Transport
for NSW

Richmond Road Upgrade between M7 Motorway and Townson Road, Marsden Park

Review of Environmental Factors

November 2024

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which the Richmond Road Upgrade between M7 Motorway and Townson Road, Marsden Park is proposed.

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

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

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

Approval and authorisation

Title	Richmond Road Upgrade between M7 Motorway and Townson Road, Marsden Park: Review of Environmental Factors
Accepted on behalf of Transport for NSW by:	Maddy Mukerjee Project Development Manager
Signed	Maddy Mukerjee
Date:	21 November 2024

Executive summary

The proposal

Transport for NSW (Transport) proposes to upgrade Richmond Road between the M7 Motorway and Townson Road, Marsden Park. Key features of the proposal would include:

- Upgrade of Richmond Road between the M7 Motorway and Townson Road to six lanes (three lanes in each direction). This would include:
    - road widening between the M7 Motorway and the Alderton Drive / Langford Drive intersection including a new bridge structure over Bells Creek
    - widening into the median from the Alderton Drive / Langford Drive intersection to 250 metres north of the Hollinsworth Road / Townson Road intersection.
- Building a new flyover bridge from the M7 Motorway Rooty Hill Road North off-ramp landing on Richmond Road around 300 metres prior to Bells Creek. This would include:
    - a single lane bridge structure around 250 metres long and 8.4 metres wide for traffic heading northbound on Richmond Road
    - 170 metre embankment at the southern end of the bridge beginning at the M7 Motorway Rooty Hill Road North off-ramp, roughly five metres above the existing ground level
    - 150 metre long retaining wall located at the northern end of the bridge within the median of Richmond Road. At its highest point the retaining wall would be 8.4 metres high
    - minor re-surfacing of the existing M7 Motorway Rooty Hill Road North off-ramp where the ramp ties into the new flyover
    - no changes to existing gantry, exit lanes or lane functions on the M7 Motorway.
- Upgrades to the intersection of Richmond Road, Hollinsworth Road and Townson Road including:
    - an additional northbound through lane along Richmond Road (providing three through lanes towards Richmond)
    - an additional dedicated right turn lane from Richmond Road southbound onto Hollinsworth Road
    - a new left turn slip lane from Hollinsworth Road onto Richmond Road including a pedestrian island and crossing
    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Langford Drive and Alderton Drive including:
    - additional northbound and southbound through lanes along Richmond Road (providing three through lanes in both directions)
    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Rooty Hill Road North and the M7 Motorway ramps including:
    - two dedicated lanes on Richmond Road heading onto the M7 Motorway (southbound on-ramp)
    - two dedicated southbound through lanes on Richmond Road (towards Blacktown)
    - an additional right turn lane from Richmond Road southbound onto Rooty Hill Road North (providing two dedicated right turn lanes onto Rooty Hill Road North)
    - extension of 10 metres for the left turn lane from Richmond Road southbound onto M7 Motorway northbound on-ramp

    - relocation of the existing pedestrian crossing on Richmond Road approximately 160 metres south. This would be a new staged pedestrian crossing across Richmond Road, with a pedestrian refuge in the median at the intersection of Richmond Road and the M7 Motorway southbound on-ramp.
- Active transport provisions throughout the proposal area including:
    - moving the existing shared pedestrian and bike path on the western side of Richmond Road to be further west. This would be a four metre wide shared pedestrian and bike path on the western side of Richmond Road (between the M7 Motorway to approximately 150 metres south of the Richmond Road / Langford Drive / Alderton Drive intersection) where it would connect to the existing shared path.
- Building a new concrete bridge structure over Bells Creek for the northbound carriageway located approximately 14 metres west of the existing Bells Creek bridge. This would include:
    - a bridge structure around 29 metres long and 18 metres wide
    - three northbound travel lanes
    - a shared pedestrian and bike path on the western side, which replaces the existing boardwalk bridge next to the northbound Richmond Road carriageway.
- Retention of the five bus stops on Richmond Road between Yarramundi Drive and the Richmond Road / Hollinsworth Road / Townson Road intersection. The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road are also retained.
- Drainage and water quality structures along the proposal including:
    - adjustments to the pits and pipes of the existing stormwater network
    - two gross pollutant traps to the north and south of Bells Creek
    - open flooding channel on the eastern side of Richmond Road roughly between the M7 Motorway northbound on-ramp and Bells Creek for flood mitigation purposes. The channel would be around 425 metres long and 10 metres wide and would discharge into Bells Creek.
- Roadside furniture including safety barriers, signage, line marking, lighting and fencing.
- Earthwork cutting, embankments and retaining walls to accommodate the widened road alignment, flyover bridge and open flooding channel.
- Modified formal access to four properties along the upgraded sections of Richmond Road.
- Installation of a formal driveway access to the Blacktown Native Institution property within the Rooty Hill Road North road corridor, and removal of the informal access track to the property from Richmond Road.
- Property acquisition including full acquisition of one property and partial acquisition of two properties.
- Rehabilitation of disturbed areas and landscaping.
- Establishment and use of three temporary ancillary facilities during construction.

The construction for the proposal would be undertaken in two stages with the following expected durations, weather permitting:

- Stage 1 Northern section – expected to commence at the end of 2025 and take around 12 months to complete
- Stage 2 Southern section – expected to commence at the end of 2026 and take around 24 months to complete.

Need for the proposal

The NSW Government established the North West Growth Area (NWGA) as a location for greenfield urban growth including housing, employment, shops, health and education facilities, parks and bushland. The rezoning and subsequent population growth in the NWGA through rapid developments such as Marsden Park North and West Schofields have led to increasing congestion on road infrastructure in the area. According to 2056 forecasts when developed, the NWGA will provide approximately 90,000 homes accommodating 250,000 people.

To unlock the potential of the NWGA, a *Road Network Strategy* (TfNSW, 2015) was prepared and includes proposed upgrades of transport infrastructure to align with current needs while considering the forecasted population and economic growth. The proposal (Richmond Road Upgrade between M7 Motorway and Townson Road, Marsden Park) forms part of Transport's Road Network Strategy to support development in the fast growing NWGA.

Richmond Road is a key north-south state arterial road corridor that forms part of the wider road transport network connecting residential, commercial, industrial and social land uses in north-west Sydney. The proposal provides a vital gateway link for freight and commuters between Blacktown, Richmond and Windsor. Richmond Road is also part of the flood evacuation road network for the Hawkesbury-Nepean Valley.

The M7 Motorway runs through the southern fringe of the proposal area, and the proposal includes upgrades to both the northbound off-ramp and the southbound on-ramp access lanes. The M7 Motorway serves as a key link between north-west Sydney, Parramatta and the central business district (CBD), and will also connect north-west Sydney residents with the new M12 Motorway and the Western Sydney Airport to the south.

Road users currently experience heavy congestion, slow travel times and significant delays when travelling on Richmond Road through the proposal area. Historical crash clusters have been recorded to be below the NSW benchmark as a result of the slow moving queues through intersections on Richmond Road.

A key pinch point of the NWGA is the intersection of Richmond Road and Rooty Hill Road North in the proposal area. People driving on the M7 Motorway wishing to travel north towards Richmond currently need to exit via the M7 Motorway Rooty Hill Road North off-ramp through a signalised intersection onto Rooty Hill Road North, then through another signalised intersection to turn onto Richmond Road to continue northbound. This intersection also provides for signalised access to the M7 Motorway northbound and southbound on-ramps, and a through connection to Blacktown. Each day over 89,000 vehicles travel through the Richmond Road and Rooty Hill Road North intersection, which currently exceeds capacity and experiences high delays. Traffic queues at the M7 Motorway Rooty Hill Road North off-ramp often extend into the M7 Motorway through lanes.

Overall, the road within the proposal area does not have sufficient capacity to support the everyday needs of the community today. The forecast growth and projected travel demand in NWGA will put additional pressure on the road network and delays will become exponentially worse.

The proposal would ease congestion and improve travel times for all users through increased capacity and new dedicated movement lanes and providing a northbound off-ramp connecting directly to Richmond Road (removing the need to travel through two sets of traffic signals). The proposal would also ensure this key movement corridor serves its strategic function for the growing NWGA community. The proposal would improve safety and connectivity for the communities in the north-west, making it easier to move in and around the area.

Proposal objectives

The objectives of the proposal are to:

- Reduce transport cost by improving travel times and reducing congestion.
- Support economic growth and productivity by providing road capacity for projected freight and general traffic volumes.
- Improve road safety in line with the *NSW Road Safety Strategy 2012-2021* (TfNSW, 2012a): Safe System Directions and Safer Roads Key Focus.
- Improve quality of service, sustainability and liveability.
- Minimise impacts on the environment.

Options considered

Given the broader transport network needs, constrained space and continued urban development of the NWGA, the Richmond Road corridor was considered the key north-south link proposed for upgrade. There were no alternative north-south route available for consideration.

Further, in the northern section of the proposal, previous designs and upgrades of Richmond Road provided for the future widening of the road corridor into the median to provide for three lanes in each direction. This option substantially limited impacts to surrounding properties and the environment as all works would remain within the existing kerb line. Therefore, this was the only option considered for the northern section of the proposal against the 'Do-Minimal' option. A number of design refinements were further developed around the intersections within the northern section to improve the efficiency and safety of these intersections. These refinements included things such as the staged pedestrian crossings, left turn slip lanes from side streets and upgrades to turning lane capacity.

For the southern section of the proposal, several options assessments of the proposal were undertaken during the strategic and concept design phases. Options were developed over time as more data and information became available. The strategic options included:

- 'Do-Minimal' option – this option would involve no upgrade to Richmond Road and involve routine traffic signals optimisation and ongoing maintenance of the existing road corridor.
- An 'at grade' upgrade to the intersections of the Richmond Road / Rooty Hill Road North/ M7 Motorway intersection. Four options were identified for the potential upgrade to this intersection (Options 1, 1A and 2, 2A). Ultimately these options were ruled out as the impacts on surrounding properties were not acceptable and there was limited to no improvements in the capacity of the intersection when compared to the 'Do minimal' option.
- An 'at grade' upgrade to the intersection of the M7 Motorway Rooty Hill Road North off-ramp and Rooty Hill Road North (Option 2B). A new at-grade design Option 2B was developed with reduced impacts to surrounding properties as well as some minor upgrades to the existing Richmond Road / Rooty Hill Road North intersection. This option was developed in parallel to and ultimately compared against Option 3.
- Option 3 - a new flyover bridge linking the M7 Motorway Rooty Hill Road North off-ramp to Richmond Road over Rooty Hill Road North. This option would carry traffic heading north towards Richmond.

Option 3 provided the most benefits to traffic improvements, increased capacity as well as safety improvements when compared to Option 2B and the 'Do-Minimal' options. Option 3 was chosen as the preferred option.

Once the flyover bridge was determined as the preferred option, a number of sub-options for the landing arrangements of the flyover bridge were considered. The options were:

- Option 1 – Flyover bridge landing on Richmond Road outside/kerb side lane just south of Bells Creek.
- Option 2 – Flyover bridge landing on Richmond Road within the median just south of Bells Creek.
- Option 3 – Flyover bridge landing on Richmond Road outside/kerb side lane with a future on-ramp located in the median to separately carry traffic onto the Castlereagh Connection (CC).

Each option was evaluated on how it would mitigate the identified impacts and maximise functional benefits of the proposal. The preferred landing option was selected based how it meets the need for the proposal as well as how it aligns with the objectives and assessment criteria. The preferred arrangement was Option 2 where the new flyover bridge lands on Richmond Road within the median.

As the concept design has developed a number of design refinements to the above broadscale preferred options have been developed across both sections of the proposal. These refinements have aimed to minimise impacts to the surrounding community and environment, while also providing the greatest benefits to traffic flow and capacity, road safety and pedestrian and cyclist access. Such design refinements include (but are not limited to):

- considerations around intersection arrangements, such as staged pedestrian crossings and increase turning lane capacity
- bridge designs and styles, including structural features, location of piers and abutments
- adjustments to property accesses, including the relocation of the vehicle access to the Blacktown Native Institution site
- utility and drainage designs.

In the development of each refinement, the impacts to the surrounding environment and community, as well as which best meets the proposal objectives have been considered. The result, is the concept design presented in this Review of Environmental Factors (REF). Design refinements and adjustments will continue throughout the concept and detailed design process in response to community feedback and the best outcomes for the proposal.

Statutory and planning framework

The objective of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* is to facilitate the effective delivery of infrastructure across NSW. Section 2.109 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.

The proposal is for road and road infrastructure facilities and is to be carried out on behalf of Transport. It can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from council is not required.

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

The proposal is subject to multiple biocertification processes; the northern section of the proposal is within the NGWA under *State Environmental Planning Policy (Precincts – Central River City) 2021* and the southern section of the proposal is within the Cumberland Plan Conservation Plan (CPCP) area under the *State Environmental Planning Policy (Biodiversity and Conservation) 2021*. An activity proposed to be carried out on biocertified land is taken to be an activity that is not likely to significantly affect any threatened species, populations or ecological communities, or their habitats, therefore no further assessment is required.

For areas outside the biocertification where impact assessment is required, the proposal is not likely to significantly impact threatened species, populations and ecological communities, within the meaning of the *Biodiversity Conservation Act 2016*. Eight flora species have been identified in the significance assessment as assumed presence as part of this assessment. However, seasonal targeted surveys (spring and summer) are currently underway to confirm if they are present and the significance assessment will be updated using these findings prior to the proposal being considered for determination.

The assessment of the proposal's impact, on matters of national environmental significance (MNES) and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water under the *Environment Protection and Biodiversity Conservation Act 1999*. Five identified threatened flora species were 'assumed present' as part of this assessment. However, seasonal targeted surveys (spring and summer) for these species are currently underway and the significance assessments will be updated using these findings prior to the proposal being considered for determination.

Community and stakeholder consultation

A *Community and Stakeholder Engagement Plan* (CSEP) (TfNSW, 2023a) has been prepared for the proposal to outline communications objectives, delivery methods and key stakeholders the proposal will need to consult. It details specific communications and engagement tools, key messages and processes to be implemented to inform the design of the proposal. It also presents specific communications and engagement tools, key messages and processes to support the delivery of the proposal.

