utilities, reducing the likelihood of Aboriginal objects or intact archaeological deposits to occur. The proposed modification area displays no potential for intact archaeological deposits.

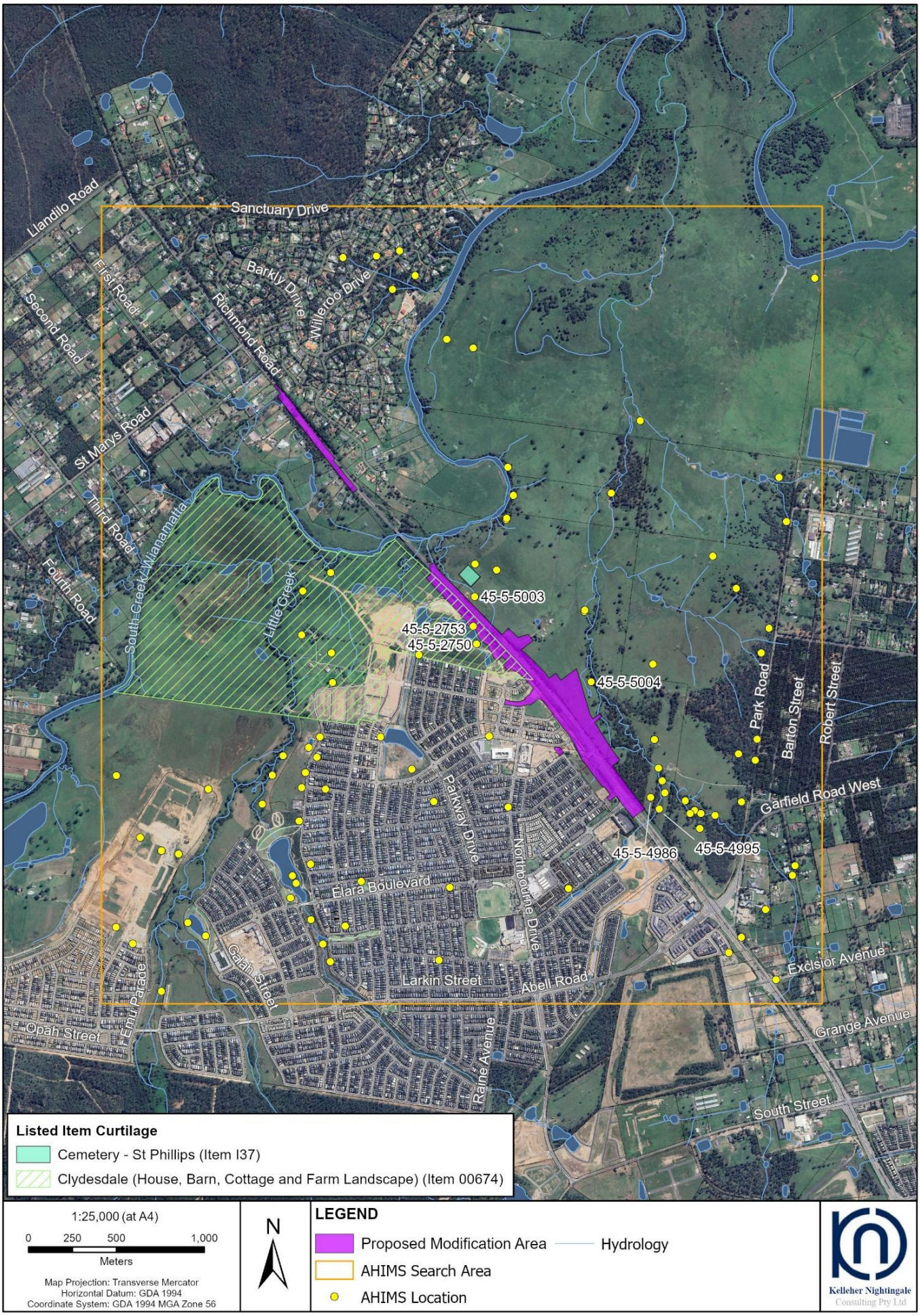

Figure 6-11: AHIMS search results

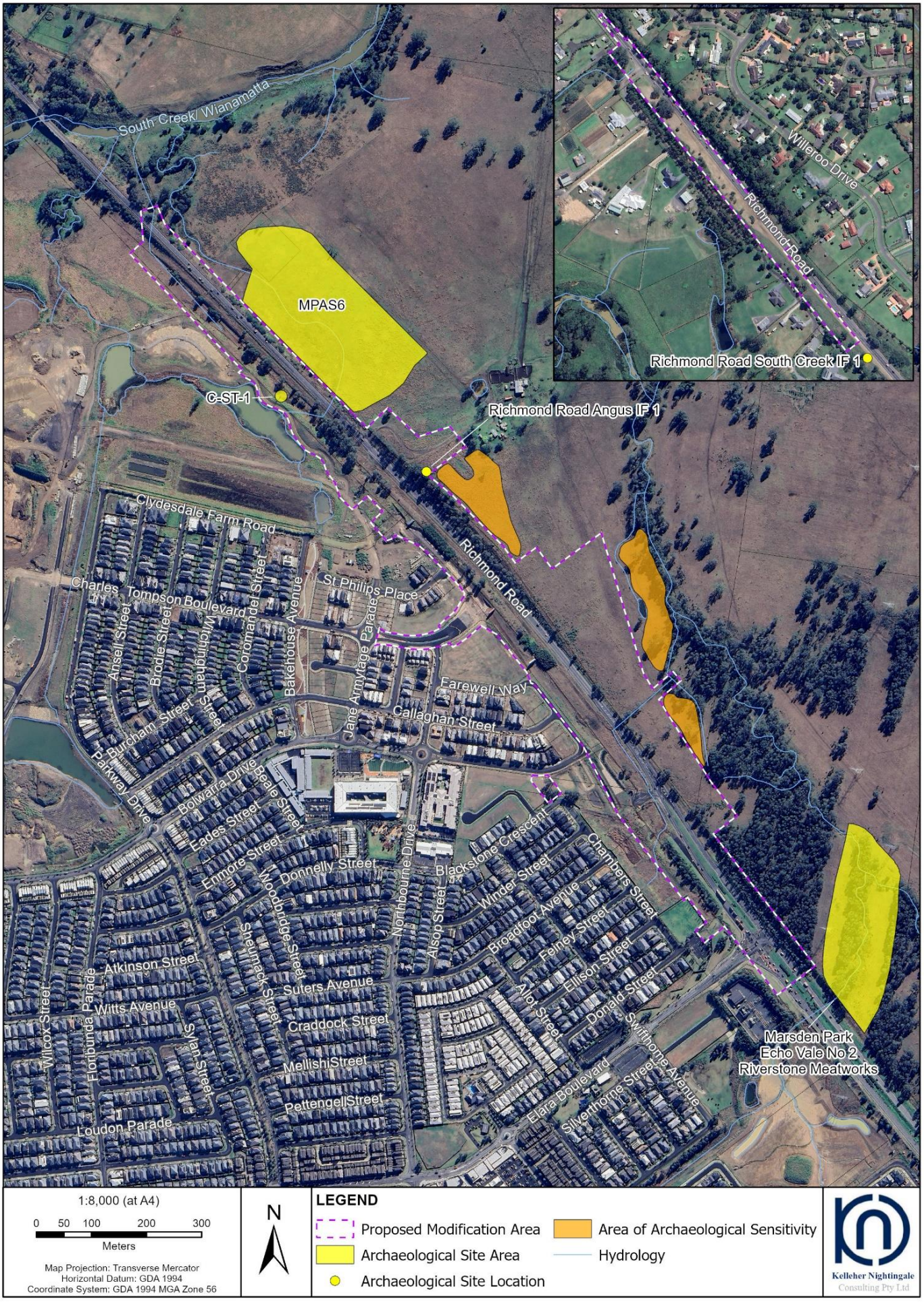

Figure 6-12: Survey results showing Aboriginal heritage within and bordering the proposed modification area

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Existing AHIPs

AHIP #C0004249 was granted on 18 January 2019 for impacts to sites C-IF-1/Clydesdale, C-IF-2 and C-OS-1 located on the Clydesdale Estate. This AHIP covers a portion of the proposed modification area, although none of these sites were identified within the proposed modification area. Any works related to the current proposal undertaken within this existing AHIP area will be required to comply with the AHIP conditions.

6.7.3 Potential impacts

No new impacts to Aboriginal heritage are expected from the proposed modification, as the Aboriginal archaeological sites would be avoided by construction works by establishing exclusion zones. If impact to these sites cannot be avoided, extra assessment and an AHIP would be required.

6.7.4 Safeguards and management measures

Safeguards and management measures remain consistent with Section 6.7.4 of the project REF.

6.8 Landscape character and visual impacts

Impacts of the proposed modification on landscape character and amenity have been assessed in the Urban Design Landscape Character and Visual Impact Assessment – Addendum REF Memo (Tract, 2025), provided in Appendix K. This chapter presents a summary of the assessment.

6.8.1 Methodology

A review of the Richmond Road Upgrade, Marsden Park Urban Design, Landscape Character and Visual Impact Assessment (Tract, 2020) was carried out to determine changes in the existing environment and impacts of the proposed modification. Changes in land zoning, heritage, vegetation, topography and drainage were reviewed to determine changes in landscape character zones. Existing viewpoints were also reviewed, with new viewpoints added, to determine visual impacts of the proposed modification. A site visit was carried out on 3 October 2024 to inform the assessment.

6.8.2 Existing environment

Minor changes have occurred within the existing environment since the project REF. The master planning proposal for residential and commercial development in Marsden Park North has been withdrawn, changing future land use for the surrounding area. The proposal for a flood offset area within the Marsden Park housing development, referred to in the project REF, has now been constructed. Nevertheless, the overall landscape character remains largely consistent with Section 6.8.2 of the project REF. The following landscape character zones (LCZ) remain consistent with unchanged extents:

- LCZ1 - Residential Landscape
- LCZ2 – The Road Corridor
- LCZ3 – Rural / Open Pasture.

6.8.3 Potential impacts

Impacts to LCZ1 and LCZ2 are unchanged from the project REF. Impacts to LCZ3 have changed due to the withdrawal of the Marsden Park North development. These changes have been summarised in Table 6-47.