Transport consulted with the community and stakeholders on early design features in June and July 2024. The community and stakeholders were encouraged to provide comment, feedback, ideas and suggestions on the concept design. The key areas of comment included proposal justification, safety concerns, property and environmental impacts and the surrounding transport network. The comments have been considered in the ongoing development of the concept design and within this REF.

Consultation with Aboriginal people has been carried out for the proposal in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS, 2011), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the requirements of section 60 of *the National Parks and Wildlife Regulation 2019*. Further to this, the Dharug Strategic Management Group (DSMG) manages the culturally sensitive land immediately adjacent to the proposal (on the north-western corner of Richmond Road and Rooty Hill Road North intersection). This Aboriginal community holds valuable knowledge and insight into the cultural significance of this area to Aboriginal people and historically to the local community. Consultation with this group has been and will continue to be undertaken throughout the development of the design of this proposal.

Consultation with key stakeholders has also been carried out throughout the development of the concept design, including with Blacktown City Council, Westlink M7, Sydney Business Park and relevant utility authorities.

In addition, Transport formally consulted with Blacktown City Council and the State Emergency Services (SES) under the requirements of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* during November 2024. The outcomes of the consultation will be considered by Transport as part of the Submissions report following the consultation period.

Transport for NSW will continue to consult and engage with residents, key stakeholders and the community during the development of the proposal and delivery of the proposal.

Environmental impacts

The main environmental impacts of the proposal are:

Traffic and transport

A Traffic and Transport Impact Assessment (TTIA) has been carried out to assess the potential traffic and transport impacts during construction and operation of the proposal for all road users.

The potential traffic and transport impacts during construction are expected to include:

- Minor and temporary increase to travel times for vehicles, buses and on-road cyclists due to changed lane configurations and reduced speed limits as a result of construction lane closures.
- Minor increase in heavy vehicles on the network in comparison to the existing traffic volumes on Richmond Road.
- Altered property access arrangements during construction.

During construction, temporary traffic arrangements would be made to ensure impacts to road users along Richmond Road are minimised as much as feasible. A Traffic Management Plan (TMP) would be prepared to minimise impacts and would include measures to address site traffic control, maintain property access and community consultation.

Traffic modelling for the years 2028 and 2038 was undertaken to assess the operational impacts of the proposal against the 'Do-Minimum' (without proposal) scenario. The modelling results identify that the proposal would have positive impacts to traffic flow with an increase network throughput, allowing the corridor to carry more traffic with less delays compared to the 'Do-Minimum' scenario. A decrease in average travel times, decrease in number of stops and increase in average speed indicates that the road users would experience a reduction in congestion within the proposal area. The proposal would either maintain or improve intersection performance in future years (2028 and 2038).

Most importantly, the proposal brings in additional capacity along the Richmond Road corridor, thus providing opportunity to avoid delays for road users in the future years.

Aboriginal cultural heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared to assess the potential Aboriginal cultural heritage impacts during construction and operation of the proposal. The assessment of Aboriginal cultural heritage has also been informed by the Connecting with Country process currently being undertaken for the proposal.

Four Aboriginal archaeological sites would be at least partially impacted by the proposal. These sites are:

- MPIP 12 (AHIMS 45-5-3741). A surface artefact scatter considered to display low archaeological value and significance. There would be a total loss of value of this site.
- Richmond Road Bells Creek AFT 1 (AHIMS 45-5-5471), Richmond Road Bells Creek AFT2 (AHIMS 45-5-5826) and Western Sydney PAD 3 (AHIMS 45-5-3322). These are surface artefact scatters with associated sub-surface deposits and are considered to display moderate significance based on the scientific value of the information. There would be a partial loss of value of these sites.

It is noted that the Richmond Road Bells Creek AFT 1 (AHIMS 45-5-5471) site is located within the State heritage listing for the Blacktown Native Institution site (SHR No. 01866). This site is located across both the Transport portion and the DSMG portion of land under this State heritage listing. Only the part of the site that is located within land owned by Transport would be impacted by the proposal and applicable salvage works.

Recovery of this information through archaeological salvage excavation would mitigate the impact of the proposal and offer an opportunity to better understand the activities which were undertaken at these sites and the effect of land use disturbance and natural processes on subsurface archaeological deposits in the vicinity of Bells Creek and associated ridges. An application for an Aboriginal Heritage Impact Permit (AHIP) would be made under section 90A of the *National Parks and Wildlife Act 1974* for the proposal.

The proposal lies on the unceded Traditional Lands of the Dharug peoples. The proposal area, including Bells Creek and its tributaries were used by Aboriginal people living in the region. Aboriginal people inhabited the area, living in groups of extended families tied to specific regions. These groups were interconnected through marriage and gathered for activities like subsistence gathering, initiations, funerals, and ritual combat.

Following colonisation of NSW, the British sought to change the social practices of Aboriginal people in the region through the establishment in 1814 of the Native Institution in Parramatta, in which Aboriginal children were taught European domestic and religious practices. In 1823, the Native Institution was moved from Parramatta to land now known as the Blacktown Native Institution, located on the north-western corner of Richmond Road and Rooty Hill Road North (within and adjacent to the proposal area). Aboriginal (and some Māori) children were institutionalised at this facility until about 1829. Part of this site was handed back to the Aboriginal community in 2018 and continues to be managed by the DSMG with plans to develop this site as a place for Aboriginal cultural connection and education. This site is the state heritage listed Blacktown Native Institution (SHR No. 01866). The curtilage of this heritage listing is located across both the DSMG owned land and land owned by Transport allocated for the future widening of Richmond Road. Therefore, this heritage curtilage would be impacted by the proposal, however, impacts to the DSMG owned portion of the heritage curtilage have been avoided.

Further significance of this area is on the north-eastern edge of the proposal area is land that has historically been granted to Colebee and Nurragingy in 1816. The first such grant to be issued to Aboriginal people, an allotment of 30 acres was granted, and a settlement developed on the land of Aboriginal families. This area became known as 'Black Town'. Impacts to this land have been avoided by the proposal.

The identified Aboriginal cultural values of the study area are both specific to the Blacktown Native Institution and a wider feeling of attachment and responsibility for the land. The study area retains significance due to its association with historical events and people. Ongoing consultation is being undertaken with the DSMG to understand the cultural sensitivities within the proposal area and adjacent lands, and how the proposal can best manage, mitigate or avoid these potential impacts.

The proposal would require the relocation of the existing informal vehicle access on Richmond Road to Rooty Hill Road North. This relocation would need to be undertaken prior to construction commencing in order to maintain vehicle access to the site. Therefore, included in this REF is a proposed interim vehicle access design along Rooty Hill Road North. Transport will continue to engage with DSMG to understand their future needs and plans for the site to determine the best location for a permanent access relocation. Further assessment for this final design may be required in the future.

Transport will consult with the DSMG to identify opportunities for co-design at the Blacktown Native Institution site with the aim to reflect the identified cultural and spiritual values and the significance of the site. These opportunities for co-design would be identified through the Connecting with Country process and may include design enhancements on structures such as the new flyover bridge, landscaping and other mitigation measures.

Non-Aboriginal heritage

A Statement of Heritage Impact (SoHI) has been prepared to assess the potential non-Aboriginal heritage impacts during construction and operation of the proposal.

The proposed works are within the curtilage of the state listed Blacktown Native Institution item (SHR No. 01866). The curtilage of this heritage item is split across different owners and development zoning classifications. The majority of the curtilage is owned and managed by the Dharug Strategic Management Group (DSMG) after being handed back to Aboriginal ownership in 2018. The land immediately adjacent to the road corridor within the heritage curtilage is owned by Transport and is zoned for the future widening of Richmond Road. The heritage listing includes an exemption for road construction activities within this Transport owned land. The proposal has been designed to avoid all direct physical impacts to the DSMG owned portion of the heritage listing, however, road widening works would occur within the Transport owned part of the heritage curtilage operating primarily under the exemption.

In addition, the proposal would result in moderate adverse visual impacts to the DSMG owned portion of the Blacktown Native Institution due to construction of the new flyover bridge and general road widening bringing the road corridor closer to the site.

The proposed works are also adjacent to the curtilage of the state listed Colebee and Nurragingy Land Grant item (SHR No. 01877), however, there would be no physical and little to no visual impacts to this item as a result of the proposal.

As the proposal area has been previously highly disturbed due to road construction and utility installation activities, it has a generally low potential to contain archaeological remains. Therefore, the proposed works are unlikely to result in physical impacts to surviving archaeological resources within the Blacktown Native Institution heritage curtilage (Transport owned portion).

Mitigation measures would be implemented to mitigate potential impacts including further consultation with the local Aboriginal community including DSMG, and identification of opportunities for interpretation and minimising the visual impact of structures. An opportunity for interpretation could be located on the flyover and/or retaining wall on the Blacktown Native Institution facing side, to assist in minimising the visual impact of the structures and provide a positive Connection to Country outcome.

Works within the Blacktown Native Institution would require a section 60 permit under the *Heritage Act 1977*, due to the visual impacts of the proposal and for the Aboriginal salvage excavation works that would need to be undertaken within the heritage curtilage.

Noise and vibration

A Noise and Vibration Assessment has been carried out to assess the potential noise and vibration impacts during construction and operation of the proposal. The assessment has considered construction activities both during standard working hours and outside standard working hours. Up to five nights per week of construction activities have been assessed for the proposal. Due to the high volume of traffic that utilises the roads within the proposal area, it is likely that obtaining Road Occupancy Licences (ROLs) would require night closures.

The construction noise assessment concluded that:

- Noise levels for all modelled scenarios are predicted to exceed management levels for standard hours and non-standard hours at a number of residential receivers due to their proximity to the works.
- Residential receivers located in close proximity to Richmond Road are already affected by exceedances of sleep disturbance, likely related to existing road traffic.
- The majority of predicted exceedances for non-residential receivers are expected for locations fronting or backing onto Richmond Road, adjacent to the proposed construction work.
- Construction traffic noise impacts associated with the ancillary sites on Richmond Road and near the M7 Motorway are unlikely to increase the traffic noise levels above criteria. Further assessment of the traffic noise impacts of the ancillary site on Newnham Street would be determined once final plans for the site are confirmed.
- Human vibration discomfort may be caused should large vibratory rollers be used within 100 metres of nearby receivers, while building damage may occur should large vibratory rollers be used within 20 metres of nearby receivers.

A Noise and Vibration Management Plan (NVMP) would be prepared and implemented throughout the construction period to address noise and vibration impacts. The NVMP would incorporate the best practice mitigation measures including staging of construction activities, types of plant to be used, advanced notification of night works, respite periods and vibration monitoring. Relevant respite mitigation measures in line with relevant guidelines would be implemented for any out of hours works and outlined in the NVMP.

Based on the operational road traffic noise assessment, the proposal is not predicted to increase traffic noise levels by more than 2 dBA at the assessed receivers. However, due to existing high traffic noise levels from roads within the study area, up to 109 residential receiver locations and two non-residential receiver locations may qualify for the consideration of operational noise mitigation. It is noted however, that the majority of these properties (located adjacent to the northern section of the proposal area) were built in the past 10 to 12 years and therefore were required to have considered existing road noise levels and applicable noise attenuation for the properties as part of their development approval to meet noise guidelines. Further investigation would be undertaken into the need for treatment based on the detailed design, the noise assessment and existing treatments at these properties.

Mitigation measures for the receivers qualifying for the consideration of mitigation may include noise walls/mounds and/or at property treatments. Any treatments to be implemented as part of the proposal would be determined as the design progresses.

Biodiversity

A Biodiversity Assessment Report (BAR) has been carried out to assess the potential impacts on biodiversity during construction and operation of the proposal.

The proposal area includes certified lands, in the northern section associated with the NWGA under the *State Environmental Planning Policy (Precincts – Central River City) 2021,* and in the southern section associated with the Cumberland Plan Conservation Plan (CPCP) under the *State Environmental Planning Policy (Biodiversity and Conservation) 2021*. The proposal would require the removal of 2.11 hectares of native vegetation and 60 planted native trees. This includes 0.35 hectares of native vegetation within certified areas, which has previously been offset under the NWGA and CPCP biodiversity certification processes. The remaining 1.76 hectares of native vegetation and 60 planted native trees occur outside of certified lands. This includes 1.76 hectares of vegetation commensurate with threatened ecological communities (TECs) listed under the *Biodiversity Conservation Act 2016*, of which 1.07 hectares are commensurate with TECs listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

Six threatened species were recorded in the study area during field surveys. These were Juniper-leaved Grevillea, Cumberland Plain Land Snail, Eastern Coastal Free-tailed Bat, Large Bent-winged Bat, Southern Myotis and Grey-headed Flying-fox. Survey observations and consultation with the local community have also identified the presence of Kangaroos within the adjacent lands on both sides of the road corridor (in the southern section). These animals are being displaced by the volume of urban development occurring in this area and the existing road corridor is a barrier to their movement between the surrounding open spaces.

The proposal would require the construction of a bridge over Bells Creek, classified as a Class 2 fish habitat waterway. Although the bridge would span the width of the creek, temporary work for bridge construction may lead to erosion and sedimentation and may obstruct fish passage.

A Flora and Fauna Management Plan (FFMP) would be prepared to mitigate potential biodiversity impacts during construction. Mitigation measures would include pre-clearance surveys, un-expected finds procedures, weed management protocols and fauna handling protocols. The requirements for the provision of biodiversity offsets, conservation measures and tree and hollow replacement for the proposal would be considered in accordance with the *No Net Loss Guidelines* (TfNSW, 2023b) and the *Tree and Hollow Replacement Guidelines* (TfNSW, 2023c).

Landscape character and visual impacts

An Urban Design Concept and Landscape Character and Visual Impact Assessment (LCVIA) has been carried out to assesses the potential impacts on landscape character and visual amenity during construction and operation of the proposal.

Seven landscape character zones were identified across the study area. The visual impact of the proposal to these zones would vary from negligible to high. The highest impact would relate to the two landscape character zones at the southern end of the proposal and are the result of the permanent introduction of the new flyover bridge and retaining wall, which is in strong contrast to the generally unstructured existing character.

The urban and landscape design of the proposal is considered to satisfactorily respond to the landscape character, and to have addressed the visual impacts, of the proposal in its setting. In particular, the alignment and pier locations of the new bridge flyover have balanced structural requirements with optimising openness at ground level for road users, cyclists and pedestrians.

Retention of vegetation along the eastern side of the road corridor, particularly remnant native riparian species around Bells Creek, is a positive, as is supplementary and new planting on the western side to mitigate the loss of existing trees and provide visual amenity to the adjacent Blacktown Native Institution site and open space.

Mitigation measures and opportunities associated with the new flyover bridge and its impacts to the culturally significant Blacktown Native Institution would be considered further during detailed design. This would be done in consultation with local Aboriginal stakeholders to ensure an appropriate response to Country that can mitigate the impacts on the character as well as on outward views from the Blacktown Native Institution impacted by the flyover bridge.

Justification and conclusion

To unlock the potential of the NWGA, upgrades to transport infrastructure must align with current and future needs, while considering forecasted population and economic growth. Richmond Road is one of the main north-south arterial roads for Sydney's north-west providing a vital link to residential, commercial and social land uses within the NWGA. Richmond Road already experiences significant congestion, impacting travel times and hindering the potential for growth in the area.

The upgrade of Richmond Road is one of a number of projects that form part of the broader road network strategy for the region. The proposal is the first section of Richmond Road to be upgraded into the future and provides the 'gateway' connection from the M7 Motorway to Richmond Road and the broader north-west areas of Sydney. The benefits of the proposal are to:

- ease congestion and improve the travel times for all road users
- improve traffic flow through the intersections
- improve safety for all road users
- improve connectivity for the communities in the north-west
- improve freight movements between the M7 Motorway and key precincts
- improve pedestrian safety with new staged crossings making it easier for pedestrians and bike riders to move safely in and around the area.

While there would be some environmental impacts as a consequence of the proposal such as traffic and transport, noise, biodiversity, Aboriginal and non-Aboriginal heritage, and landscape character and visual amenity, mitigation measures detailed in this REF would ameliorate or minimise these expected impacts.

The benefits of improving traffic efficiency, road safety and connectivity to the north-west are considered to outweigh the adverse impacts and risks associated with the proposal.

Display of the review of environmental factors

This REF is on display for comment between November and December 2024. You can access the documents in the following ways:

Internet

The documents are available as pdf files on the Transport for NSW website at: nswroads.work/richmondrd-m7-townsonrd

Copies by request

Printed and electronic copies are available by contacting the Project Infoline via phone 1300 367 561, noting that there may be a charge for hard copies or USB.

Staffed drop-in sessions

Wednesday 27 November between 4pm and 8pm at Greenway Village Shopping Centre (799 Richmond Road, Colebee NSW 2761)

Saturday 30 November between 10am and 4pm at Dean Park Neighbourhood Centre (9 Yarramundi Drive, Dean Park 2761)

How can I make a submission?

To make a submission about this proposal, please send your written comments to:

PO BOX 973, Parramatta NSW 2124

richmondroadupgrade@transport.nsw.gov.au

Submissions must be received by Friday 20 December 2024. Submissions will be managed in accordance with the *Transport for NSW Privacy Statement*. A copy can be made available upon request.

What happens next?

Transport will collate and consider the submissions received during public display of the REF.

After this consideration, Transport will determine whether or not the proposal should proceed as proposed and will inform the community and stakeholders of this decision.

If the proposal is determined to proceed, Transport will continue to consult with the community and stakeholders prior to and during construction.

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Figures

1. Introduction

This chapter introduces the proposal and provides context for the environmental assessment. In introducing the proposal, the objectives and project development history are detailed and the purpose of the report provided.

1.1 Proposal identification

The North West Growth Area (NWGA) has been identified by the New South Wales (NSW) Government as a key area to support urban growth in the greater Sydney region. When developed (2056 forecasts), the NWGA will provide approximately 90,000 homes accommodating 250,000 people. A key part of the identification of the NWGA was its proximity and connection to transport nodes including the M7 Motorway and ease of connection to the M4 Motorway, Sydney Metro and the new Western Sydney Airport.

To unlock the potential of the NWGA, upgrades to transport infrastructure must align with current and forecasted needs, while considering forecasted population and economic growth. Richmond Road already experiences significant congestion, impacting travel times and hindering the potential for economic growth in the area. As the NWGA continues to grow there will be increasing pressure on Richmond Road and the transport network.

As part of the *NWGA Road Transport Strategy* (TfNSW, 2015), Transport for NSW (Transport) is proposing to upgrade Richmond Road between the M7 Motorway and Townson Road, Marsden Park (the proposal). The proposal has the ultimate objectives of relieving the current corridor congestion and providing road capacity that supports growth.

The section of Richmond Road to be upgraded is located in the Blacktown City Council Local Government Area (LGA) and traverses the suburbs of Marsden Park, Colebee, Hassall Grove, Oakhurst, Dean Park and Glendenning.

Key features of the proposal would include:

- Upgrade of Richmond Road between the M7 Motorway and Townson Road to six lanes (three lanes in each direction). This would include:
    - road widening between the M7 Motorway and the Alderton Drive / Langford Drive intersection including a new bridge structure over Bells Creek
    - widening into the median from the Alderton Drive / Langford Drive intersection to 250 metres north of the Hollinsworth Road / Townson Road intersection.
- Building a new flyover bridge from the M7 Motorway Rooty Hill Road North off-ramp landing on Richmond Road around 300 metres prior to Bells Creek. This would include:
    - a single lane bridge structure around 250 metres long and 8.4 metres wide for traffic heading northbound on Richmond Road
    - 170 metre embankment at the southern end of the bridge beginning at the M7 Motorway Rooty Hill Road North off-ramp, roughly five metres above the existing ground level
    - 150 metre long retaining wall located at the northern end of the bridge within the median of Richmond Road. At its highest point the retaining wall would be 8.4 metres high
    - minor re-surfacing of the existing M7 Motorway Rooty Hill Road North off-ramp where the ramp ties into the new flyover
    - no changes to existing gantry, exit lanes or lane functions on the M7 Motorway.
- Upgrades to the intersection of Richmond Road, Hollinsworth Road and Townson Road including:
    - an additional northbound through lane along Richmond Road (providing three through lanes towards Richmond)
    - an additional dedicated right turn lane from Richmond Road southbound onto Hollinsworth Road
    - a new left turn slip lane from Hollinsworth Road onto Richmond Road including a pedestrian island and crossing

    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Langford Drive and Alderton Drive including:
    - additional northbound and southbound through lanes along Richmond Road (providing three through lanes in both directions)
    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Rooty Hill Road North and the M7 Motorway ramps including:
    - two dedicated lanes on Richmond Road heading onto the M7 Motorway (southbound on-ramp)
    - two dedicated southbound through lanes on Richmond Road (towards Blacktown)
    - an additional right turn lane from Richmond Road southbound onto Rooty Hill Road North (providing two dedicated right turn lanes onto Rooty Hill Road North)
    - extension of 10 metres for the left turn lane from Richmond Road southbound onto M7 Motorway northbound on-ramp
    - relocation of the existing pedestrian crossing on Richmond Road approximately 160 metres south. This would be a new staged pedestrian crossing across Richmond Road, with a pedestrian refuge in the median at the intersection of Richmond Road and the M7 Motorway southbound on-ramp.
- Active transport provisions throughout the proposal area including:
    - moving the existing shared pedestrian and bike path on the western side of Richmond Road to be further west. This would be a four metre wide shared pedestrian and bike path on the western side of Richmond Road (between the M7 Motorway to approximately 150 metres south of the Richmond Road / Langford Drive / Alderton Drive intersection) where it would connect to the existing shared path.
- Building a new concrete bridge structure over Bells Creek for the northbound carriageway located approximately 14 metres west of the existing Bells Creek bridge. This would include:
    - a bridge structure around 29 metres long and 18 metres wide
    - three northbound travel lanes
    - a shared pedestrian and bike path on the western side, which replaces the existing boardwalk bridge next to the northbound Richmond Road carriageway.
- Retention of the five bus stops on Richmond Road between Yarramundi Drive and the Richmond Road / Hollinsworth Road / Townson Road intersection. The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road are also retained.
- Drainage and water quality structures along the proposal including:
    - adjustments to the pits and pipes of the existing stormwater network
    - two gross pollutant traps to the north and south of Bells Creek
    - open flooding channel on the eastern side of Richmond Road roughly between the M7 Motorway northbound on-ramp and Bells Creek for flood mitigation purposes. The channel would be around 425 metres long and 10 metres wide and would discharge into Bells Creek.
- Roadside furniture including safety barriers, signage, line marking, lighting and fencing.
- Earthwork cutting, embankments and retaining walls to accommodate the widened road alignment, flyover bridge and open flooding channel.
- Modified formal access to four properties along the upgraded sections of Richmond Road.
- Installation of a formal driveway access to the Blacktown Native Institution property within the Rooty Hill Road North road corridor, and removal of the informal access track to the property from Richmond Road.
- Property acquisition including full acquisition of one property and partial acquisition of two properties.
- Rehabilitation of disturbed areas and landscaping.

- Establishment and use of three temporary ancillary facilities during construction.

The locality of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-2. Section 3 describes the proposal in more detail.

Figure 1-1: Proposal locality

Richmond Road Upgrade between M7 Motorway to Townson Road

Project Code: 305001173-EN-GS-005
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-07

Legend

- Proposal location
- REF construction boundary
- 80% Design freeze
- Watercourse
- Major road
- Minor road

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (MetroMap, Sep 2024)
2. Road and Watercourse (NSW SS, 2023)

0 1 2 3 4 Kilometres

Scale at A3: 1:110,000

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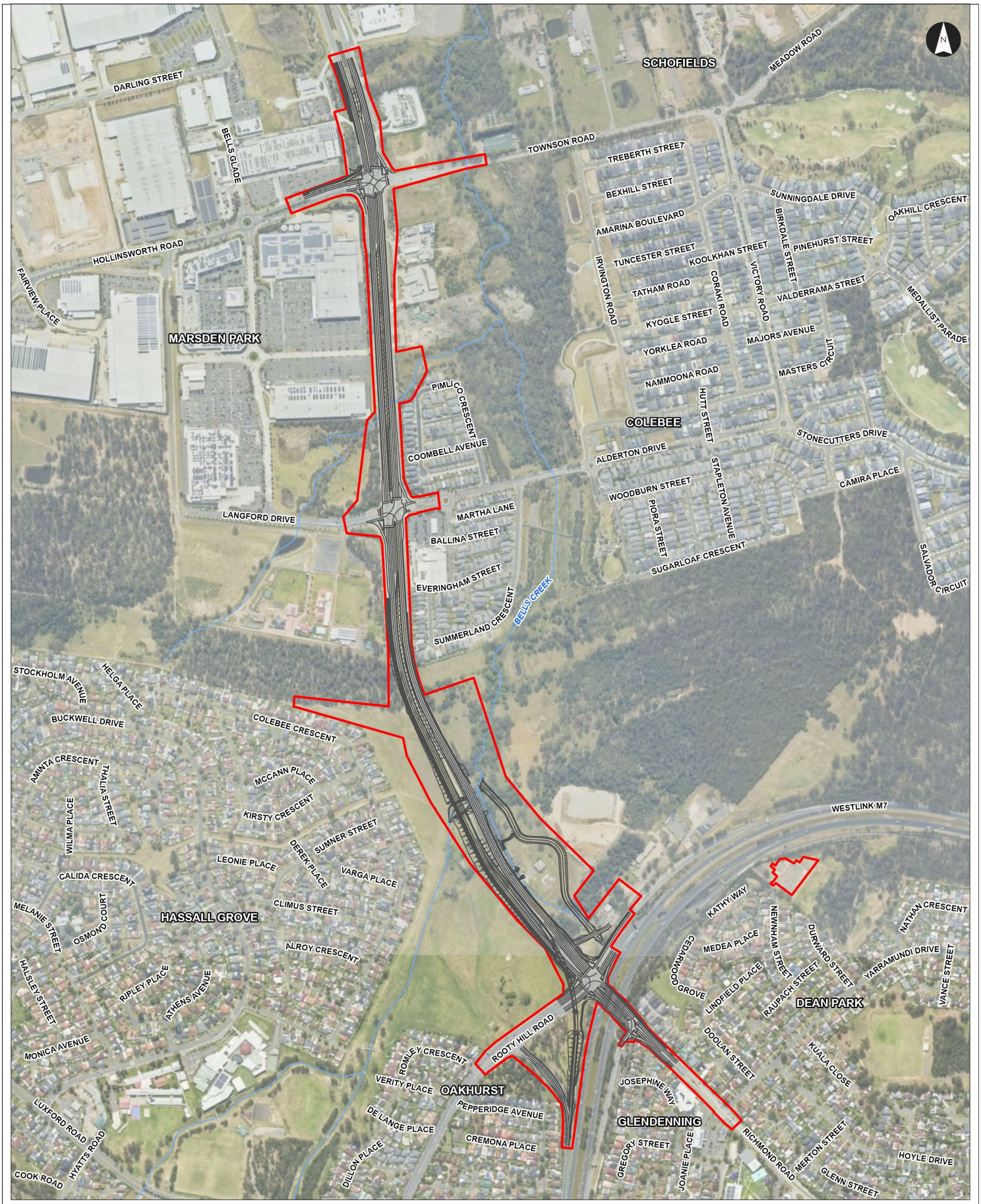


Figure 1-2: Proposal overview

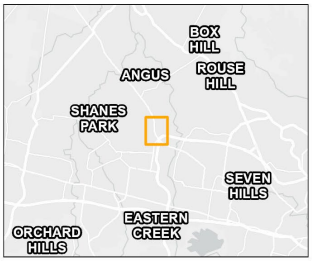
Richmond Road Upgrade between M7 Motorway to Townson Road

Legend

- REF construction boundary
- 80% Design freeze
- Watercourse

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (MetroMap, Sep 2024)
2. Watercourse (NSW SS, 2023)



Project Code: 305001173-EN-GS-004
Drawn By: RA, Checked By: SM
Rev: 01 | Date: 2024-11-07

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0 100 200 300 Metres
Scale at A3: 1:7,500

1.2 Purpose of the report

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

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal 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 the context of section 171 of the Environmental Planning and Assessment Regulation 2021, the factors in *Guidelines for Division 5.1 assessments* (DPE, 2022a), *Roads and Related Facilities EIS Guideline* (DUAP, 1996a), 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 REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Transport examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.
- The strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport's road activities on nationally-listed threatened species, ecological communities and migratory species.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval 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 if offsets are required and able to be secured.
- The potential for the proposal to significantly impact any other matters of national environmental significance (MNES) or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

Growth areas were established by the NSW Government as a location for greenfield urban growth including housing, employment, shops, health and education facilities, parks, bushland, and new or upgraded infrastructure. The North West Growth Area (NWGA) sits around 37 kilometres north-west from Sydney's CBD, governed by The Hills Shire Council, Blacktown City Council and Hawkesbury City Council. The plan for this growth area is to balance the needs of residents with the timely delivery of infrastructure, services and facilities. To allow for a sustainable release of land, the NWGA was divided into 16 precincts.