Table 6-47: Landscape character impact assessment

Site context	Site feature	Number
LCZ3	Magnitude	• The proposed modification is mostly within the road corridor but alters the relationship between the road and grassland, including through the provision of intersection stubs • Magnitude is unchanged from the project REF and remains to be low.
	Sensitivity	• The landscape is largely open, which permits expansive uninterrupted views • Vegetation cover provides limited screening opportunities, reducing the ability of the landscape to absorb changes • Sensitivity was previously considered to be low, but is now considered moderate due to the limited screening opportunities and retention of rural landscape as part of the land use planning for Marsden Park North
	Summary impact rating	• Moderate to low • This is an increase from the project REF, which rated the impact as low. The increase in impact reflects the increase in sensitivity because of the retention of the rural landscape character. A moderate temporary impact is also expected during construction due to the works at AS1.

6.8.4 Visual impact assessment

Existing viewpoints have been reassessed where there has been a change in the existing environment. Several viewpoints have been added in areas that may now be impacted by the proposed modification, and two viewpoints have been removed for areas no longer impacted. Viewpoints are shown in Figure 6-13 and

Figure 6-14. As shown in Table 6-48, there is no change in the impact to the viewpoints that were reassessed, while the new viewpoints were determined to have the following impacts:

- Two viewpoints would have a Low impact
- One viewpoint would have a Low to Moderate impact
- One viewpoint would have a Moderate impact.

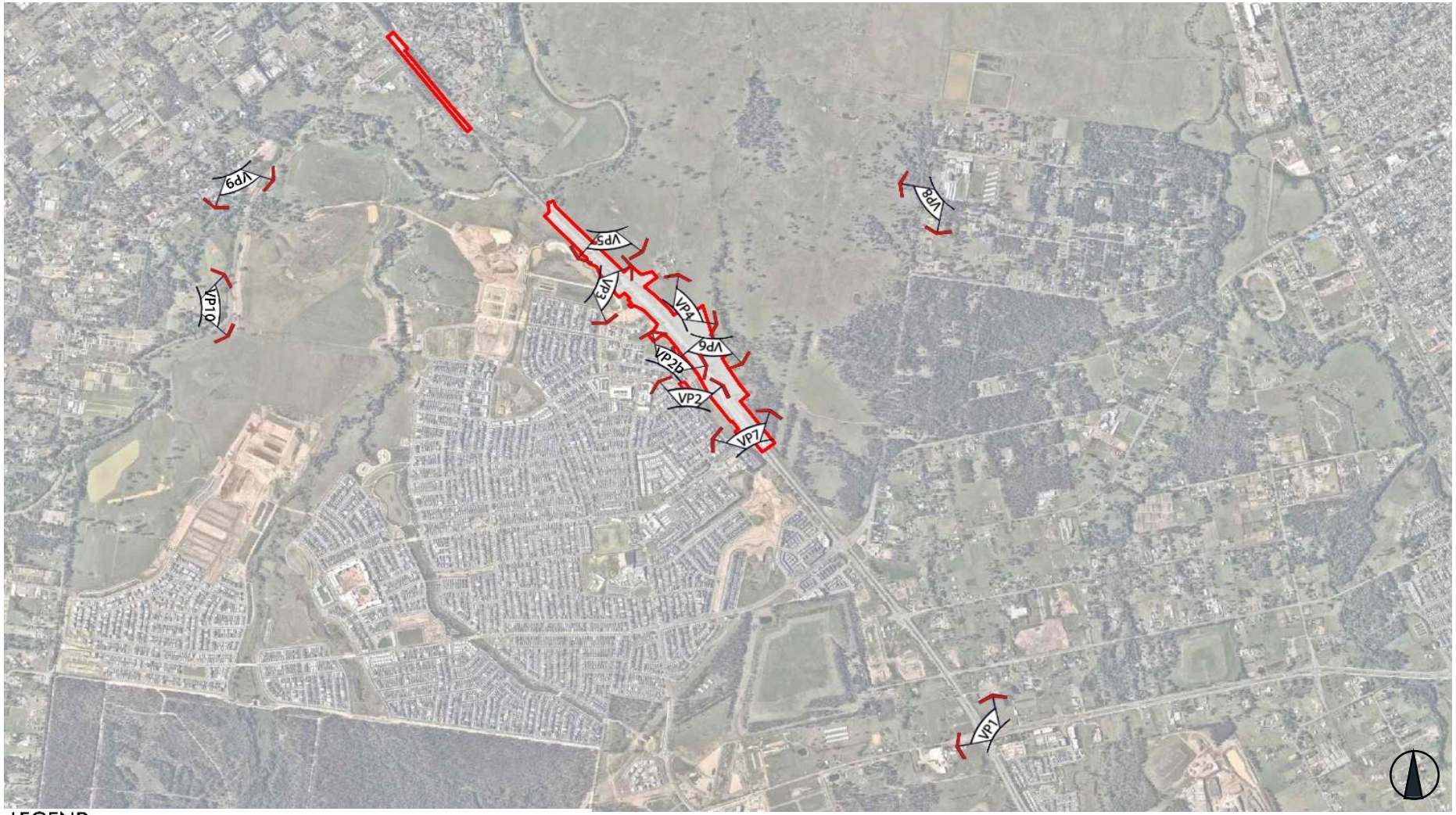

Figure 6-13: Visual impact assessment plan (Tract, 2025)

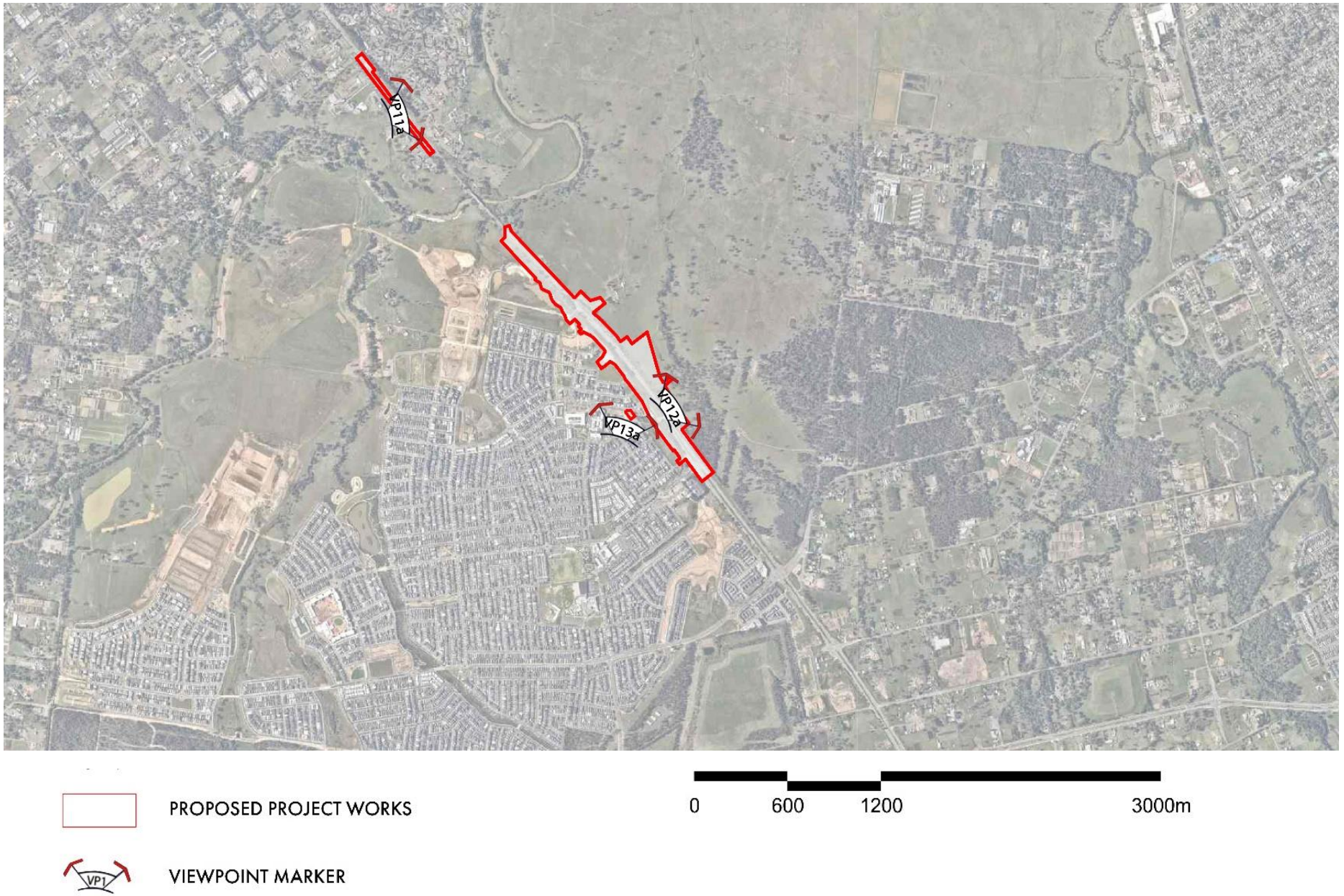

Figure 6-14: Ancillary site viewpoints (Tract, 2025)

Table 6-48: Visual assessment summary

Viewpoint number	Change	Sensitivity	Magnitude	Summary impact rating
VP1	Updated to reflect change in surrounding environment	Low	Negligible	Negligible
VP2	Updated to reflect change in surrounding environment	Low	Low	Low
VP2b	New viewpoint added to reflect changes within the Marsden Park development	Low	Low	Low
VP9	Deleted due to removal of flood storage area	N/A	N/A	N/A
VP10	Deleted due to removal of flood storage area	N/A	N/A	N/A
VP11a	New viewpoint added for AS3	Moderate	Low	Low to moderate
VP12a	New viewpoint added for AS1	Moderate	Moderate	Moderate
VP13a	New viewpoint added for AS2	Low	Low	Low

6.8.5 Safeguards and management measures

Safeguards and management measures for landscape character and visual impacts remain consistent with Section 6.8.5 of the project REF.

6.9 Property, land use and socio-economic

Potential land use and socio-economic impacts on the proposed modification are presented in this section, together with safeguards and management measures to manage any negative impacts.

6.9.1 Methodology

A desktop review was carried out to determine changes in the existing environment for property, land use and socio-economic factors, and any impacts to them from the proposed modification. Databases searched include:

- Profile ID
- Australian Bureau of Statistics (ABS)
- Google Maps.

6.9.2 Existing socio-economic environment

This section provides a social profile for the area surrounding the proposed modification. It includes information of the current population and demographic projections, age composition and household size. This section also identifies facilities and services in the area, places of special interest and significant community activities.

Regional context

The proposed modification is located within the Blacktown, Penrith, and Hawkesbury LGAs in Western Sydney.

The Blacktown LGA is located approximately 35 kilometres west of the Sydney central business district (CBD) and spans an area of about 239 square kilometres. It is bordered by Hawkesbury City in the north, The Hills Shire in the north-east, the City of Parramatta in the east, the Cumberland Council area in the south-east, Fairfield City in the south and Penrith City in the west (.id community, 2024a). Blacktown is one of the most populous LGAs in NSW, comprising of 48 suburbs and localities, including Marsden Park. In 2023, its estimated resident population was 426,202 people, representing a total population growth of 3.71 percent from 2022 (ABS, 2023). Projections suggest this number will grow to 572,860 by 2046 driven by urban development as part of the NWGC. Land use in the Blacktown LGA is primarily residential, with some commercial, industrial, rural, infrastructure and environmental and public recreation zones (.id community, 2024a).

The Penrith LGA, located approximately 54 kilometres from the Sydney CBD, covers an area of 404.8 square kilometres. The LGA is bounded by Hawkesbury City LGA in the north, Blacktown City and Fairfield City LGAs in the east, Liverpool City and Wollondilly Shire LGA in the south, and the Blue Mountains City LGA in the west (.id community, 2024c). In 2023, the LGA had an estimated resident population of 224,483 people (ABS, 2023). The LGA's land use combines urban and semi-urban elements, including predominantly residential and rural areas, with some commercial areas, industrial areas and nature reserves such as the Nepean River corridor (.id community, 2024c).

The Hawkesbury LGA is located 50 kilometres north-west of Sydney CBD, covering a vast area of 2,776 square kilometres. It is bounded by the Singleton Council and Cessnock City LGAs in the north, the Central Coast Council and The Hills Shire LGAs in the east, Blacktown City, Penrith City and Blue Mountains City LGAs in the south, and Lithgow City LGA in the west (.id community, 2024d). The population estimate for the LGA as of 2023 is 68,156 people (ABS, 2023). The Hawkesbury is characterised by 5 river systems: the Nepean, Hawkesbury, Grose, Colo and MacDonald Rivers. Over 70 percent of the LGA is covered by national and state parks, including the Blue Mountains and Cattai National Park. Other land uses include residential, commercial, industrial and military (.id community, 2024d).

Community profile

This section describes existing socio-economic conditions in the area surrounding the proposed modification, including population and demography, housing and households, employment and local businesses.

At the 2021 Census, Marsden Park had an estimated resident population of 14,610 people (ABS, 2021). In 2023, Marsden Park and the adjoining suburb of Shanes Park and Melonba had an estimated resident population of 24,792 people, representing a total population growth of about 69.7 percent from 2021 (.id community, 2024c).

Table 6-49 summarises key population and demographic characteristics for the area surrounding the proposed modification from the 2021 ABS Census. Compared to Greater Sydney, communities in the area are generally characterised by:

- An older population with a lower median age, higher proportion of children and lower proportion of older people aged 65 years or over
- Generally higher levels of cultural diversity, with higher populations of people who were born overseas and who speak another language other than English at home
- Proportions of people who reported as being Aboriginal and/or Torres Strait Islander is lower than the Greater Sydney average
- High proportion of houses that were occupied and higher proportions of low density dwellings to Greater Sydney.

Table 6-49: Population and demographic characteristics, 2021

Indicator	Marsden Park	Greater Sydney
Population		
Total population	14,610	5,231,147
Median age	32 years	37 years
0-14 years (percent)	30.1%	18.4%
15-64 years (percent)	64.2%	66.4%
65 years and over (percent)	5.7%	15.2%
Cultural diversity		
Overseas born (percent)	55.9%	43.2%
Speaks language other than English at home (percent)	65.3%	42%
Aboriginal and/or Torres Strait Islander (percent)	1.3%	1.7%
Dwellings		
Total private dwellings	4,446	2,076,284
Occupied private dwellings (percent)	97.2%	91.7%
Separate dwellings (percent)	97.4%	55.8%
Flat or apartment (percent)	0.2%	30.7%
Semi-detached, row or terrace house, townhouse etc (percent)	2.3%	12.8%
Transport		
Households with no vehicle (percent)	1.9%	11.1%
Households with two or more vehicles (percent)	65%	48%

Indicator	Marsden Park	Greater Sydney
Source: ABS 2021 Census QuickStats for Marsden Park State Suburb (SAL12515) and Greater Sydney (1GSYD), available from https://www.abs.gov.au/census/find-census-data/search-by-area		

Future population and housing

The area surrounding the proposed modification is located within the Marsden Park Precinct and Marsden Park North Precinct precincts of the North West Growth Area (NWGA). The Marsden Park Precinct has been rezoned and when fully developed, will benefit a population of about 30,000 people from up to 10,300 new homes and delivery of local amenities close to transport options (DPE, 2024).

In August 2023, the Department has considered the potential for a partial rezoning of the Marsden Park North Precinct (MPNP), however this is not recommended due to flood risk concerns and challenges for servicing the land. Therefore, the rezoning of MPNP did not proceed as recent flood modelling has demonstrated that flood related risk to life and property may be greater than previously known (DPE, 2023a).

Economic profile

Table 6-50 summarises key economic indicators for the area surrounding the proposed modification from the 2021 ABS Census. Compared to Greater Sydney, communities in the area are generally characterised by:

- Individuals and households with higher incomes, with a median household income of $2,722 per week compared to $2,077 in Greater Sydney and a median weekly income of $1,131 compared to $881 in Greater Sydney
- Relative low levels of unemployment, with four percent of people aged 15 years or older looking for work compared to five percent in Greater Sydney
- Key industries of employed people aged 15 years or older in Marsden Park include working in healthcare, computer system design and related services, banking, food retailing and social assistance services.

Table 6-50: Economic indicators, 2021

Indicator	Marsden Park	Greater Sydney
Median weekly individual income ($)	1,131	881
Median weekly household income ($)	2,722	2,077
Unemployment (percent)	3.9%	5.1%
Industry of employment (top five responses)	• Hospital (except Psychiatric Hospitals) (6.1%) • Computer system design and related services (4.9%) • Banking (4.1%) • Supermarket and grocery stores (3.3%) • Other social assistance services (2.3%)	• Hospital (except Psychiatric Hospitals) (4.1%) • Computer system design and related services (3.1%) • Banking (2.6%) • Supermarket and grocery stores (2.4%) • Other social assistance services (2%)
Source: ABS 2021 Census QuickStats for Marsden Park State Suburb (SAL12515) and Greater Sydney (1GSYD), available from https://www.abs.gov.au/census/find-census-data/search-by-area		

Future employment

The future employment opportunities generated by developments in the Marsden Park Precinct remain consistent with those outlined in the project REF.

Business and industry

Table 6-51 lists businesses in areas surrounding the proposed modification. Businesses near the proposed modification are generally limited and mainly businesses operating at Elara Village Shopping Centre, home businesses operating from houses within the Elara development, display home sales centres, and retail businesses north of the proposed modification.

Table 6-51: Businesses near the proposed modification

Business type	Business	Location	Description
Retail	Coles Elara Marsden Park	Parish Street and Elara Boulevard, Marsden Park	Supermarket at Elara Village Shopping Centre

Business type	Business	Location	Description
	T-Rex Racing Engines	Richmond Road, Berkshire Park	Engine rebuilding service
Cafes	Leaf Café & Co	Elara Boulevard, Marsden Park	Café at the Elara Village Shopping Centre
	12th Avenue Café & Thai	Elara Boulevard, Marsden Park	Café at the Elara Village Shopping Centre
Real estate	HomeWorld Village	Elara Boulevard, Donald Street and Swifthome Avenue, Marsden Park	Display home centre
	DreamBig Realty	Hannah Morris Street, Marsden Park	Real estate agency
	Rite Properties Pty Ltd	Westbrook Circuit, Marsden Park	Real estate agency
	H K REALTORS	McLoughlin Street, Marsden Park	Real estate agency
	Praveen Reddy Property	Landsdowne Glade, Marsden Park	Real estate agency
	Urban Real Estate	Northbourne Drive and Elara Boulevard, Marsden Park	Real estate agency
	Stockland Elara Display Village and Sales Centre	Elara Boulevard, Marsden Park	Real estate developer
	Clarendon Homes Display Centre	Watkin Cres, Marsden Park	Display home centres

Community values

Community values remain consistent with Section 6.9.2 of the project REF.

Social infrastructure

Table 6-52 lists social infrastructure near the proposed modification. Social infrastructure located near the proposed modification is generally limited and includes education, cultural facilities, family day cares, and sport and recreational facilities.

Table 6-52: Social infrastructure near the proposed modification

Social infrastructure	Facility	Location	Description
Education facilities	Marsden Park Public School	Garfield Road W, Marsden Park	Marsden Park Public School provides primary school education for students from kindergarten to year six. In 2022, the school had an enrolment of 170 students with about 12 staff members. Anticipated growth will occur over the coming years as the surrounding area undergoes extensive development.
	Northbourne Public School	Northbourne Drive, Marsden Park	Marsden Park Public School provides primary school education for students from kindergarten to year six. In 2023, there are 1,268 students enrolled with about 100 staff members. As a new school, the numbers of students are expected to grow steadily.
	St Luke's Catholic College	Frontier Avenue, Marsden Park	The school currently offers primary and secondary education for students in kindergarten to year 12. In 2023, the school had a total enrolment of 1,587 students with about 100 staff members.
	Australian Christian College	Farm Road, Angus	The school currently offers primary and secondary education for students in kindergarten to year 12. In 2022, there are 1,706 students enrolled with about 130 staff members.
Child care	Marsden Park Education and Care	Clydesdale Farm Road, Marsden Park	Child care centre
	Pooja's Family Day Care	Swifthome Avenue, Marsden Park	Family day care services
	Creative minds	Charles Tompson Boulevard, Marsden Park	Family day care services
	Goodstart Early Learning Elara	Blackstone Street and Harvest Street, Marsden Park	Child care centre

Social infrastructure	Facility	Location	Description
	Anu's Family Day Care	Callaghan Street, Marsden Park	Family day care services
	Maa Family Day Care	Bloomfield Street, Marsden Park	Family day care services
	Ohana Family Day Care	Northbourne Drive, Marsden Park	Family day care services
Sport and recreation	Elara Sporting Fields	Marsden Park	A 6.5-hectare sports and recreation facility which include a full-size Australian Football League (AFL) playing field and a junior playing field, amenities building, cricket nets, walking and cycling paths, a playground and a car park.
Cultural facilities	Australian Hindu Multicultural Association Cultural Centre	Richmond Road, Marsden Park	The Cultural Centre will provide a central location for members to celebrate their cultural values and beliefs as well as providing a gathering place where members of the community can create social networks.
Emergency service	Marsden Park Rural Fire Brigade	Garfield Road W, Marsden Park	Fire station
	NSW Rural Fire Service (RFS) – Berkshire Park Brigade	Sixth Road, Berkshire Park	Fire station

Transport and access

Richmond Road continues to connect Richmond and Blacktown and serves as an important link to new residential development within the NWGA. Bus routes 757 and 6082 identified in the project REF are no longer in operation. New bus routes have been introduced including:

- Route 748, which connects Marsden Park to Rouse Hill via Schofields
- Route 751, which connects Melonba to Blacktown, via Marsden Park.