The NSW Government is supporting the development and population growth in the NWGA with an improved transport network. The northern section of the proposal is located in the NWGA within the Marsden Park Industrial Precinct. The rezoning and subsequent population growth in the NWGA has led to increasing congestion on road infrastructure in the area. Developments such as Marsden Park North and West Schofields have brought an influx of new residents to the area.

The *North West Growth Centre Road Network Strategy* (TfNSW, 2015) (Network Strategy) proposes a road network to support the forecast growth in the NWGA. The Richmond Road Upgrade between M7 Motorway and Townson Road, Marsden Park is one of a number of projects in planning that form part of the Network Strategy. Richmond Road is a key connection point for several of the other projects in the Network Strategy including the planned new connection using the Bandon Road corridor and upgrades to Garfield Road West and Townson Road.

Richmond Road is a key north-south state arterial road corridor that forms part of the wider road transport network connecting residential, commercial, industrial and social land uses in north-west Sydney. The proposal provides a vital link for freight and commuters between Blacktown and Richmond and Windsor. Richmond Road is also part of the flood evacuation road network for the Hawkesbury-Nepean Valley. Road users currently experience heavy congestion, slow travel times and delays when travelling through Richmond Road. The road does not have the capacity to meet the current and projected traffic volumes.

The M7 Motorway runs along on the southern fringe of the proposal area, and the proposal includes upgrades to both the northbound off-ramp and the southbound on-ramp access lanes. The M7 Motorway serves as a key link between north-west Sydney, Parramatta and the central business district (CBD), and will also connect north-west Sydney residents with the new M12 and the Western Sydney Airport to the south.

A pinch point of the NWGA is the intersection of Richmond Road and Rooty Hill Road North. People driving on the M7 Motorway wishing to travel north towards Richmond Road currently need to exit via the M7 Motorway Rooty Hill Road North off-ramp through a signalised intersection onto Rooty Hill Road North, then through another signalised intersection to turn onto Richmond Road to continue northbound. Each day over 89,000 vehicles travel through the Richmond Road and Rooty Hill Road North intersection, which currently exceeds capacity and experiences high delays. Traffic queues at the M7 Motorway Rooty Hill Road North off-ramp often extend into the M7 Motorway though lanes.

Overall, the road within the proposal area does not have sufficient capacity to support the everyday needs of the community today. The forecast growth and projected travel demand in NWGA will put additional pressure on the road network and delays will become exponentially worse.

The proposal would ease congestion and improve travel times for all users through increased capacity and new dedicated movement lanes and providing a northbound M7 Motorway off-ramp connecting directly to Richmond Road (removing the need to travel through two sets of traffic signals). The proposal would also ensure this key movement corridor serves its strategic function for the growing NWGA community. The proposal would improve safety and connectivity for the communities in the north-west, making it easier to move in and around the area.

2.1.1 Strategic planning and policy framework

A number of State and local strategic plans refer to the need for improving safety and efficiency in roads in the State. The proposal is consistent with these strategic plans as discussed below.

Future Transport Strategy

The *Future Transport Strategy* (TfNSW, 2022a) (The Strategy) sets the strategic directions for Transport to achieve world-leading mobility for customers, communities, businesses and our people. It is part of a suite of government strategies, policies and plans that integrate and guide land use and transport planning across NSW. It replaces *Future Transport 2056: Shaping the Future* (TfNSW, 2018).

The Strategy works to deliver Transport's three high-level outcomes. These are:

- connecting our customers' whole lives
- successful places for communities
- enabling economic activity.

The Strategy sets 14 strategic directions which will guide Transports work to achieve these outcomes. Each direction contains a set of responses and actions that Transport and its partners need to achieve. The actions will form the basis of Transports programs of work to realise the vision. The strategic directions applicable to the proposal are:

- 'C1: Connectivity is improved across NSW'
- 'C2: Multimodal mobility supports end to-end journeys'
- 'P1: Supporting growth through smarter planning'
- 'P2: Transport infrastructure makes a tangible improvement to places" 'E1: Freight networks and supply chains are efficient and reliable'
- 'E2: Existing infrastructure is optimised'.

The proposal is consistent with The Strategy as it would support future development and improve connectivity for the communities in north-west of Sydney, making it easier to move in and around the area. The proposal is one of several projects planned in the wider region to support the NWGA. The proposal would encourage active travel using the shared pathway along the western side of Richmond Road. Upgrades to Richmond Road would improve the efficiency and reliability and provide a vital link for commuters and freight between Blacktown and Windsor.

State Infrastructure Strategy 2022-2042

The *State Infrastructure Strategy 2022-2042* (INSW, 2022) (The Infrastructure Strategy) identifies the NSW Government's infrastructure vision for the state over the next 20 years, across all sectors.

The Infrastructure Strategy assesses infrastructure problems and solutions, and provides recommendations to best grow the State's economy, enhance productivity and improve living standards for our NSW community. The Infrastructure Strategy is framed around nine long-term objectives and makes 57 recommendations (102 including sub-recommendations) to the NSW Government aimed at improving outcomes and living standards for the people of NSW.

The proposal is consistent with the following objectives:

- 'Objective 2: Service growing communities'
- 'Objective 8: Integrate infrastructure, land use and service planning'.

The proposal would deliver infrastructure to service the growing communities in the NWGA. This would include the road upgrade to ease congestion and improve traffic flow, a separated pedestrian and bike path along the western side of Richmond Road, and staged pedestrian crossing at the intersection of Richmond Road with Hollinsworth Road / Townson Road, Langford Drive / Alderton Drive and the M7 southbound on-ramp. These features align with access to infrastructure that supports walking and cycling.

NSW Long Term Transport Masterplan

The *NSW Long Term Transport Master Plan* (TfNSW, 2012b) (The Masterplan) sets the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first. The Master Plan is principally focused on the following six key transport challenges:

- integrating modes to meet customer needs
- getting Sydney moving again
- sustaining growth in Greater Sydney
- providing essential access to regional NSW
- supporting efficient and productive freight
- statewide actions.

The Master Plan responds to these challenges through four types of action:

- integrate transport services
- modernise our system
- grow our networks to meet future demand (including the important tasks of corridor preservation)
- maintain important road and public transport assets.

The proposal aligns with the following types of actions:

- 'Grow our networks to meet future demand': Without extra capacity along Greater Sydney's road corridors, by 2031 the number of constrained corridors will increase, and slow down the overall transport system. This would reduce the ability to maintain free flowing high volumes of passenger and freight traffic. The proposal aims to manage the prediction of future congestion in the NWGA by upgrading Richmond Road, and building a new flyover bridge from the M7 Motorway Rooty Hill Road North off-ramp to Richmond Road northbound. This would allow road users to bypass two sets of traffic lights, reducing congestion and queuing allowing uninterrupted flow of traffic.
- 'Maintain important road and public transport assets': The proposal would allow for better connection and services to and between Sydney's growth areas by upgrading Richmond Road. Without actions such as the proposal, growth across Greater Sydney, particularly in the city's west would put a massive strain on transport networks. The proposal would also maintain the dedicated bus lanes at the intersections of Richmond Road and include a separated pedestrian and bike path along the western side of Richmond Road.

The Master Plan includes 220 short, medium and long term actions that are focused on a commitment to make NSW number one and transform the transport system over the next 20 years. One action: 'Implement a program to address pinch points across Greater Sydney' relates to the proposal. The 'Richmond Road – Blacktown Road from Blacktown to Richmond' is identified as a pinch point corridor. The proposal would improve congestion and road safety and respond to growing pressure on the road network within this road corridor.

2026 Road Safety Action Plan

The *2026 Road Safety Action Plan* (TfNSW, 2022b) (The Action Plan) provides a detailed outline of the NSW Government's commitment to improving safety on our roads across the State. The Action Plan sets clear road safety targets and outlines initiatives to ensure we continue to work towards zero deaths and serious injuries on NSW roads.

The Action Plan includes two targets: halving fatalities on NSW roads by 2030 and reducing serious injuries by 30 per cent on NSW roads by 2030. The road safety delivery framework includes five key priority areas:

- creating safer country roads and urban places
- enhancing road safety in local communities
- increasing the safety of light vehicles, heavy vehicles and protective equipment
- making safer choices on our roads
- ensuring the safety of vulnerable and other at-risk road users.

The consistency of the proposal against the above priority areas in The Action Plan are as follows:

- 'Creating safer country roads and urban places': the proposal has been designed to relevant safety standards and would provide capacity improvements that would help address congestion related crashes.
- 'Ensuring the safety of vulnerable and other at-risk road users': having a separated pedestrian and bike path along the western side of Richmond Road assists in ensuring the safety of vulnerable and other at risk road users, providing a designated link targeted to them and therefore separating them from motorists. Staged pedestrian crossings with pedestrian refuges also provide increased pedestrian safety.

A Metropolis of Three Cities – The Greater Sydney Region Plan

A Metropolis of Three Cities – The Greater Sydney Region Plan (Greater Sydney Commission, 2018a) (The Region Plan) is the NSW Government's regional plan for Greater Sydney which provides key directions and actions to rebalance growth and deliver its benefits equally to residents across Greater Sydney.

The Region Plan is built on a vision of three cities, where most residents live within 30 minutes of jobs, education, health facilities, and other services: the Western Parkland City, Central River City and Eastern Harbour City. It informs district and local plans and the assessment of planning proposals.

The Region Plan includes 10 directions and 40 objectives for the future of Sydney. The proposal is consistent with the following objectives outlined by The Region Plan:

- 'Objective 1: Infrastructure supports the three cities'
- 'Objective 2: Infrastructure aligns with forecast growth – growth infrastructure compact'
- 'Objective 3: Infrastructure adapts to future needs'
    - Each of the three cities will require new infrastructure, and improvements to existing infrastructure for future growth. Objectives 1, 2, and 3 are met by the proposal, as the design includes both new infrastructure such as the flyover bridge, and additional lanes and intersection turns within the existing Richmond Road corridor. This aims to support an increased number of road users to bypass two sets of traffic lights, which would reduce overall congestion and queuing and improve traffic flow through pinch points.
- 'Objective 6: Services and infrastructure meet communities' changing needs'
    - Greater Sydney is growing at the same time as major demographic changes are occurring. Improved health, public transport and accessibility outcomes can be achieved through the provision of accessible transport. The proposal would maintain the dedicated bus lanes at the intersections of Richmond Road and include a separated pedestrian and bike path along the western side of Richmond Road.
- 'Objective 13: Environmental heritage is identified, conserved and enhanced'
- 'Objective 28: Scenic and cultural landscapes are protected'
    - Environmental heritage includes natural and built heritage, Aboriginal places and objects, and cultural heritage such as stories, traditions and events inherited from the past. This REF includes Aboriginal and non-Aboriginal heritage impact assessments, which outline mitigation measures to minimise impacts to the heritage within the vicinity of the proposal (refer to section 6.4 and 6.5 for further details). A Connecting with Country process is being undertaken to better understand Aboriginal stakeholders' primary concerns and aspirations for the area surrounding the proposal (refer section 2.3.3 and section 5.3.2). Scenic landscapes have been addressed in this REF, where a landscape character and visual impact assessment has been completed. Mitigation measures have been provided to minimise impacts (refer to section 6.9 for further detail).

Central City District Plan

The NSW Government has prepared five district plans that guide the implementation of *A Metropolis of Three Cities – The Greater Sydney Region Plan* (Greater Sydney Commission, 2018a). The district plans outline objectives and actions for the future development of the relevant district and are structured around the strategies for infrastructure and collaboration, liveability, productivity, sustainability and implementation.

The proposal is located in the area subject to the *Central City District Plan* (Greater Sydney Commission, 2018b) (The District Plan). The proposal is consistent with the following planning priorities in The District Plan:

- 'C1: Planning for a city supported by infrastructure'
    - The need for the proposal has been identified based on the predicted growth within the local and wider regions. With an increased population comes an increase in traffic and road user numbers. To ease the pressure on the road network, the proposal would reduce congestion and travel times.
- 'C3: Providing services and social infrastructure to meet people's changing needs'
    - The proposal would maintain the dedicated bus lanes at the intersections of Richmond Road and include a separated pedestrian and bike path along the western side of Richmond Road, maintaining public transport needs and providing active transport opportunities.
- 'C9: Delivering integrated land use and transport planning and a 30-minute city'
    - The proposal would provide improved access and connectivity via reducing congestion and travel times, supporting the expected growth in the NWGA. The northern section of the proposal is located in the NWGA within the Marsden Park Industrial Precinct.

North West Priority Growth Area Land Use and Infrastructure Implementation Plan

North West Priority Growth Area Land Use and Infrastructure Implementation Plan (DPE, 2017) (The Implementation Plan) outlines plans for the growing NWGA and the infrastructure needed to support this growth. Within the NWGA, new communities will progressively develop with access to schools, parks, community facilities, jobs, roads and public transport. Over the next ten years, 33,000 homes will be provided, and the growth area will be home to around 92,400 people. The Implementation Plan provides a robust framework to grow new communities in line with the provision of infrastructure.

The upgrade of Richmond Road is mentioned within The Implementation Plan as key infrastructure that will be required over the next 10 years to support the additional population. The Implementation Plan proposes a robust road network strategy for the growth area that will provide a grid layout to promote connectivity, permeability and legibility. It is stated that primary access to the growth area will be via the M7 Motorway, Richmond Road and Windsor Road. Upgrades to Richmond Road are required to support new homes in the north-west of Sydney.

Our Blacktown 2041 - Community Strategic Plan

The *Blacktown Community Strategic Plan 2041* (Blacktown City Council, 2022) (The Blacktown CSP) identifies the main priorities of our community and aspirations for the Blacktown City over the next two decades and beyond. Its directions and objectives are comprehensive and are based on principles of sustainability and social equity. The Blacktown CSP consists of six strategic directions which are:

- a vibrant, inclusive and resilient community
- a clean, sustainable and climate resilient city
- a smart and prosperous economy
- a growing city supported by accessible infrastructure
- a healthy, sporting and active city
- a leading city.

The proposal is consistent with the strategic direction 'A growing city supported by accessible infrastructure'. The new transport infrastructure provided by the proposal would support the proposed rezoning and expected population growth in the NWGA. The proposal would provide an improved transport network for vehicle and non-vehicle users.

2.2 Limitations of existing infrastructure

Richmond Road provides a vital link for commuters and freight between Blacktown and Windsor, while also connecting the M7 Motorway to new housing and employment areas in the surrounding LGAs, the NWGA and beyond. Within the proposal area, Richmond Road is a divided two-way road generally with two lanes in each direction. Major intersections with Richmond Road within the study area include Rooty Hill Road North / M7 Motorway on/off ramps, Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road.

Several issues have been identified which contribute to the poor performance of the Richmond Road corridor. These include:

- Intersections operating at or exceeding capacity. Traffic modelling indicates that the existing intersections of Richmond Road with Hollinsworth Road / Townson Road, Langford Drive / Alderton Drive and Rooty Hill Road North / M7 Motorway on/off ramps are at or exceed capacity by the second hour of the morning and afternoon peak periods.
- Capacity limitations caused by the existing two-lane carriageway of Richmond Road carriageway result in slow travel times due to low average speeds. The road does not have the capacity to meet the current and projected traffic volumes.

Further details on the existing traffic conditions are provided in section 6.1.

2.3 Proposal objectives

2.3.1 Proposal objectives

The objectives of the proposal are to:

- Reduce transport cost by improving travel times and reducing congestion.
- Support economic growth and productivity by providing road capacity for projected freight and general traffic volumes.
- Improve road safety in line with the *NSW Road Safety Strategy 2012-2021* (TfNSW, 2012a): Safe System Directions and Safer Roads Key Focus.
- Improve quality of service, sustainability and liveability.
- Minimise impacts on the environment.

2.3.2 Urban design objectives

The proposal would provide direct connectivity from the M7 Motorway onto Richmond Road northbound. The urban design of the proposal aims to enhance the experience of all road users through landscape regeneration of the natural environment along the Bells Creek catchment corridor and provide respectful integration with nearby sites of cultural and heritage significance.

The proposal would create a smoother transition between these vehicle arterials and future urban development north towards the Hawkesbury River. This connection would increase capacity, improve reliability and safety on Richmond Road and the M7 Motorway, enhancing the road experience and affording the opportunity to reconsider the conditions for all drivers, cyclists and pedestrians.

The urban design objectives and principles will be used to evaluate the design outcomes to ensure the proposal is sensitive to the visual, physical and operational contexts. The specific urban design objectives and principles for the proposal which have been developed in line with *Beyond the Pavement* (TfNSW, 2023d) are outlined in Table 2-1.

Urban design must be undertaken collaboratively and must be considered at the start of the proposal, and continued through its development, implementation and finalisation.

Table 2-1: Urban design objectives and principles (DesignInc, 2024)

Objective	Principles
Objective 1: Achieve a project that fits sensitively within the existing site qualities and characteristics	• Reduce the impacts of the project to the existing vegetation and natural landform as much as possible. • Enhance and reinstate existing vegetation communities to integrate the project with the existing setting. • Maintain and enhance landscape views for road users by retaining open vistas along the Bells Creek flood plain. • Mitigate the visual impact of large new infrastructure from outside the project corridor, through landscape design, clean and elegant lines to structures and architectural treatments that together complement their setting.

Objective	Principles
	• Design earthworks to reflect the existing natural topography of the setting as much as possible.
Objective 2: Protect and enhance existing ecological systems	• Contribute to the biodiversity and habitat of the area through planting design and selection. • Revitalise and revegetate the planted banks of Bells Creek to maintain its natural ecosystem. • Create a low maintenance landscape using predominantly endemic plant species suited to their specific conditions. • Minimise the construction footprint by reducing the amount of cut and fill, with limited impact to existing land forms, water flow and vegetation. • Retain vegetation as much as possible by reducing the construction footprint.
Objective 3: Respect and integrate local Aboriginal narratives and themes through Designing from Country design principles	• Creating a strong sense of place drawing on the narratives of local Aboriginal people and integrating them into the design response. • Ensure minimal impact on areas of heritage significance and the Blacktown Native Institution Project sites. • Integrate knowledge on the 'Connection to Country' stories, with emphasis on the landscape Bells Creek and Blacktown Native Institution Project relationship. • Ensure that views from the project and the experience it brings to the drivers, pedestrians and cyclists reinforces the interpretation of any heritage items. • Use significant plant species, identified by local Aboriginal groups, in the design. • Identify potential opportunities for art integration to express connection to Country, whether integrated within the project structures or as an interaction with the Blacktown Native Institution Project and/or through cultural plantings, to be in consultation with the appropriate stakeholders. • Identify key landmarks and cultural views to ensure their protection or enhancement.
Objective 4: Achieve a high-quality design outcome that improves the experience for motorist, cyclists, pedestrians and the local community	• Design the form of structures that sit above grade in the view plane from surrounding properties or circulation areas to relate to and enhance the surrounding context. • Design structures (walls, columns, beams, screens, abutments) to be designed in a unified design approach utilising common elements between all structures across the alignment. • Apply the use of oxides and textures to structures/bridges to help recede the built form into the surrounding landscape. • Design the edges and undersides of structures visible at close range to be visually interesting and integrated with the overall expression of structure.
Objective 5: To provide safe and convenient pedestrian and cyclist connectivity along and across the road corridor	• Retain and enhance the accessibility and connectivity of surrounding communities for all users including pedestrians, cyclists, public transport users. • Provide connectivity along the Bells Creek flood plain with adjoining existing and future residential and commercial developments.
Objective 6: Achieve a high level of sustainability for the project within all aspects of design	• Incorporate strategies like Water Sensitive Urban Design (WSUD) including passive irrigation. • Reduce impacts of the urban heat island effect such as increasing planting/ reducing hard surfaces where possible. • Adopt a native plant palette which responds to the local climate and environmental conditions. • Help protect natural environments by minimising the construction footprint and carefully locating structures. • Use low carbon and durable materials. • Include opportunities for 'Dark Sky' lighting within the context of the project.

Beyond the Pavement

Beyond the Pavement (TfNSW, 2023d) provides a guideline on creating 'successful places' with 'liveability, amenity and economic success of communities and places enhanced by transport'. The document sets out four physical urban design objectives which should be achieved on all road and maritime infrastructure work:

- Projects should fit sensitively into the built, natural, and cultural environment in both urban and rural locations.
- Projects should contribute to the accessibility and connectivity of communities and a general permeability of movement through areas by all modes of movement.
- The design and management of projects should contribute to the overall design quality of the public domain for the community, including transport users.
- Projects should help revitalise areas and contribute to the local and broader economy.

The physical urban design objectives are supported by nine design principles. Two of the nine principles in particular support broader commitments by Transport and these should be reflected in the concept design process:

- Principle five – Contributing to green infrastructure and responding to natural systems: In support of the Premier's Priority to increase the tree canopy and green cover across Greater Sydney, the Secretary for Transport has committed to a design-led approach to safely integrating trees and green open space on all Transport projects and report on all trees planted in projects in the Greater Sydney area.
- Principle six – Connecting with Country and incorporating heritage and cultural contexts into projects: In 2019 Transport published a reconciliation action plan which incorporates principles for embedding Aboriginal and Torres Strait Islander co-design principles across all the Transport cluster projects and promoting respect for Aboriginal heritage and increasing inclusion of Aboriginal art.

2.3.3 Connecting with Country principles

A Connecting with Country report is currently being prepared for the proposal in consultation with representatives of the Dharug Strategic Management Group (DSMG) and local Aboriginal community. As part of this report, preliminary Connecting with Country principles have been developed from information and knowledge shared by knowledge holders from the DSMG and from the *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024). These preliminary Connecting with Country design principles are outlined in Table 2-2 and are intended to inform the design of the proposal. These principles will continue to be refined and will fulfil the urban design Objective 3: 'Respect and integrate local Aboriginal narratives and themes through Designing with Country design principles' as outlined in Table 2-1.

Table 2-2 Connecting with Country principles (Nguluway, 2024)

Principles	Description
A place of cultural connection	• Acknowledge that you are on Dharug Country, for example through information signage, artwork, and/or naming embedded within the project elements. Commission a local Dharug artist to design any artwork. • Keep language and culture alive – use local materials, colours and plant species to convey and share the story of Dharug Country. • Maintain and enhance accessible entry and gathering spaces to and within the Blacktown Native Institution site, in support of ongoing cultural practices and ceremony. • Include a range of yarning spaces of different sizes, including rest spaces along shared and pedestrian paths, at the water, and within the Blacktown Native Institution site.
A place for children	• Create safe pathways for children, young people and adults to move through the area. • Design for moments of play and learning, including about the native plants, animals and landscape. • Acknowledge the generational trauma and the sense of hope for future generations associated with the history of the place. • Use artwork to celebrate and create a joyful response to the spirit of childhood.
A place of healing	• Educate and inform the public about Dharug history, including sites of trauma. • Nurture nature: protect or reconnect fauna corridors through green belts and creeks.

Principles	Description
	• Identify possible sites for education, training and healing programs for Dharug to share with the wider community. • Design education spaces to be inclusive of all community needs, including culturally safe spaces, spaces for women, children, older people and people with disability, so that all can share in gathering and healing activities.
A place of water	• Identify opportunities for cultural water practices and ceremony, honouring the role of water. • Use water-sensitive urban design for a sustainable landscape. • Restore the waters: naturalise 'hard' edges to waterways where possible. • Create regeneration opportunities, for example strengthen and/or extend areas of remnant native planting, especially creating an interconnected green network along the creek lines.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

Given the broader transport network needs, constrained space and continued urban development of the NWGA, the Richmond Road corridor was considered the key north-south link proposed for upgrade. There were no alternative north-south route options available for consideration.

Further, in the northern section of the proposal, previous designs and upgrades of Richmond Road provided for the future widening of the road corridor into the median to provide for three lanes in each direction. This option substantially limited impacts to surrounding properties and the environment as all works would remain within the existing kerb line. Therefore this was the only option considered for the northern section of the proposal against the 'Do-Minimal' option. A number of design refinements were further developed around the intersections within the northern section to improve the efficiency and safety of these intersections. These refinements included things such as the staged pedestrian crossings, left turn slip lanes from side streets and upgrades to turning lane capacity.

For the southern section, several options assessments of the proposal were undertaken during the strategic and concept design phases. Options were developed over time as more data and information became available. Each option was evaluated on how it would mitigate the identified impacts and maximise functional benefits of the proposal. The preferred option was selected based how it meets the need for the proposal as well as how it aligns with the objectives and assessment criteria.

Various workshops were held to assess the options during the early design as follows:

- Strategic options: Value Management Workshop for the strategic design (Ranbury, 2020)
    - held on 26 November 2020
    - attended by representatives from Transport and Blacktown City Council
    - to evaluate at-grade design options (Options 1, 1A, and 2, 2A).
- Strategic options: Value Management Workshop for the strategic design (Ranbury, 2022)
    - held on 5 April 2022
    - attended by representatives from various Transport divisions
    - to evaluate and compare an at-grade design Option 2B with a new flyover Option 3.
- Strategic options: Value Management Options Workshop for the M7 Motorway ramps (TPK, 2023)
    - held on 2 May 2023
    - attended by representatives from Transport and Blacktown City Council
    - to evaluate different landing configurations of the new flyover with consideration of the future proposed Castlereagh Connection.

The identified options and a summary of the analysis of the options (via a multi-criteria analysis) are provided in sections 2.4.2 and section 2.4.3, respectively.

2.4.2 Identified options

The strategic options included the following.

'Do-Minimal' option

The 'Do-Minimal' option would involve no upgrade to Richmond Road and involve routine traffic signals optimisation and ongoing maintenance of the existing road corridor.

Strategic options

Initial optioneering focused on what could be changed at-grade for the M7 Motorway, Rooty Hill Road North and Richmond Road intersection. Four options were identified for the potential upgrade to this intersection (Options 1, 1A and 2, 2A). Ultimately these options were ruled out as the impacts on surrounding properties were not acceptable and there was little to no improvements in capacity of the intersection compared to 'Do minimal' option.

A new at-grade design Option 2B at the intersection of M7 Motorway Rooty Hill Road North off-ramp and Rooty Hill Road was developed with reduced impacts to surrounding properties as well as some minor upgrades to the existing Richmond Road / Rooty Hill Road North intersection. This option was developed in parallel to and ultimately compared against Option 3. Option 3 included a new flyover bridge linking the M7 Motorway Rooty Hill Road North off-ramp to Richmond Road.

Of these several options initially developed, the latter two options, Option 2B and Option 3, were shortlisted and presented at the Value Management Workshop (Ranbury, 2022). Option 2B and Option 3 were generally the same for the upgrade of Richmond Road between the M7 Motorway intersection to Townson Road.

Option 2B

Key features of Option 2B include (refer Figure 2-1):

- Additional right turn lane from M7 Motorway Rooty Hill Road North off-ramp to achieve three right turn lanes onto Rooty Hill Road North.
- There would be two dedicated lanes for traffic turning right from the M7 Motorway Rooty Hill Road North off-ramp onto Rooty Hill Road North then left onto Richmond Road after which the two lanes would merge into one through lane adjacent to two northbound lanes on Richmond Road.
- There would be one dedicated right turn lane for traffic turning from the M7 Motorway Rooty Hill Road North off-ramp onto Rooty Hill Road North to turn right or continue straight through at the intersection with Richmond Road.
- The widening of Rooty Hill Road North would follow the existing road corridor and not encroach into the Blacktown Native Institution site.

Figure 2-1 Proposed Option 2B alignment (extract)

Option 3

Option 3 varies from Option 2B with respect to the upgrade of the M7 Motorway Rooty Hill Road North off-ramp and right turn from Rooty Hill Road North. This option would include construction of a flyover of Rooty Hill Road North to convey northbound traffic exiting from the M7 Motorway to Richmond Road. The flyover would be an approximately 210 metre long bridge as shown in Figure 2-2.