6.9.3 Potential impacts

Property impacts

The proposed modification would require the acquisition of about an extra 0.1 hectares of land for various uses as described in Table 3-5. About an extra 0.3 hectares of land would now be required for easements, and about five less hectares of land would need to be leased.

Employment

Employment impacts remain consistent with Section 6.9.3 of the project REF. There is no change to the construction workforce requirements from the project REF.

Local business

Impacts on local business remain consistent with Section 6.9.3 of the project REF.

Social infrastructure

Social infrastructure impacts remain consistent with Section 6.9.3 of the project REF.

Community values

Impacts on community values remain consistent with Section 6.9.3 of the project REF. However, due to the progress in residential development in Marsden Park, more properties may be impacted. This includes properties between Bolwarra Drive and St Philips Place. Properties next to AS3 may also experience changes in visual amenity, noise and dust from construction activities due to the presence of the stockpile site.

Access and connectivity

Impacts on access and connectivity remain consistent with Section 6.9.3 of the project REF.

Evaluation of significance

The evaluation of significance of socio-economic impacts remains mostly consistent with Section 6.9.3 of the project REF. There is now no property impact associated with the compensatory flood storage area.

6.9.4 Safeguards and management measures

Safeguards and management measures remain consistent with Section 6.9.5 of the project REF, noting changes to guidelines.

Table 6-53: Revised environmental management measures for property, land use and socio-economic impacts

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will 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. The CP will be prepared in accordance with ~~the Community Involvement and Communications Resource Manual (RTA, 2008)~~ ***relevant Transport for NSW community engagement guidelines and in consultation with the Transport for NSW community engagement team.***	Contractor	Pre-construction	Core standard safeguard SE1

6.10 Other impacts

This section assesses environmental factors that are considered to have a to negligible impact.

6.10.1 Existing environment and potential impacts

Changes to other impacts are summarised in Table 6-54.

Table 6-54: Assessment of other impacts

Environmental factor	Existing environment	Potential impacts
Air quality	The existing environment remains consistent with Section 6.10.2 of the project REF.	Construction impacts of the proposed modification remain predominantly consistent with Section 6.10.3 of the project REF. Given the increase in road height, additional earthworks may result in additional air quality impacts. However, the consequence of this impact is unchanged, and therefore the potential impact to air quality is still considered to be moderate. Operational impacts of the proposed modification remain consistent with section 6.10.3 of the project REF.
Resource and waste management	The existing environment remains consistent with Section 6.11 of the project REF.	Potential impacts of the proposed modification remain consistent with Section 6.11 of the project REF.

6.10.2 Safeguards and management measures

Safeguards and management measures for air quality impacts remain consistent with Section 6.10.4 of the project REF.

Safeguards for resource and waste management remain consistent with Section 6.11.1 of the project REF.

6.11 Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of the proposal with other external projects. Transport for NSW is required under Clause 228(2) of the Environmental Planning and Assessment Regulation 2000, to take into account potential cumulative impacts as a result of the proposed modification.

6.11.1 Methodology

The cumulative impact assessment identified other projects and developments known to occur within a ten kilometre radius of the proposed modification. A search of the Department of Planning and Environment's Major Projects Register and strategic planning website on 7 November 2024 identified no major projects within the immediate vicinity of the proposed modification. The closest works to the proposed modification occur at South Street Warehousing Estate, about 2.6 kilometres from the proposed modification.

Other major developments within ten kilometres of the proposed modification include:

- NewCold Cold Storage Facility
- Marsden Park Data Centre
- Multi-stage mixed use residential development at 23 - 27 Schofields Road, Schofields
- In-fill affordable housing development at 108 Burdekin Road, Schofields
- New Tallawong Public School
- Grundys Waste Solutions Resource Recovery Facility
- Denmark Link Road
- New Richmond Bridge.

6.11.2 Potential impacts

Given the distance to the nearest major project, no additional cumulative impacts are expected for the proposed modification.

6.11.3 Safeguards and management measures

Safeguards and management measures for cumulative impacts remain consistent with Section 6.12.5 of the project REF.

7. Environmental management

7.1 Environmental management plans (or system)

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 Contractors 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 Richmond Road Upgrade, Marsden Park 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 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 CEMP will 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 will address the following: • Any requirements associated with statutory approvals • Details of how the project will 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 will be implemented during the undertaking of the activity.	Contractor/Transport for NSW project manager	Pre-construction/detailed design	Section 4.8 of QA G36 Environment Protection
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor/Transport for NSW project manager	Pre-construction	Core standard mitigation measure NV2
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular ‘toolbox’ style briefings.			GEN3

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
Traffic and transport					
TT1	Traffic and transport	A Construction Traffic Management Plan (CTMP) would be prepared by the construction contractor in consultation with relevant local councils and in accordance with relevant guidelines, ***Transport for NSW contract requirements and specifications, and Road Occupancy License as applicable.*** The CTMP would outline: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • 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 • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. • Parking arrangements for construction staff • 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	Contractor	Pre-construction	Section 4.8 of QA G36 *Environment Protection*
TT2	Property access - during construction	Access to properties will be maintained during construction. Where that is not feasible, temporary alternative access arrangements will be provided following consultation with affected landowners and the relevant local road authority. Any disruptions to property access and traffic will be notified to landowners at least five days prior in accordance with the relevant community consultation processes outlined in the CTMP.	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT3	Reduce speeds, traffic delays and disruptions during construction	Road users and local communities will be provided with timely, accurate, relevant and accessible information about changed traffic arrangements and delays owing to construction activities	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT4	Reduce speeds, traffic delays and disruptions during construction	Construction site traffic will be managed to minimise movements during peak periods	Transport for NSW and Contractor	Construction	Additional standard safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
TT5	Reduce speeds, traffic delays and disruptions during construction	Clear wayfinding and safety signage will be provided to direct and guide vehicles not related to the proposal during road construction work. This will be supplemented by variable message signs to advise drivers of traffic diversions, speed restrictions or alternative routes	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT6	Impacts to the regional road network	The most disruptive work (such as work that requires lane closures) will be carried out at night where practicable, to minimise potential impacts on the regional road network.	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT7	***Traffic and transport***	***A Road Occupancy License would be required prior to construction activities that impact on road operations***	***Contractor***	***Construction***	***Additional safeguard***
TT8	Parking	~~All staff parking will be provided on-site and not on surrounding local streets.~~ ***Staff parking would be limited to the ancillary sites and Bolwarra Drive.***	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT9	Site access and egress	All vehicles will enter and exit construction sites in a forward direction, where feasible and reasonable.	Transport for NSW and Contractor	Construction	Additional standard safeguard
TT10	***AS3 construction traffic.***	***Consultation with landowners on Clydesdale Rural Estate road to be undertaken prior to the use of AS3.***	***Transport for NSW***	***Pre-construction***	***Additional***
TT11	***AS3 construction traffic***	***Construction vehicles are not to use the Clydesdale Rural Estate Road.***	***Contractor***	***Construction***	***Additional safeguard***
Noise and vibration					
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the activity • Nearby sensitive receivers • Feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Roads and Maritime, 2014) • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours, sensitive receivers and NSW SES including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Construction contractor	Pre-construction	Core standard safeguard NV1

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV2	Notification	All sensitive receivers (eg schools, local residents) likely to be affected will be notified prior to commencement of any work associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • The proposal • The construction period and construction hours • Contact information for proposal management staff • Complaint and incident reporting • How to obtain further information.	Construction contractor	Construction	Core standard safeguard NV2
NV3	Construction noise and vibration assessments	Location and activity specific noise and vibration impact assessments should 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 likely to result in noise levels in greater than the relevant Noise Management Levels • With the potential to exceed relevant criteria for vibration. The assessments should 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	Construction	Additional safeguard
NV4	Staff induction	Construction staff will be inducted and educated regarding management of noise impacts.	Construction contractor	Construction	Additional safeguard
NV5	Out of hours work	Where works are required outside standard construction hours, construction programming will be developed in consultation with Transport for New South Wales to minimise noise impacts – this may include agreement on completing construction in as short a time as possible or implementing time and duration restrictions and respite periods.	Construction contractor	Construction	Additional safeguard
NV6	Compounds with long term work	Place as much distance as possible between the plant or equipment and residences and other sensitive land uses, particularly at site compounds.	Construction contractor	Construction	Additional safeguard
NV7	Compounds with long term work	Hoarding, or other shielding structures, should be used where receivers are impacted near compounds or fixed work areas with long durations. To provide effective noise mitigation, the barriers should break line of sight from the nearest receivers to the work and be of solid construction with minimal gaps.	Construction contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV8	Vibration	Where practical, schedule the use of vibration intensive equipment during standard construction hours. Avoid multiple vibration intensive activities occurring at the same time. ***Apply, where reasonable and feasible, the standard mitigation measures contained within Assessing Vibration: A technical guideline (NSW DCCEEW, 2006).***	Construction contractor	Construction	Additional safeguard
NV9	Noise and vibration	Where possible, work outside of standard construction hours will be planned so that noisier works are carried out in the earlier part of the evening or night time.	Construction contractor	Construction	Additional safeguard
NV10	Construction machinery noise	Examine the different types of machines that perform the same function and compare the noise level data to select the least noisy machine. For example, rubber wheeled tractors can be less noisy than steel tracked tractors.	Construction contractor	Construction	Additional safeguard
NV11	Construction machinery noise	Select appropriately sized equipment for the task rather than using large equipment when not necessary.	Construction contractor	Construction	Additional safeguard
NV12	Construction machinery noise	Reduce throttle setting and turn off equipment when not in use.	Construction contractor	Construction	Additional safeguard
NV13	Construction machinery noise	Regularly inspect and maintain equipment to ensure it is in good working order. Also check the condition of the mufflers.	Construction contractor	Construction	Additional safeguard
NV14	Construction machinery noise	Where acceptable from a work health and safety perspective, quieter alternatives to reversing alarms (such as spotters, closed circuit television monitors and 'smart' reversing alarms) will be used particularly during out of hours activities.	Construction contractor	Construction	Additional safeguard
NV15	Monitoring	Monitoring should be carried out at the start of new noise and vibration intensive activities to confirm that actual levels are consistent with the predictions and that appropriate mitigation measures from the CNVG have been implemented. ***Vibration monitoring should be carried out at nearest receivers within human comfort setback distances when a vibratory roller is proposed to be used to confirm vibration levels.***	Construction contractor	Construction	Additional safeguard
NV16	Noise complaints	All noise complaints will be investigated and appropriate mitigation measures implemented where practicable to minimise further impacts.	Construction contractor	Construction	Additional safeguard
NV17	NV17 operational noise mitigation	~~Further assessment of reasonable and feasible operational noise mitigation will be assessed and determined when information regarding the location and size of the future buildings in Marsden Park Precinct is better understood.~~ ***Investigate receivers eligible for noise mitigation to determine the appropriate at-property treatments to be applied to address the predicted operational traffic noise impacts.***	Transport for New South Wales	***Construction***	Updated safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV18	***Construction traffic noise***	***Apply, where reasonable and feasible, the standard mitigation measures contained within Appendix B of the CNVG(R).***	***Construction contractor***	***Construction***	***Additional safeguard***
NV19	***Construction traffic noise***	***Ahead of works where works anticipated to produce significant noise and vibration impacts, apply the 'Additional Mitigation Measures' provided in Appendix C of the CNVG(R).***	***Construction contractor***	***Construction***	***Additional safeguard***
NV20	***Construction traffic noise***	• ***Schedule construction traffic movements to avoid night periods and other sensitive times*** • ***Revising vehicle routes and scheduling to reduce heavy vehicle traffic along roads predicted to experience construction traffic noise impacts*** • ***Avoiding the use of compression brakes*** • ***Ensuring vehicles are adequately silenced before leaving or accessing the Project area***	***Construction contractor***	***Construction***	***Additional safeguard***
Non-Aboriginal heritage					
NAH1	Construction management	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to Non-Aboriginal heritage.	Contractor	Detailed design/pre-construction	Section 4.10 of QA G36 Environment Protection
NAH2	Unexpected finds	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Detailed design/pre-construction	Section 4.10 of QA G36 Environment Protection
NAH3	Section 60 permit	A Section 60 permit must be obtained from the NSW Heritage Division of OEH for proposed impacts within the curtilage of Clydesdale – House, Barn, Cottage and Farm Landscape.	Transport for NSW	Pre-construction	Additional safeguard
NAH4	Induction	Non-Aboriginal heritage awareness training will be provided for all contractors and personnel before commencement of construction to outline the values of the place, avoidance procedure, and contacts (site manager, Transport for NSW heritage officer) for reporting unexpected archaeological finds or inadvertent impacts to the heritage item.	Contractor	Pre-construction	Additional safeguard
NAH5	Screen planting	New vegetation plantings along Richmond Road ***must be consistent with*** ~~must take into consideration~~ the vegetation management policies of the 2017 Conservation Management Plan (CMP) and the 2016 Marsden Park Development Control Plan (DCP). This includes ensuring that new plantings within the road corridor do not restrict the significant view corridor from Richmond Road back towards Clydesdale House, whilst being sympathetic to view lines from Homestead yard and working hub across the floodplain towards Richmond Road.	Transport for NSW	Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NAH6	Screen planting	Replanting or regeneration of native extant vegetation and grasses should occur along the road alignment ~~and around the floodplain offset area~~ to mitigate impact on the views and setting within the study area	Transport for NSW	Pre-construction	Additional safeguard
NAH7	Photographic record	A photographic archival recording should be prepared of the proposal area and significant view lines prior to commencement of work	Transport for NSW	Pre-construction	Additional safeguard
NAH8	Access 2 design	Design of the new entrance to Clydesdale 'Heritage Road', ***should align with existing approvals and be consistent with*** ~~should consider~~ design elements sympathetic to the significance values of Precinct 3, including timber fences and tubular metal gates. New vegetation plantings along Heritage Road must take into consideration the vegetation management policies of the CMP and the Marsden Park DCP, including significant view lines from Richmond Road across the floodplain to Clydesdale House and views along Entrance Drive and from Entrance Drive across surrounding paddocks.	Transport for NSW	Pre-construction	Additional safeguard
~~NAH9~~	~~Lookout~~	~~Further design for the proposal should consider the feasibility of safely and effectively integrating a lookout and interpretation point on the southern side of Richmond Road overlooking the floodplain setting~~	~~Transport for NSW~~	~~Pre-construction~~	~~Additional safeguard~~
NAH10	Additional work	Any work not assessed in this document will require additional heritage assessment and potentially an application for revised or new approvals under the Heritage Act 1977. Examples of additional work not assessed in this document include the location of compound sites, stockpile sites, ancillary facilities, and installation of services or temporary vehicle access routes not specified in the preliminary strategic design	Transport for NSW	Pre-construction	Additional safeguard
NAH11	***Impacts to heritage items***	***Develop a comprehensive Heritage Interpretation Strategy that incorporates information about all heritage items in the proposed modification area, including Clydesdale Estate, St Phillips Cemetery, and Berkshire Park Homestead. This HIS should consider existing interpretative elements being delivered by adjacent projects to support understanding of these places, but not replicate, content or approaches employed. The HIS also needs to ensure that the options presented for Clydesdale are consistent with CMP policies for interpretation, with those developed enhancing understanding of the significance of the cultural landscape.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
NAH12	***Impacts to heritage items***	***Implement 70 metre buffer zones around St Phillips Cemetery to protect any potential archaeological remains associated with the former church site.***	***Construction contractor***	***Construction***	***Additional safeguard***
NAH13	***Management of potential archaeological resources***	***Consult with relevant stakeholders regarding the management of potential archaeological resources at all heritage sites.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NAH14	***Heritage induction***	***Conduct a heritage induction for workers before commencing construction, covering all heritage items within 100 metres of the proposed modification area, including Clydesdale Estate, St Phillips Cemetery, and the Site of Berkshire Park Homestead. Include procedures for reporting unexpected archaeological finds.***	***Construction contractor***	***Construction***	***Additional safeguard***
Biodiversity					
B1	Removal of vegetation	A Flora and Fauna Management Plan will be prepared in accordance with ~~*Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011)*~~ ***relevant Transport for NSW biodiversity guidelines*** and implemented as part of the CEMP. It will include, but not be limited to: • Pre-clearing survey • Unexpected find procedure • Inductions • Vegetation removal protocols • Exclusion zones.	Construction contractor	Detailed design/pre-construction	Section 4.8 of QA G36 Environment Protection
B2	Unexpected finds	The unexpected species find procedure is to be followed under ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)*~~ ***relevant Transport for NSW biodiversity guidelines*** if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	Construction contractor	Construction	Additional safeguard
B3	Vegetation removal	Vegetation removal will be undertaken 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)~~ ***relevant Transport for NSW biodiversity guidelines***.	Construction contractor	Construction	Additional safeguard
B4	Pre-clearance surveys	Pre-clearing surveys will be undertaken in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Construction contractor	Construction	Additional safeguard
B5	Induction	All personnel working on site will receive training to ensure awareness of requirements of the Flora and Fauna Management Plan and relevant statutory responsibilities. Site-specific training will be given to personnel when working in the vicinity of areas identified biodiversity values that are to be protected.	Contractor	Detailed design / pre-construction	Additional safeguard
B6	Weeds and pathogens	Any soil or other materials imported to the site for use in restoration or rehabilitation will be certified free from weeds and pathogens, or obtained from sources that demonstrate best practice management to minimise weed and pathogen risks.	Construction contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
		Weed species will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Construction contractor	Construction	Additional safeguard
		Pathogens will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).~~	Construction contractor	Construction	Additional safeguard
B7	Exclusion zones	Exclusion zones will be set up at the limit of clearing (i.e. the edge of the impact area) in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Construction contractor	Construction	Additional safeguard
B8	Aquatic habitat	Aquatic habitat will be protected in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~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
B9	Fauna injury	Fauna will be managed in accordance with ***relevant Transport for NSW biodiversity guidelines*** ~~Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~.	Contractor	Construction	Additional safeguard
B10	Fauna habitat	The fallen log within the proposed amended culvert drainage footprint should be protected from impact during construction and relocated near to the drainage line post-construction.	Contractor	Pre-construction, post-construction	Additional safeguard
Hydrology, flooding and water quality					
H1	Soil and water management plan	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and designer how these risks will be addressed during construction. ***Culvert and scour protection to be installed at all new culvert and pavement drainage pipes.***	Construction Contractor	Pre-construction	
H2	Erosion and sediment control plan	A site-specific Erosion and Sediment Control Plan/s (ESCP) will be prepared and implemented as part of the SWMP.	Construction contractor	Pre-construction	

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
H3	Sediment basins	~~For the catchment located between the proposed intersection and the northern end of the limit of work towards South Creek, one sediment basin of 220 cubic metres will be required.~~ ~~The maximum allowable area to be disturbed at any one time within this catchment is about 1.3 hectares. If it is found to be not practical by the contractor, then a supplementary basin could be located within the construction footprint at about Chainage 1300m with an approximate size of 250 cubic metres. These sediment basins will be located as far downslope as possible to maximise the catchment area that they treat.~~ ***Up to four (4) temporary sediment basins will be located to capture and treat runoff from all disturbed areas of the project before discharging to the receiving environment. Basins are proposed to be located at the northern end of the project site and 3 basins located on the eastern side of Richmond Road within the construction compound.***	Construction contractor	Sediment basins	