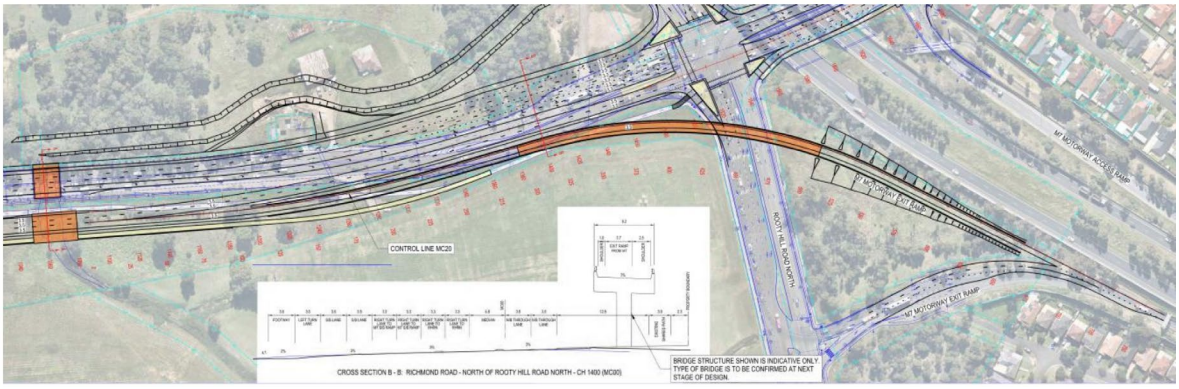

Figure 2-2 Proposed Option 3 alignment (extract)

Strategic options – flyover landing

Several options were considered as to the location of the northern landing of the proposed flyover bridge structure (Option 3 above) from the M7 Motorway Rooty Hill Road North off-ramp to Richmond Road northbound. Three options were presented at the Value Management Workshop (TPK, 2023) as follows:

- Option 1 – Flyover bridge landing on Richmond Road outside/kerb side lane just south of Bells Creek.
- Option 2 – Flyover bridge landing on Richmond Road within the median just south of Bells Creek.
- Option 3 – Flyover bridge landing on Richmond Road outside/kerb side lane with a future on-ramp in the median to separately carry traffic to the Castlereagh Connection (CC).

2.4.3 Analysis of options

Analysis of strategic options

The two strategic options were evaluated using the weighted assessment criteria in each of the following categories, with equal weighting assigned to each category:

- Environmental - impacts on biodiversity, heritage, visual amenity/urban design and air quality.
- Socio-economic - property impacts, connectivity for residential, social, commercial and industrial users and employment opportunities.
- Functional - traffic efficiency, road safety, constructability (with respect to staging and utility impacts) and queues impacting the M7 Motorway.

The options were judged on a qualitative basis of how well each option performed with respect to each category's assessment criteria relatively on a scale of 1 to 4. The best performing option was allocated a 4, with the other options scored relative to the best performing option. The strategic options assessment is provided in Table 2-3.

Table 2-3 Strategic options assessment (Ranbury, 2022)

Category	Criteria	Weighting (%)	Option 2B		Option 3	
			Rating	Sum	Rating	Sum
Environmental	Impacts on biodiversity	25	3	75	2	50
	Impacts to heritage	50	3	150	3	150
	Visual amenity/urban design	8	3	25	2	17
	Air quality	17	3	50	4	67
	Total weighted score			*300*		*283*
Socio-economic	Minimise impacts to property (access/acquisition)	0	3	0	3	0

Category	Criteria	Weighting (%)	Option 2B		Option 3	
			Rating	Sum	Rating	Sum
	Provide better connectivity for residential, social, commercial and industrial users	67	3	200	4	267
	Potential uplift in employment opportunities	33	3	100	4	133
	Total weighted score			*300*		*400*
Functional	Improve traffic efficiency (travel time, congestion)	20	3	60	4	80
	Enhance road safety for vehicles - queue lengths impacting intersections etc.	35	3	105	4	140
	Constructability with respect to staging along Richmond Road and Rooty Hill Road North	5	2	10	3	15
	Constructability with respect to utility impacts/relocation	20	1	20	3	60
	Queues impacting the M7 Motorway	20	2	40	4	80
	Total weighted score			*235*		*375*
Weighted score				**835**		**1,058**

Following the options assessment in Table 2-3 cost estimates were provided for the options (Option 2B: $128 million and Option 3: $142 million) and a multiplier was applied to the weighted score. Option 3 still performed best against the assessment criteria following application of the cost multiplier.

Analysis of strategic options – flyover landing

The three flyover landing options were assessed against the following assessment criteria to determine whether the options achieve the agreed project objectives by delivering the greatest benefits and minimising impacts within the solution area defined by the critical constraints. The following assessment criteria was used:

- Queue length, travel time savings, level of service.
- Reducing the frequency and severity of crashes, weaving movement, queuing on the M7 Motorway.
- Benefit to cost ratio (BCR) - relative cost estimates and qualitative benefits.
- Overall urban design outcome – active transport, visual impacts, etc.

The performance of options against the objectives / assessment criteria was scored on a scale of 1-5. The best performing option was allocated a 5, with the other options scored relative to the best performing option. Each option was rated twice, one in terms of performance before the Castlereagh Connection (CC) and again for after its implementation.

The strategic options assessment is provided in Table 2-4.

Table 2-4 Strategic options assessment (TPK, 2023)

Criteria	Option 1 Landing on Richmond Road (outside lane)	Option 2 Landing on Richmond Road (median)	Option 3 Landing on Richmond Road outside lane, future ramp in median to take traffic to the CC
Queue lengths, travel time savings, level of service	4.5	5	4.5
After CC connection	2	5	3.5
Reducing the frequency and severity of crashes, weaving movement, queuing on the M7 Motorway	4	5	4
After CC connection	1	5	2.5
BCR (Relative cost estimates and qualitative benefits)	5	4	4.5
After CC connection	2	5	3.5
Overall Urban design outcome – active transport, visual impacts	4.5	5	4.5
After CC connection	3	5	2
Total – before CC connection	*18*	*19*	*17.5*
Total - After CC connection	*8*	*20*	*11.5*
Overall score	**26**	**39**	**29**

These total scores showed that Option 2 would result in the best short and longer term outcomes. Following the above assessment, further assessment in relation to the identified constraints was undertaken which concluded that Option 2 was the still the preferred option.

The advantages and disadvantages of the options under consideration are outlined in Table 2-5. This was done to assist in identifying the preferred alignment option to be taken forward.

Table 2-5 Advantages and disadvantages of options (TPK, 2023)

Criteria	Option 1 Landing on Richmond Road (outside lane)	Option 2 Landing on Richmond Road (median)	Option 3 Landing on Richmond Road outside lane, future ramp in median to take traffic to the CC
Advantages	• Tight footprint providing more space for vegetation. • Smaller bridge spans. • Less visual impact than Option 3. • More traditional design, i.e., more predictable as the ramp enters from the left therefore potentially reduced driver confusion risk.	• Bridge is further away from the Blacktown Native Institution i.e., better visual impact and improved opportunities for active transport. • Better access to the shared path. On-road cyclists do not need to cross any ramps. • Safety benefit due to no weave in the future when	• Similar construction method to Option 1 with fewer staging switches compared to Option 2. • Further away from the existing road (same as Option 1) i.e., easier to build. • More space in a large central median until Castlereagh Connection is built. Opportunities for planting.

Criteria	Option 1 Landing on Richmond Road (outside lane)	Option 2 Landing on Richmond Road (median)	Option 3 Landing on Richmond Road outside lane, future ramp in median to take traffic to the CC
	• Reduced impact on traffic compared to other options during construction as a lot is built offline. • Less staging switches (similar to Option 3).	the Castlereagh Connection is built. • Similar tight footprint to Option 1 providing space for vegetation.	
Disadvantages	• Very tightly constrained against the Blacktown Native Institution land parcel (similar in all options). • Safety issue associated with the weave when the Castlereagh connection is constructed. • Potential need to undo work and for additional work to deal with the weave in the future. • The weave has more potential to cause a traffic incident causing tailback on both Richmond Road and the M7 Motorway. • Additional traffic in the slow lane resulting in traffic impact (same as Option 3). • Access to shared path is not as good as Option 2. On-road cyclists would also need to cross the entry ramp (same as Option 3).	• More traffic stages because the bridge is in the median. • 5.4 m clearance required over two roads, therefore the structure would be slightly higher for this option compared to others. • Possibly greater visual impact for road users due to the bridge landing in the median. • Pier and abutment within the median more challenging to protect with barriers and for maintenance access. • Most impact from a traffic perspective during construction due to longer construction timeframe.	• Very tightly constrained against the Blacktown Native Institution therefore greatest visual and direct impact. • Significant traffic issue with difficult/dangerous movement from Rooty Hill Road North to get onto the Castlereagh Connection. • Lots of structure i.e., significant visual impact. • More difficult construction to the Castlereagh Connection in the future (e.g., building in the median). • Tree maintenance, safety risks, and costs (similar in all options). • Bells Creek bridge would need to increase significantly to accommodate the wide median.

2.4.4 Preferred option

Preferred strategic design

Following the options assessment as described in section 2.4.3, it was agreed that Option 3 (bridge) performed best against the assessment criteria. Option 3 proposed to upgrade the M7 Motorway Rooty Hill Road North off-ramp and build a new single lane ramp to take the traffic directly from the Rooty Hill Road North off-ramp to the Richmond Road northbound carriageway. The design of this option would:

- provide an efficient connection from the M7 Motorway to Richmond Road and thus avoid a major traffic movement having to turn right from the M7 Motorway Rooty Hill Road North off-ramp onto Rooty Hill Road North and the left turn onto Richmond Road
- provide a much better level of service as it provides a free-flowing arrangement that reduces delays and improves efficiencies
- avoid the need to widen Rooty Hill Road North with all the associated utility impacts.

Preferred strategic design – flyover landing

Following the options assessment as described in section 2.4.3, Option 2 was selected as the preferred option. Option 2 proposed to locate the flyover bridge landing in the median of Richmond Road. This option best meets the objectives of:

- maximise capacity and efficiency
- maximise road safety
- support active transport.

2.4.5 Design refinements

Concept design refinements

As the concept design has developed a number of design refinements have been developed. These refinements have aimed to minimise impacts to the surrounding community and environment, while also providing the greatest benefits to traffic flow and capacity, road safety and pedestrian and cyclist access. A summary of the key refinements is provided in Table 2-6.

Table 2-6 Concept design refinements

Item	Description
Removal of the shared path on Richmond Road southbound	The proposed four metre wide shared footpath connecting the existing path on the eastern side of Richmond Road between the intersection with M7 Motorway northbound on-ramp and Langford Drive / Alderton Drive was removed as part of the concept design. The shared path on the eastern side of Richmond Road was removed for the following reasons: • Flow of traffic at the Richmond Road / Rooty Hill Road North / M7 Motorway on/off ramps intersection would be improved by removing the need for a signalised pedestrian crossing at the northern end of the intersection. This crossing would be relocated to the intersection of Richmond Road and the M7 Motorway southbound on-ramp. • Avoid impacts to the access of the Sydney Water pump station. • Avoid impacts to the existing Ampitel communication tower. • Avoid removal of around 40 trees. • Avoid the need for the construction of a new pedestrian bridge.
New staged pedestrian crossings	The existing long pedestrian crossings at the intersection of Richmond Road with Langford Drive / Alderton Drive, and Hollinsworth Road / Townson Road were upgraded to staged pedestrian crossings. This change would allow for improvements to pedestrian safety at the intersections and traffic flow at the intersections.
Provision of the open flooding channel	The open flooding channel was moved further to the east than originally proposed during the strategic design to avoid impacts to the existing dwelling on the private property (Lot 49 / DP1104950). The open flooding channel would ensure the required flood immunity of Richmond Road and freeboard under the Bells Creek bridge is achieved. As full acquisition of the private property (Lot 49 / DP1104950) is now proposed, it is possible the flooding channel may be relocated back closer to Richmond Road as per the strategic design. The location of the open flooding channel would be further refined during detailed design and any changes to the channel would be subject to a separate environmental assessment where required.
Blacktown Native Institution access	The existing Blacktown Native Institution vehicle access is directly impacted by the proposed widening and would need to be relocated. A number of options from a traffic and safety perspective were considered during the concept design for reinstatement of a temporary access during construction to the Blacktown Native Institution site. These options were located as follows: • Option 1 Rooty Hill Road North – south of the M7 Motorway Rooty Hill Road North off-ramp • Option 2 Rooty Hill Road North – north of the M7 Motorway Rooty Hill Road North off-ramp • Option 3 Richmond Road – around 40 metres north of the existing access. Option 2 was selected as the preferred option from a safety and constructability perspective. However, alternative driveway locations are currently being discussed with Dharug Strategic Management Group (DSMG) to determine a suitable location that would provide both safe access to the site and avoid the most culturally significant places. Final design of the temporary access is

Item	Description
	subject to the outcome of this ongoing discussion. Further discussion would also continue for the permanent access location.
Utility and drainage design	Refinement of the utility and drainage design has been carried out in consultation with key stakeholders including Blacktown City Council and utility providers. This included a review of the proposed operational water quality treatment measures.

Bridge design refinements

As a part of the concept design phase, several suitable bridge options (Stantec, 2024a) were considered for the new flyover bridge (BR1) and the proposed bridge over Bells Creek (BR2) as outlined in Table 2-7.

Table 2-7 Bridge design options

Bridge no.	Bridge description	Options
BR1	M7 Motorway Rooty Hill Road North off-ramp (flyover bridge) One-way single lane traffic flyover bridge connecting eastbound M7 Motorway traffic towards northbound Richmond Road.	1. Conventionally constructed weathering steel trough girder bridge 2. Incrementally launched weathering steel trough girder bridge 3. Incrementally launched concrete box girder bridge 4. Precast segmental balanced cantilever concrete box girder bridge
BR2	New Bells Creek Bridge northbound One-way three lane traffic bridge with a four metre wide shared path, west of the existing Bells Creek Bridge for northbound Richmond Road.	1. Single-span super T bridge 2. Two-span plank bridge 3. Two-span super T bridge

A multi-criteria analysis was applied to the bridge concept designs which considered the following assessment criteria:

- benefits to cost ratio taking into consideration the construction, maintenance and decommissioning costs
- bridge aesthetics taking into consideration material appearance, design harmony and structural elegance.