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
H4	Contaminants entering receiving environments during construction	Control measures to minimise the risk of water pollution will be included in the ESCP. The following measures will be included to limit sediment and other contaminants entering receiving waterways: • No stockpiles of materials or storage of fuels or chemicals will be located adjacent to the existing culverts • Vehicles and machinery will be properly maintained to minimise the risk of fuel/oil leaks • Routine inspections of all construction vehicles and equipment will be undertaken for evidence of fuel/oil leaks • All fuels, chemicals and hazardous liquids will be stored within an impervious bunded area in accordance with Australian standards and NSW EPA Guidelines • All water discharges will be undertaken in accordance with Transport for NSW's Water Discharge and Re-use Guideline • Emergency spill kits will be kept on-site at all times. All staff will be made aware of the location of the spill kit and be trained in its use • ***Provision of sandbag at five locations on the drainage plans so that stormwater channel can be temporarily bunded to contain any accidental spills and protect downstream sensitive receiving environments*** • Construction plant, vehicles and equipment will be refuelled off-site, or in designated re-fuelling areas located at a minimum distance of 50 metres from drainage lines or waterways • Groundwater encountered during the construction of the proposal will be managed in accordance with the requirements of the Waste Classification Guidelines (DECCW 2009) and Transport for NSW's Water Discharge and Re-use Guideline • Stabilised surfaces will be reinstated as quickly as practicable after construction • Material transport from site to surrounding pavement surfaces will be minimised Soil and water management measures will be identified in consultation with relevant government agencies and Councils and will be consistent with the principles and practices detailed in Managing Urban Stormwater: Soils and Construction, 2004 (known as the blue book).	Construction contractor	Construction	

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
H7	***Flood management during construction***	***A Flood Management Plan will be prepared before construction. This plan will include:*** • ***Review and coordination with existing local flood plans and evacuation procedures*** • ***Flood emergency preparation, response, and recovery measures which will be implemented during construction*** • ***Procedure for daily review of the Bureau of Meteorology website*** ***Site protection measures to be implemented before and in the event of flooding.***	***Construction contractor***	***Pre-construction/ construction***	***Additional safeguard***
H8	***AS3 stockpiles site***	***No long-term material stockpiles, equipment storage or construction buildings are to be located with the 1% AEP flood level at site AS3 and swale drainage system.***	***Construction contractor***	***Construction***	***Additional safeguard***
Topography, geology, soils and contamination					
SC1	Accidental spill	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the ~~Roads and Maritime Code of Practice for Water Management (RTA, 1999) and~~ relevant ***Transport for NSW*** and EPA guidelines. The plan will 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).	Contractor	Detailed design/Pre-construction	Section 4.3 of QA G36 Environment Protection
SC2	Stockpile management	Stockpiles will be designed, established, operated and decommissioned in accordance with the ***relevant Transport for NSW guidelines.*** ~~Roads and Maritime Stockpile Site Management Guideline 2015.~~	Construction contractor	Construction	Additional standard safeguard
SC3	Soil stabilisation and restoration	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with: • Landcom's Managing Urban Stormwater: Soils and Construction series • ***Relevant Transport for NSW landscape and batter stabilisation guidelines*** • ~~RTA Landscape Guideline~~ • ~~Roads and Maritimes' Guideline for Batter Stabilisation Using Vegetation (2015).~~	Construction contractor	Construction	Additional standard safeguard
SC4	Land contamination	'Unexpected finds protocol' must be incorporated in the CEMP.	Construction contractor	Construction	Additional standard safeguard
SC5	Groundwater	If groundwater is encountered during excavations and dewatering is undertaken, water should be tested and disposed of at an appropriately licensed facility	Construction contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
Aboriginal heritage					
AH1	Aboriginal heritage management plan	An Aboriginal Heritage Management Plan (AHMP) will 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 will provide specific guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Construction contactor	Detailed design/pre-construction	Section 4.9 of QA G36 Environment Protection
AH2	Impacts to Aboriginal heritage	Construction within the Clydesdale property must be undertaken in accordance with the measures relating to Aboriginal heritage in the Clydesdale Estate Conservation management Plan (GBA Heritage 2016).	Construction contractor	Construction	Section 4.9 of QA G36 Environment Protection
AH3	Permit to harm	Consult with relevant AHIP holders to complete the proposed works in these areas under their respective permits. Any works undertaken within existing AHIP areas must be undertaken in accordance with AHIP conditions.	Transport for NSW	Pre-construction	Additional safeguard
AH4	Item protection	MPAS6 (AHIMS 45-5-5003) and C-ST-1 (AHIMS 45-5-2753) must be demarcated on the AHMP, and temporary fencing installed along the proposal boundary at this location to ensure no inadvertent impact.	Construction contractor	Construction	Additional safeguard
AH5	Unexpected finds	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Roads and Maritime 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 will only re-commence once the requirements of that Procedure have been satisfied.	Construction contactor	Construction	Section 4.9 of QA G36 Environment Protection
AH6	Induction	All personnel working on site will receive training to ensure awareness of requirements of the AHMP and relevant statutory responsibilities. Site-specific training will be given to personnel when working in the vicinity of identified Aboriginal heritage items.	Construction contractor	Construction	Additional standard safeguard AH3
AH7	Additional Aboriginal heritage impacts	All personnel working on site will receive training to ensure awareness of requirements of the AHMP and relevant statutory responsibilities. Site-specific training will be given to personnel when working in the vicinity of identified Aboriginal heritage items.	Transport for NSW	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
Landscape character and visual					
LC1	Urban design	The Design Principles and Concept Design Strategy provided in Urban Design, Landscape Character and Visual Impact Assessment (Tract, 2020) form the basis of future design development including: • Reinstate visual buffer planting between Richmond Road and nearby residential properties • Screen and allow views consistent with the plan for Clydesdale Estate • Maximise tree planting in the verges around intersections to maintain or reinstate the character of the road corridor.	Transport for NSW	Detailed design/pre-construction	Additional safeguard
LC2	Urban Design	Blacktown City Council, Eyes on Blacktown – Landscape Design Manual and SP2 Landscape Design Principles; and Transport for NSW Urban Design Policy (Beyond the Pavement)' and Urban Design Guidelines will be used to guide design development of the proposal.	Transport for NSW	Detailed design/pre-construction	Additional safeguard
LC3	Signage	• Signage is to be installed in accordance with the requirements of standards • Signage is kept to a minimum • Avoidance of signage structures on the skyline and within key views and vistas by considering placement or the incorporation of landscape beyond the structure as a backdrop.	Transport for NSW	Detailed design/pre-construction	Additional safeguard
LC4	Lighting	• Limit extent of lighting • Lighting will be designed to minimise light spill into residential properties and sensitive receptors in accordance with AS4282-1997.	Transport for NSW	Detailed design	Additional safeguard
LC5	Lighting	Temporary lighting will be sited and designed to avoid light spill into residential properties and identified sensitive receptors.	Construction Contractor	Construction	Additional safeguard
LC6	Barriers	Minimise the use of safety barriers and pedestrian fencing where possible.	Transport for NSW	Detailed design	Additional safeguard
LC7	Visual impact of work sites	Proposal work sites, including construction areas and supporting facilities (such as storage compounds and offices) will be managed to minimise visual impacts, including appropriate fencing or screening (eg. use of shade cloth), storage of equipment, parking, stockpile screening and arrangements for the storage and removal of rubbish and waste materials.	Contractor	Construction	Additional safeguard
LC8	Visual impact of work sites	Compound and ancillary facilities will be decommissioned and the sites rehabilitated to their existing condition or as otherwise agreed with the landowner as soon as possible.	Construction contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
LC9	Earthworks	Integrate with adjoining landform through adoption of appropriate grades, avoiding sharp transition in profile (where possible).	Transport for NSW	Detailed design	Additional safeguard
LC10	Earthworks	Stabilise/revegetate as works progress to limit erosion and visual impacts through early integration with surrounding vegetation.	Construction contractor	Construction	Additional safeguard
LC11	Retention of existing vegetation	• Avoid impact to prominent trees and vegetation communities where possible • Existing threatened species will be retained and protected wherever possible • Minimise clearance extent where possible	Transport for NSW	Detailed design	Additional safeguard
LC12	Retention of existing vegetation	Clearly define clearance limits and exclusion zones to protect vegetation cover	Construction contractor	Construction	Additional safeguard
LC13	Revegetation	• Replanting to respond to existing communities and landscape character • Utilise local provenance material • Provide screen planting within corridor to limit visibility of the proposal from adjoining residential properties • Screen and allow views consistent with the CMP for Clydesdale Estate	Transport for NSW	Detailed design	Additional safeguard
LC14	Revegetation	• Progressively implement revegetation works to limit erosion and to establish vegetation • Utilise cleared material as part of revegetation works.	Construction contractor	Construction	Additional safeguard
LC15	Tree Removal	Trees to be removed will be identified on the detailed landscape plan to be shared with Council.	Transport for NSW	Detailed design	Additional safeguard
LC16	Maintenance	Transport for NSW to liaise with Council regarding finalisation of the detailed landscape design	Transport for NSW	Pre-construction	Additional safeguard
LC17	Irrigation	Consideration will be given to passive irrigation of landscaping during detailed design	Transport for NSW	Detailed design	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
Socio-economic, land use and property					
SE1	Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will 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. The CP will be prepared in accordance with ~~the Community Involvement and Communications Resource Manual (RTA, 2008)~~ ***relevant Transport for NSW community engagement guidelines and in consultation with the Transport for NSW community engagement team.***	Contractor	Pre-construction	Core standard safeguard SE1
SE2	Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012) and the Land Acquisition (Just Terms Compensation) Act 1991.	Transport for NSW	Pre-construction and construction	Additional safeguard
SE3	Property acquisition and lease	All partial acquisitions and associated property adjustments will be carried out in accordance with the requirements of the Land Acquisition (Just Terms Compensation) Act 1991 and the Land Acquisition Reform 2016 in consultation with landowners. Transport for NSW will offer a Personal Manager for each acquisition and consult with affected property owners to ensure they understand the acquisition process and are aware of the potential adjustments required to properties as part of the proposal.	Transport for NSW	Prior to construction	Additional safeguard
Air quality					
AQ1	Impacts on air quality during construction	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • Potential sources of air pollution • Air quality management objectives consistent with any relevant published EPA and/or OEH 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 disturbed areas.	Contractor	Detailed design/pre-construction	Section 4.4 of QA G36 Environment Protection
AQ2	Dust emissions during construction	Incorporates the air quality measures below into the Construction Environmental Management Plan (CEMP) prepared for the Proposal.	Construction contractor	Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
AQ3	Dust emissions during construction	Site planning and work practices: • Plan site activities so that machinery and dust causing activities are located away from receptors, as far as is possible • Ensure all vehicles, plant, and equipment operate in a proper and efficient manner • Switch off all vehicles, plant and equipment when not in-use for extended periods of time • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable • Minimise drop heights from loading and handling equipment • Implement the use of water-carts for dust suppression where necessary to prevent off-site dust emissions • Review and modify activities as appropriate to mitigate the level of dust generated during inclement weather conditions • Installation of perimeter screening around long-term compound sites and storage areas • Regularly water stockpiles and wherever possible and practical, limit the quantity of dispersive materials stored on-site • Reduce or halt stockpiling activities during inclement weather conditions. • Limit the amount of cleared and exposed areas to the extent practical.	Construction contractor	Prior to and during construction	Additional safeguard
AQ4	Dust emissions during construction	Haulage of materials: • In the event that material tracking onto roads is identified a street sweeper should be provided on-site and deployed on an as needed basis. Rumble grids should also be considered should tracking be a persistent problem • Haulage vehicles should be regularly cleaned and should not be arriving at site with loose material. Where issues arise, additional off-site cleaning should be implemented associated with the wider proposal • Ensure that all loads are covered Impose and signpost suitable maximum on-site speed limits to limit the generation of dust.	Construction contractor	Prior to and during construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
AQ5	Dust emissions during construction	Community consultation: • Implement a stakeholder communications plan that includes community engagement before work commences • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the applicable determining authority when requested • Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation.	Construction contractor	Prior to and during construction	Additional safeguard
AQ6	Dust emissions during construction	Inspections and adaptive measures: • Carry out regular site inspections to monitor compliance with the AQMP, record inspection results, and make these records available to the determining authority as requested • Increase the frequency of site inspections by the person accountable for air quality and dust issues on-site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Construction contractor	During construction	Additional safeguard
Other impacts					
OI1	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will 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 will 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.	Contactor	Detailed design/pre-construction	Section 4.2 of QA G36 Environment Protection