The preferred option for the proposed flyover bridge (BR1) is Option 4 - precast segmental balanced cantilever concrete box girder bridge. Option 4 was selected as the preferred option as:

- the concrete can be painted/textured to improve aesthetics. This provides more options to improve urban design outcomes and Connecting to Country
- it is consistent with M7 Motorway concrete bridge and the curved profile is more visually appealing highlighting the design elegance
- the variable depth reflects the engineering in the design and is more appealing than a constant depth structure.

The preferred option for the proposed Bells Creek Bridge (BR2) is Option 1- single-span super T bridge. Option 1 was selected as the preferred option as:

- likely to be the cheapest option to build and have the shortest construction duration
- material appearance and texture of the new bridge matches with the adjacent existing Richmond Road bridge over Bells Creek and M7 Motorway bridge
- concrete finish consistent with other elements in the vicinity including the adjacent existing Richmond Road Bridge over Bells Creek and M7 Motorway bridge
- a single span configuration provides a clear crossing of Bells Creek avoiding the need for a pier to be constructed within the waterway
- a single span arrangement would have a better hydrology performance than the other options.

3. Description of the proposal

This chapter describes the proposal and provides descriptions of the design parameters including major design features, the construction method and associated infrastructure and activities.

3.1 The proposal

Transport is proposing to upgrade Richmond Road between the M7 Motorway and Townson Road (the proposal). Key features of the proposal would include (refer Figure 3-1 (a) to 3-1 (e)):

- Upgrade of Richmond Road between the M7 Motorway and Townson Road to six lanes (three lanes in each direction). This would include:
    - road widening between the M7 Motorway and the Alderton Drive / Langford Drive intersection including a new bridge structure over Bells Creek
    - widening into the median from the Alderton Drive / Langford Drive intersection to 250 metres north of the Hollinsworth Road / Townson Road intersection.
- Building a new flyover bridge from the M7 Motorway Rooty Hill Road North off-ramp landing on Richmond Road around 300 metres prior to Bells Creek. This would include:
    - a single lane bridge structure around 250 metres long and 8.4 metres wide for traffic heading northbound on Richmond Road
    - 170 metre embankment at the southern end of the bridge beginning at the M7 Motorway Rooty Hill Road North off-ramp, roughly five metres above the existing ground level
    - 150 metre long retaining wall located at the northern end of the bridge within the median of Richmond Road. At its highest point the retaining wall would be 8.4 metres high
    - minor re-surfacing of the existing M7 Motorway Rooty Hill Road North off-ramp where the ramp ties into the new flyover
    - no changes to existing gantry, exit lanes or lane functions on the M7 Motorway.
- Upgrades to the intersection of Richmond Road, Hollinsworth Road and Townson Road including:
    - an additional northbound through lane along Richmond Road (providing three through lanes towards Richmond)
    - an additional dedicated right turn lane from Richmond Road southbound onto Hollinsworth Road
    - a new left turn slip lane from Hollinsworth Road onto Richmond Road including a pedestrian island and crossing
    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Langford Drive and Alderton Drive including:
    - additional northbound and southbound through lanes along Richmond Road (providing three through lanes in both directions)
    - staged pedestrian crossings across Richmond Road on the north and south sides of the intersection, with a pedestrian refuge in the median.
- Upgrades to the intersection of Richmond Road, Rooty Hill Road North and the M7 Motorway ramps including:
    - two dedicated lanes on Richmond Road heading onto the M7 Motorway (southbound on-ramp)
    - two dedicated southbound through lanes on Richmond Road (towards Blacktown)
    - an additional right turn lane from Richmond Road southbound onto Rooty Hill Road North (providing two dedicated right turn lanes onto Rooty Hill Road North)

    - extension of 10 metres for the left turn lane from Richmond Road southbound onto M7 Motorway northbound on-ramp
    - relocation of the existing pedestrian crossing on Richmond Road approximately 160 metres south. This would be a new staged pedestrian crossing across Richmond Road, with a pedestrian refuge in the median at the intersection of Richmond Road and the M7 Motorway southbound on-ramp.
- Active transport provisions throughout the proposal area including:
    - moving the existing shared pedestrian and bike path on the western side of Richmond Road to be further west. This would be a four metre wide shared pedestrian and bike path on the western side of Richmond Road (between the M7 Motorway to approximately 150 metres south of the Richmond Road / Langford Drive / Alderton Drive intersection) where it would connect to the existing shared path.
- Building a new concrete bridge structure over Bells Creek for the northbound carriageway located approximately 14 metres west of the existing Bells Creek bridge. This would include:
    - a bridge structure around 29 metres long and 18 metres wide
    - three northbound travel lanes
    - a shared pedestrian and bike path on the western side, which replaces the existing boardwalk bridge next to the northbound Richmond Road carriageway.
- Retention of the five bus stops on Richmond Road between Yarramundi Drive and the Richmond Road / Hollinsworth Road / Townson Road intersection. The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road are also retained.
- Drainage and water quality structures along the proposal including:
    - adjustments to the pits and pipes of the existing stormwater network
    - two gross pollutant traps to the north and south of Bells Creek
    - open flooding channel on the eastern side of Richmond Road roughly between the M7 Motorway northbound on-ramp and Bells Creek for flood mitigation purposes. The channel would be around 425 metres long and 10 metres wide and would discharge into Bells Creek.
- Roadside furniture including safety barriers, signage, line marking, lighting and fencing.
- Earthwork cutting, embankments and retaining walls to accommodate the widened road alignment, flyover bridge and open flooding channel.
- Modified formal access to four properties along the upgraded sections of Richmond Road.
- Installation of a formal driveway access to the Blacktown Native Institution property within the Rooty Hill Road North road corridor, and removal of the informal access track to the property from Richmond Road.
- Property acquisition including full acquisition of one property and partial acquisition of two properties.
- Rehabilitation of disturbed areas and landscaping.
- Establishment and use of three temporary ancillary facilities during construction.

For the purposes of this REF, the proposal has been defined by the following boundaries:

- Operational footprint - the area needed for the ongoing operation of the proposal as a road corridor (refer Figure 3-1 (a) to Figure 3-1 (e)).
- Construction boundary / proposal area - the area needed to construct the proposal including the road construction area, construction ancillary facilities, access roads, haulage routes and temporary water quality basins (refer Figure 3-1 (a) to 3-1 (e)).
- Study area - the geographic boundary which defines the extent of the specialist investigations supporting the proposal, these areas are different depending on the specialist investigation and are defined throughout section 6.

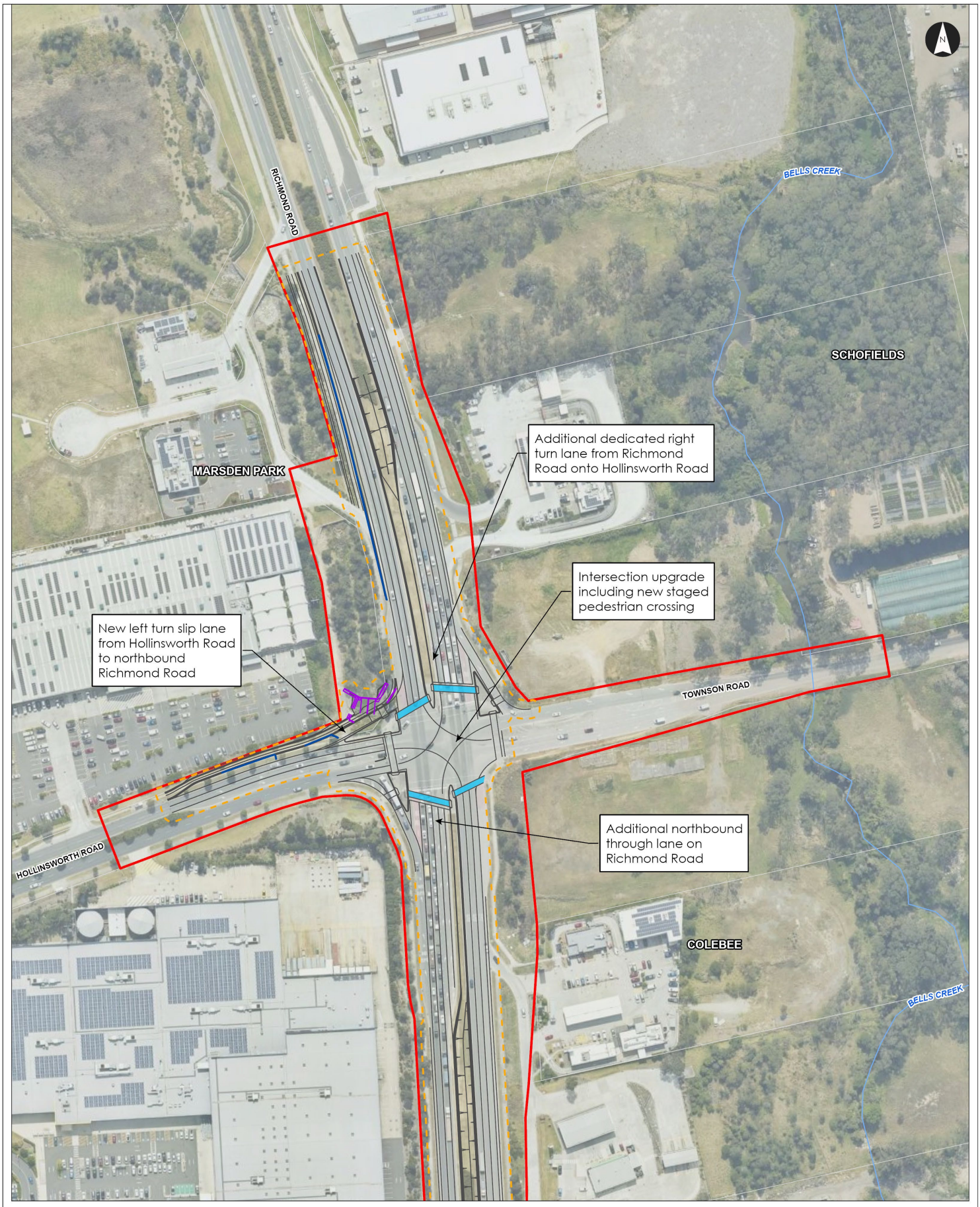

Figure 3-1 (a): Key features of the proposal

Richmond Road Upgrade between M7 Motorway to Townson Road

Legend

- REF construction boundary
- 80% Design freeze
- Drainage culvert
- Stormwater design
- Watercourse
- Cadastre
- Operational footprint
- Staged pedestrian crossings

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Watercourse and Cadastre (NSW SS, 2023)

0 15 30 45 60 75 Metres

Scale at A3: 1:1,900

Project Code: 305001173-EN-GS-001
Drawn By: RA, Checked By: MM
Rev: 07 | Date: 2024-11-08

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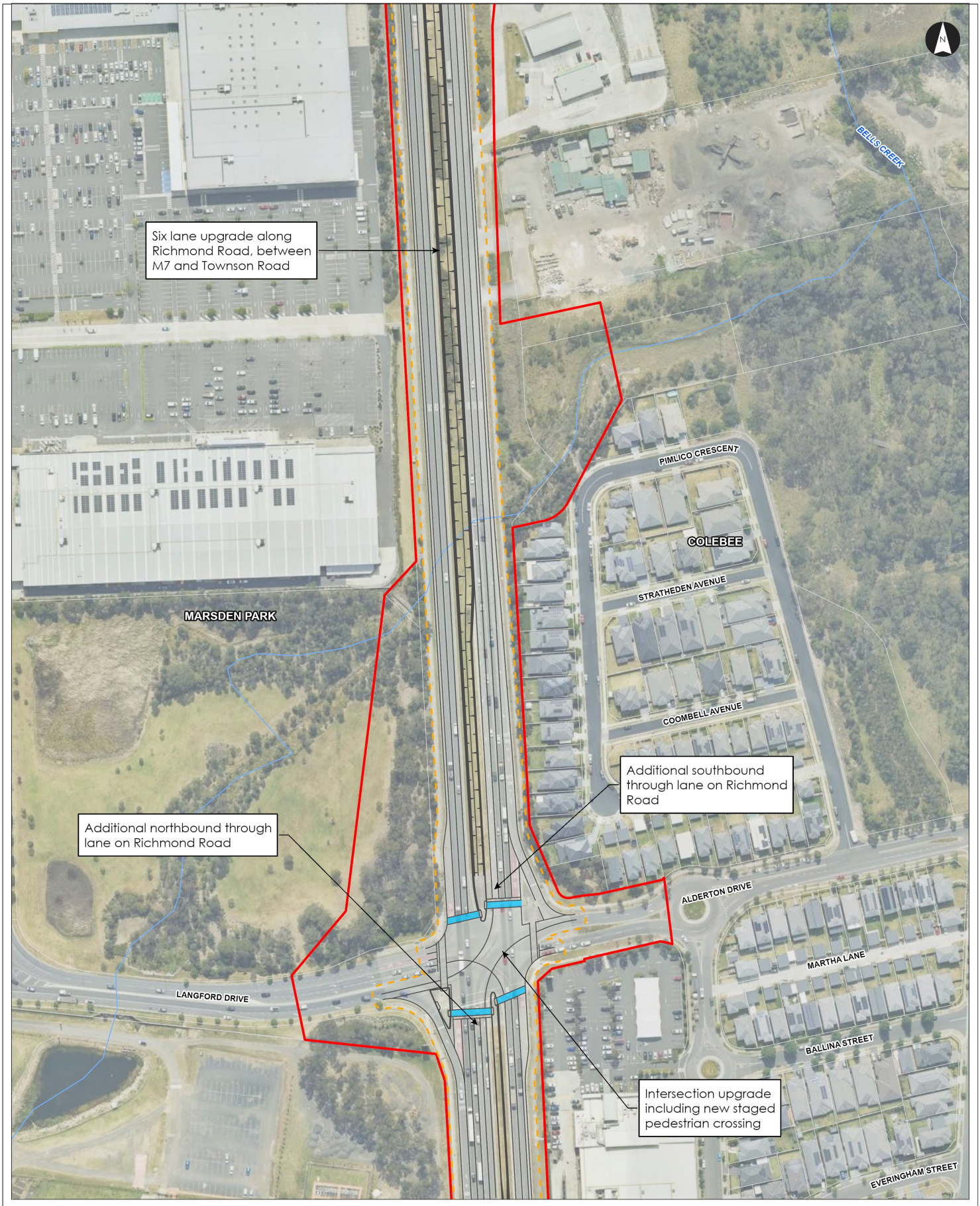