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
OI2	Utilities	Prior to the commencement of work: • The location of existing utilities and relocation details will 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 will be undertaken.	Contactor	Detailed design/pre-construction	Additional safeguard

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Richmond Road Upgrade, Marsden Park and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by underlined and/or struck out font.

Table 7-2: Summary of licensing and approval required

Instrument	Requirement	Timing
Roads Act 1993	A Road Occupancy Licence would need to be obtained as necessary prior to construction commencing that impact on roads.	Prior to start of the activity
Heritage Act 1977 (s60)	Permit to carry out activities within the curtilage of the Clydesdale Estate SHI from the Heritage Council of NSW.	Prior to start of the activity
National Parks and Wildlife Act 1974 (s90)	Transport for NSW would consult with relevant AHIP holders to complete the proposed work in these areas under their respective permits. Any work carried out within existing AHIP areas must be undertaken in accordance with AHIP conditions.	Prior to start of the activity

8. Conclusion

This chapter provides the justification for the proposed modification taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposed modification is in the public interest. The proposed modification is also considered in the context of the objectives of the EP&A Act, including the principles of the ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

Richmond Road is one of the main north-south arterial roads for Sydney's north west, providing a vital link for freight and commuters between Blacktown and Richmond. Richmond Road forms part of the wider arterial network, from the M7 Motorway to new housing and employments precincts in the NWGA.

The proposed modification would enhance the connections to the surrounding road network through updated tie-ins and provision for a future connection to the duplication of Richmond Road to the north of the project. The proposed modification addresses current traffic modelling and driving concerns, improving the experience for commuters using Richmond Road.

While there would be some environmental impacts as a consequence of the proposed modification such as temporary traffic delays, water quality impacts and vegetation clearance, they have been avoided or minimised wherever possible through design and site-specific safeguards. The benefits of improved traffic outcomes and a constructible project are considered to outweigh mostly temporary adverse impacts and risks associated with the proposed modification.

8.1.1 Social factors

As documented in Section 6.9, the social impacts of the proposed modification are mostly consistent with the project REF.

Provision for an alternative ancillary site would negate short-term social impacts on existing residences which are currently within the project area. The proposed modification would also improve drivability and travel efficiency, providing long-term social benefits.

8.1.2 Biophysical factors

Construction of the proposed modification would require the removal of an additional:

- 0.03 hectares of Cumberland Plain Woodland Critically Endangered Ecological Community under BC Act on non-certified land
- 0.93 hectares of a mix of mature, native tree species on non-certified land
- 5.11 hectares of non-native highly disturbed areas on non-certified land
- 0.44 hectares of land occupied by *Grevillea juniperina* subsp. *Juniperina* on non-certified land
- 0.96 hectares of suitable foraging habitat for various species listed on the BC Act and EPBC Act
- 0.03 hectares of suitable foraging habitat for the Cumberland Plain Land Snail.

This additional vegetation removal is not likely to significantly impact threatened species, populations or ecological communities or their habitats. However, as per the Guideline for Biodiversity Offsets (RMS, 2016), 0.03 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion and 1.41 hectares of Cumberland Plain Land Snail habitat that would be impacted would need to be offset.

Safeguards and management measures, as outlined in Section 7.2, would be implemented to avoid and mitigate any impacts on biodiversity and heritage.

8.1.3 Economic factors

The proposed modification would deliver long-term economic benefits by improving connectivity between Richmond Road, the surrounding road network and the future road network. By facilitating general constructability of the project, the

proposed modification enables the flood evacuation route to be built and would reduce the duration of road closures during future flood events.

8.1.4 Public interest

The proposed modification is considered to be in the public interest as it would improve drivability, provide for a future connection to the duplication of Richmond Road and facilitate constructability of the project.

8.2 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.	The proposed modification would improve the social and economic welfare of the community by improving drivability and enhancing connections to existing and future roads. The proposed modification improves flood resilience by providing an improved evacuation route. Safeguards and management measures have been outlined in Section 7.2 to allow for the proper management, development and conservation of the State's natural and other resources.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Sections 8.3.1. In summary the proposed modification: • Would minimise environmental and social impact by avoiding Aboriginal heritage and threatened species (conservation of biological diversity and Aboriginal heritage) • Would benefit future generations by providing for a future connection to the duplication of Richmond Road to the north of the project (intergenerational equity) • Has considered environmental and social issues in the options process and incorporated the value upon environmental resources (improved valuation, pricing and incentive mechanisms).
1.3(c) To promote the orderly and economic use and development of land.	Consistent with Section 8.2 of the project REF.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposed modification.
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.	Impacts to native animals and plants, including threatened species, populations and ecological communities and their habitats are considered in Section 6.4. The proposed modification would impact about 0.03 hectares of a critically endangered ecological community, 0.93 hectares of a mix of mature, native vegetation tree species and 0.44 hectares of land occupied by *Grevillea juniperina* subsp. *Juniperina* on non-certified land. Assessments of significance carried out as part of the Addendum Biodiversity Assessment (Jacobs, 2025c) found that the proposed modification would be unlikely to significantly impact on threatened species, populations or ecological communities. However, as per the Guideline for Biodiversity Offsets (RMS, 2016), 0.03 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion and 1.41 hectares of Cumberland Plain Land Snail habitat that would be impacted would need to be offset. The offset and safeguards and management measures identified within the project REF are considered sufficient in mitigating biodiversity impacts.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Consistent with Section 8.2 of the project REF.

Object	Comment
1.3(g) To promote good design and amenity of the built environment.	Not relevant to the proposed modification.
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 proposed modification.
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 proposed modification.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The proposed modification process has involved consultation with relevant stakeholders. Consultation carried out to date and proposed consultation is outlined in Chapter 5.

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 process on which life depends. The principles of ESD have been an integral consideration throughout the development of the proposed modification.

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. This principle states: "*if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*".

This principle was considered during route options development (refer to Section 2.4). The precautionary principle has guided the assessment of environmental impacts for this addendum REF and the development of mitigation measures in the following ways:

- Best available technical information, environmental standards and measures have been used to minimise environmental risks
- The proposed modification design was refined to minimise vegetation clearance, with particular consideration of sensitive areas
- Proposed modification design was refined to avoid potential damage to known items or areas of cultural significance
- Conservative 'worst case' scenarios were considered while assessing environmental impact
- Specialist studies were incorporated to gain a detailed understanding of the existing environment.

8.3.2 Intergenerational equity

Intergenerational equity is concerned with the distribution of economic, social and environmental costs and benefits. The principle states: "*the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*".

The intergenerational equity principle has guided the assessment of environmental impacts for this addendum REF and the development of mitigation measures in the following ways:

- A construction footprint that minimises vegetation clearance within sensitive ecological areas to ensure that such areas are conserved for future generations has been selected
- Water quality and hydrological measures were included into the design to ensure that the impacts on the distribution of flood waters were minimised both for the short and long term

- An Aboriginal cultural heritage assessment, including consultation with the local Aboriginal community, was carried out during the environmental assessment phase to avoid or minimise the potential for irreparable damage to occur to Aboriginal cultural heritage during the construction
- A future connection for the duplication of Richmond Road to the north of the project has been provided, facilitating long-term benefits of the flood evacuation route

8.3.3 Conservation of biological diversity and ecological integrity

This principle states: "*the diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival*".

The proposed modification is located in an area that has previously been modified as a result of the construction of the Marsden Park Precinct and nearby agricultural activities. However, remnant areas of native vegetation and associated habitats remain next to the existing road.

A key objective of the proposed modification is to minimise adverse impacts on the environmental values of the area. Conservation of biological diversity and ecological integrity has been considered during all stages of the proposed modification's development. Potential impacts have been avoided where possible and safeguards and management measures have been included where necessary.

The biodiversity assessment (refer to Section 6.4 and Appendix F) concluded that the proposed modification would not have a significant impact on threatened species, populations or ecological communities. The findings of the biodiversity assessment indicate that the potential impacts would be acceptable and minimised through the proposed safeguards.

8.3.4 Improved valuation, pricing and incentive mechanisms

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

This principle is defined as:

improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

i. *polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
ii. *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
iii. *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

Environmental and social issues were considered in the strategic planning and establishment of the need for the proposed modification, and in consideration of various proposal options. The value placed on environmental resources is evident in the extent of the planning and environmental investigations, and in the design of the proposed mitigation measures and safeguards including:

- Environmental issues were considered as key matters in the options selection process and in the economic and financial feasibility assessments for the proposed modification
- Minimising the division of individual properties and the subsequent potential economic impacts on affected property owners were considered
- The economic value of facilitating constructability of the project was recognised.

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 modification.

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 Federal 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 water quality. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also facilitate the constructability of the project, improve drivability concerns and tie in effectively with surrounding development. 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 project submissions report. It 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.

Tanmay Kulkarni
Environmental Scientist
Jacobs

Date: 15 April 2025

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

Anthony Dillon
Project Manager
Roads and Active Transport Projects

Date:

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?	Yes

11. Terms and acronyms used in this addendum REF

Term /acronym	Description
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AFL	Australian Football League
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AHMP	Aboriginal Heritage Management Plan
ANZG	Australian and New Zealand Guidelines
AOBV	Areas of outstanding biodiversity value
AQMP	Air quality management plan
AREF	Addendum review of environmental factors
AS1	Construction compound that has been relocated from the western side of Richmond Road to the eastern side
AS2	Compound area to support construction activities, located off Bolwarra Drive. Likely to include parking and potentially materials storage.
AS3	New stockpile area located north of South Creek
ASS	Acid sulfate soils
BC Act	*Biodiversity Conservation Act 2016 (NSW).*
BDAR	Biodiversity Development Assessment Report
BOM	Bureau of Meteorology
CBD	Central business district
CEEC	Critically Endangered Ecological Community
CEMP	Construction / Contractor's environmental management plan
CMNE(R)	Construction and Maintenance Noise Estimator (Roads)
CMP	Conservation management plan
CNVG(R)	EMF-NV-GD-0056 Construction Noise and Vibration Guideline (Roads)
CSEP	Community and Stakeholder Engagement Plan
CTMP	Construction Traffic Management Plan
dB	Decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (now Department of Climate Change, Energy, the Environment and Water)
DECCW	Department of Environment, Climate Change and Water (now Department of Climate Change, Energy, the Environment and Water)
DGV	Default guidelines value
DL	Detection limit
DoS	Degree of saturation
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPI	Department of Planning and Infrastructure (now Department of Planning, Housing and Infrastructure)
DPIE	Department of Planning, Industry and Environment
EIA	Environmental impact assessment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
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.
EPL	Environmental Protection Licence

Term /acronym	Description
ESCP	Erosion and Sediment Control Plan
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
EY	Exceedance per year
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater dependent ecosystem
HBTs	Hollow-bearing trees
HIS	Heritage interpretation strategy
Heritage Act	*Heritage Act 1977* (NSW)
ICNG	Interim Construction Noise Guideline
ICOMOS	International Council on Monuments and Sites
LCZ	Landscape character zone
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local government area
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
MNES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
MPNP	Marsden Park North Precinct
NAHMP	Non-Aboriginal Heritage Management Plan
NCA	Noise Catchment Area
NML	Noise management level
NPfI	Noise Policy for Industry (NSW EPA, 2017)
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW EPA	NSW Environment Protection Authority
NTU	Nephelometric turbidity units
NVIA	Noise and Vibration Impact Assessment
NVMP	Noise and Vibration Management Plan
NWGA	North West Growth Area
NWGC	North West Growth Centre
NWPGA	North West Priority Growth Area
OOHW	Out of Hours Work
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PCT	Plant Community Type
PMF	Probable maximum flood
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997*
project area	The project area identified and assessed in the Richmond Road Upgrade, Marsden Park submissions report, dated April 2021 and published with minor amendments in December 2024
project REF	Richmond Road Upgrade, Marsden Park REF, dated October 2020
project submissions report	Richmond Road Upgrade, Marsden Park submissions report, dated April 2021
proposed modification	Modification of Richmond Road Upgrade, Marsden Park as described in the project description
proposed modification area	The footprint for the addendum REF
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Transport for NSW.
RBL	Rating background level
RFS	NSW Rural Fire Service
RNCG	EMF-NV-GD-0025 Road Noise Criteria Guideline
RNMG	EMF-NV-GD-0024 Road Noise Mitigation Guideline
RNMVG	EMF-NV-GD-0026 Road Noise Model Validation Guideline
RNP	Road Noise Policy
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all functions are now managed by Transport for NSW
ROL	Road occupancy licence
RUSLE	Revised Universal Soil Loss Equation

Term /acronym	Description
SALIS	NSW Soil and Land Information System
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
SES	State Emergency Service
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
stockpile area	New stockpile area located north of South Creek
Submissions report footprint	The construction footprint identified in the Richmond Road Upgrade, Marsden Park Submissions Report, dated April 2021
SVTM	NSW State Vegetation Type Map
SWL	Sound power level
SWMP	Soil and Water Management Plan
TBDC	NSW Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
TSS	Total suspended solids
WQOs	Water quality objectives
WMP	Waste Management Plan
WPCA	Western Parkland City Authority
WPCA Act	*Western Parkland City Authority Act 2018*
WQO	Water quality objective

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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* (DUAP, 1996) 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? Impacts on the community are mostly consistent with the project REF. However, due to the progress in residential development in Marsden Park, more properties may be impacted by the proposed modification. This includes properties between Bolwarra Drive and St Philips Place. Properties next to AS3 may also experience changes in visual amenity, noise and dust from construction activities due to the presence of the stockpile site. Safeguards and management measures identified in the project REF are considered sufficient to mitigate these impacts.	Short-term, minor, negative impact
Any transformation of a locality? The transformation of the locality is consistent with Appendix A of the project REF.	No additional impact
Any environmental impact on the ecosystems of the locality? The proposed modification would impact about 0.03 hectares of a critically endangered ecological community, 0.93 hectares of native vegetation and 0.44 hectares of land occupied by *Grevillea juniperina* subsp. *Juniperina* on non-certified land. Assessments of significance carried out as part of the Addendum Biodiversity Assessment (Jacobs, 2025c) found that the proposed modification would be unlikely to significantly impact on threatened species, populations or ecological communities. As per the Transport for NSW Biodiversity Policy, 0.03 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion that would be impacted would need to be offset. Otherwise safeguards and management measures identified within the project REF are considered sufficient in mitigating biodiversity impacts.	Long term, minor negative impact
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? Impacts to the aesthetic, recreational, scientific or other environmental quality or value of the locality are consistent with Appendix A of the project REF.	No additional impact
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 will further encroach on the State heritage listed item, Clydesdale – House, Barn, Cottage and Farm Landscape. However, the proposed modification would not physically impact the homestead or any built structures. The proposed modification would not directly impact any known Aboriginal objects or sites. The proposed would include work within one existing AHIP area.	Long term, minor, negative Long term, minor, negative
Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposed modification would impact about 0.96 hectares of suitable foraging habitat for protected fauna. Safeguards and management measures outlined in Section 6.4.5 of the project REF are considered sufficient to mitigate these impacts.	Long term, minor, negative
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 is not anticipated to endanger any species of animal, plant or other form of life. Biodiversity impacts associated with the proposed modification would be mitigated through the implementation of safeguards outlined in Section 6.4.5 of the project REF.	Nil
Any long-term effects on the environment?	

The proposed modification would have a long-term impact on the existing environment through permanent clearance of 0.96 hectares of native vegetation in non-certified areas. During operation, new culverts may also increase flow velocity. Increased impervious area may lead to additional pollutant loads in the downstream environment. Safeguards and management measures have been outlined in Section 6.5.4 to mitigate these impacts.	Long term, minor, negative
Any degradation of the quality of the environment? The proposed modification has the potential to degrade the quality of the environment through noise, dust, sedimentation and accidental spills during construction. Management measures outlined in Section 7.2 would be implemented to mitigate potential impacts.	Short-term, minor, negative
Any risk to the safety of the environment? Risks to the safety of the environment are consistent with Appendix A of the project REF.	Nil
Any reduction in the range of beneficial uses of the environment? The proposed modification would not result in any reduction in the range of beneficial uses of the environment.	Nil
Any pollution of the environment? The proposed modification may cause additional pollution of waterways, particularly during construction. However, the potential impacts would be minimized with the implementation of safeguards outlined in Section 7.2.	Short term, minor, negative
Any environmental problems associated with the disposal of waste? No environmental problems associated with the disposal of waste are expected as a result of the proposed modification.	Nil
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposed modification would not create any significant demand on resources.	Nil
Any cumulative environmental effect with other existing or likely future activities? The cumulative environmental effect of the proposed modification is consistent with Appendix A of the project REF.	No additional impact
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification would not impact coastal processes and coastal hazards.	Nil
Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1. The proposed modification remains consistent with relevant strategic plans as discussed in Section 2.1.2 of the project REF.	N/A
Other relevant environmental factors	In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Section 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?	Nil
Any impact on a National Heritage place?	Nil
Any impact on a wetland of international importance?	Nil
Any impact on a listed threatened species or communities? The proposed modification would impact about 0.96 hectares of suitable foraging habitat for the Large-eared Pied Bat (listed as endangered under the EPBC Act), Swift Parrot (listed as critically endangered under the EPBC Act) and the Grey-headed Flying Fox (listed as vulnerable under the EPBC Act). Impacts on these species are not considered to be significant and would be mitigated through management measures outlined in Section 6.5.4 of the project REF.	Long term, minor, negative
Any impacts on listed migratory species?	Nil
Any impact on a Commonwealth marine area?	Nil
Does the proposed modification involve a nuclear action (including uranium mining)?	Nil
Additionally, any impact (direct or indirect) on Commonwealth land?	Nil

Appendix B

Statutory consultation checklists

SEPP (Transport and Infrastructure)

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	N/A	Section 2.110
Bus depots	Does the project propose a bus depot?	No	N/A	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	N/A	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	N/A	Section 2.14

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	N/A	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?	Yes	Blacktown City Council Hawkesbury City Council Penrith City Council	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	N/A	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	N/A	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	N/A	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?	Yes	Blacktown City Council Hawkesbury City Council Penrith City Council	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	N/A	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?	Yes	Blacktown City Council Hawkesbury City Council Penrith City Council	Section 2.12

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? (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	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	N/A	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	N/A	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	N/A	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	N/A	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	N/A	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	N/A	Section 2.15
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).	No	N/A	Section 2.15
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No	N/A	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*)?	Yes	Department of Planning and Environment	Section 3.24