Figure 3-1 (b): Key features of the proposal

Richmond Road Upgrade between M7 Motorway to Townson Road

Legend

- REF construction boundary
- 80% Design freeze
- Watercourse
- Cadastre
- Operational footprint
- Staged pedestrian crossings

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Watercourse and Cadastre (NSW SS, 2023)

0 15 30 45 60 75 Metres

Scale at A3: 1:1,900

Project Code: 305001173-EN-GS-001
Drawn By: RA, Checked By: MM
Rev: 07 | Date: 2024-11-08

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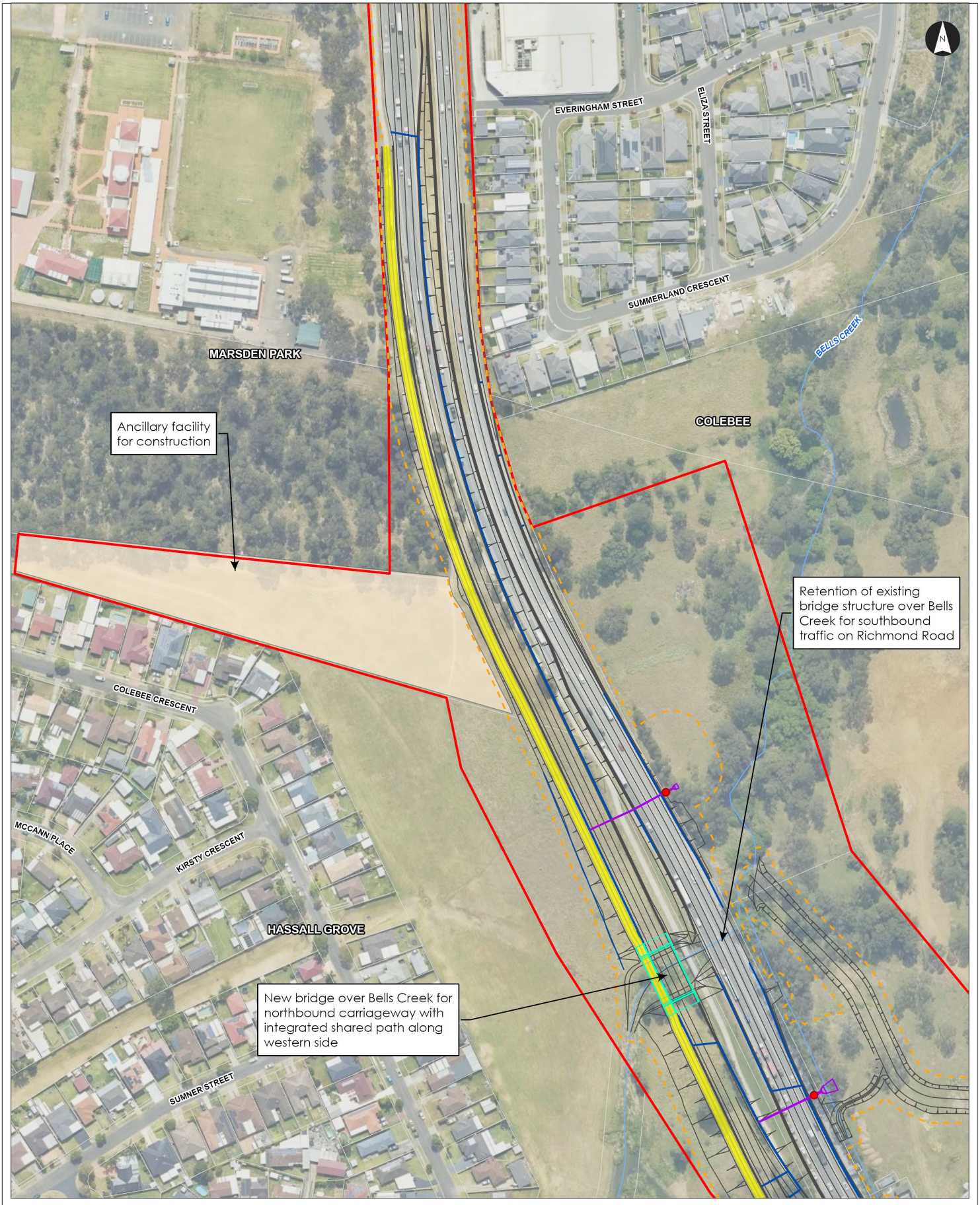


Figure 3-1 (c): Key features of the proposal

Richmond Road Upgrade between M7 Motorway to Townson Road

Project Code: 305001173-EN-GS-001
Drawn By: RA, Checked By: MM
Rev: 07 | Date: 2024-11-08

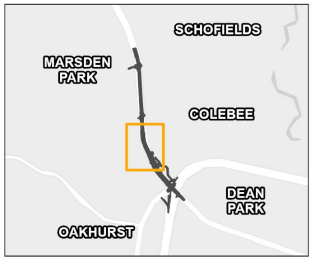
Legend

- REF construction boundary
- Gross pollutant trap
- 80% Design freeze
- Bells Creek bridge
- Drainage culvert
- Stormwater design
- Watercourse
- Cadastre
- Operational footprint
- Ancillary facility for construction
- Shared pathway

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Watercourse and Cadastre (NSW SS, 2023)

0 15 30 45 60 75 Metres
Scale at A3: 1:1,900



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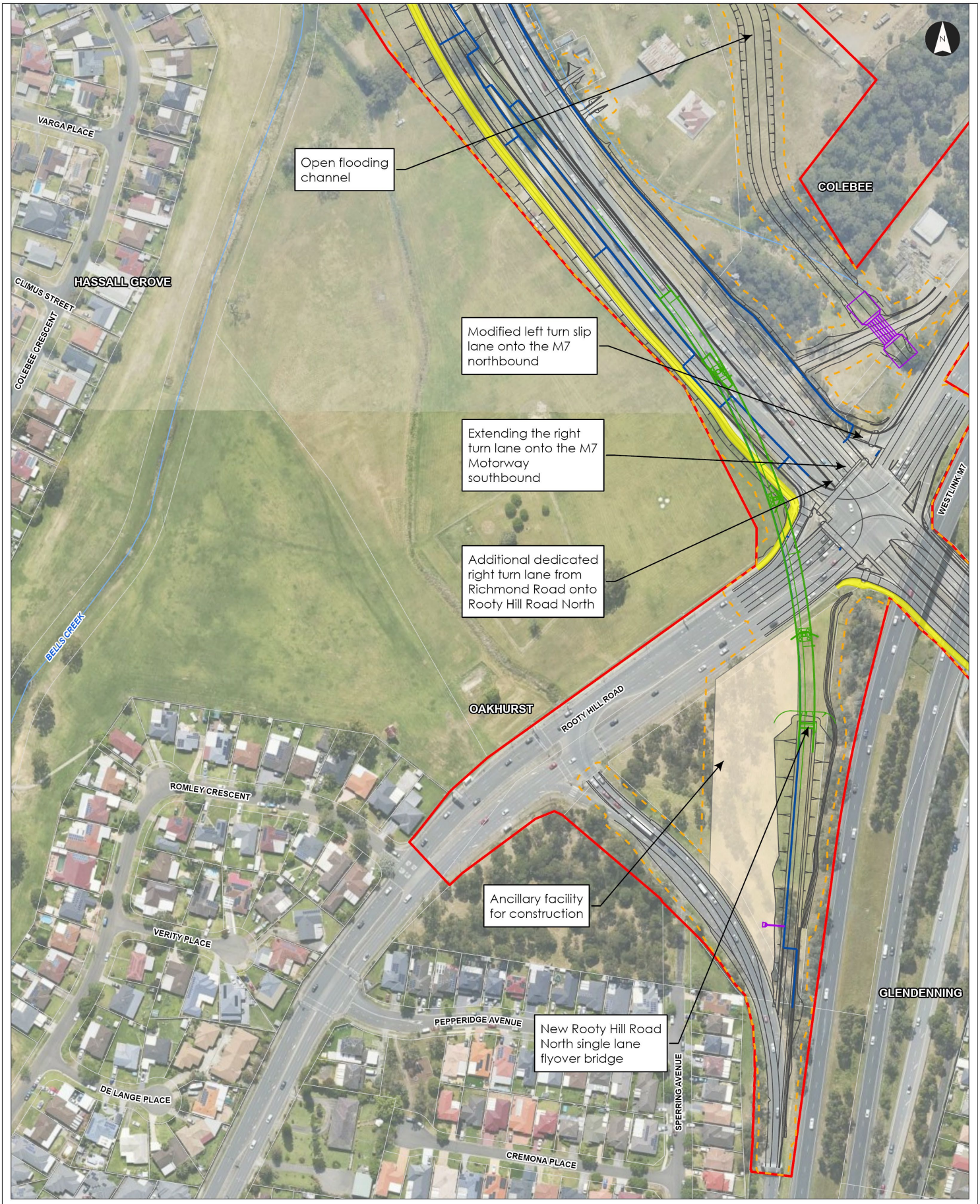


Figure 3-1 (d): Key features of the proposal

Richmond Road Upgrade between M7 Motorway to Townson Road

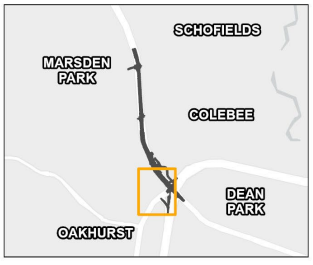
Project Code: 305001173-EN-GS-001
Drawn By: RA, Checked By: MM
Rev: 07 | Date: 2024-11-08

Legend

- REF construction boundary
- 80% Design freeze
- Flyover bridge
- Drainage culvert
- Stormwater design
- Watercourse
- Cadastre
- Operational footprint
- Ancillary facility for construction
- Shared pathway

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Watercourse and Cadastre (NSW SS, 2023)



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Scale at A3: 1:1,900

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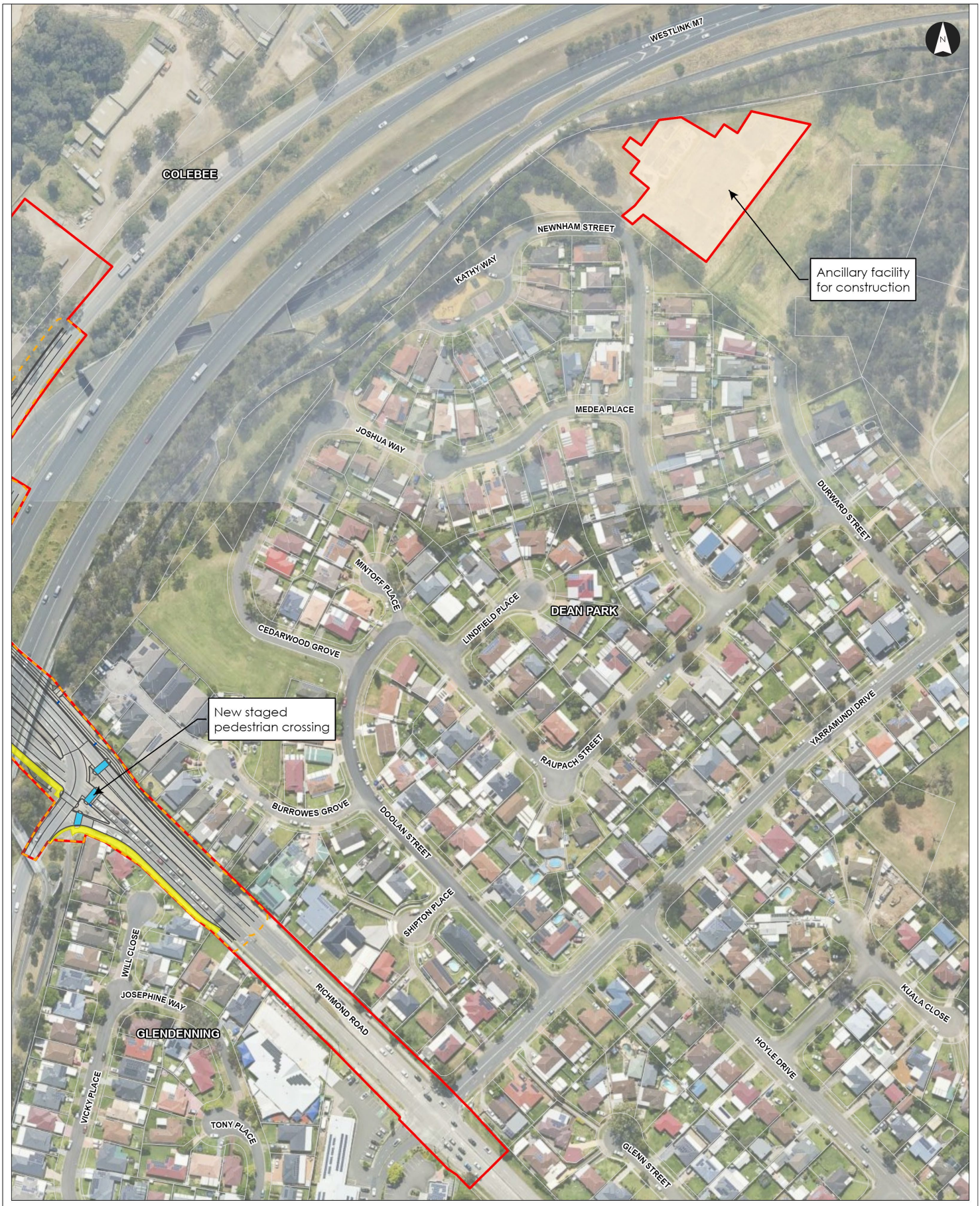


Figure 3-1 (e): Key features of the proposal

Richmond Road Upgrade between M7 Motorway to Townson Road

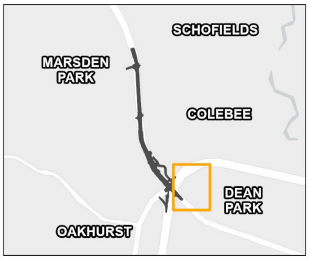
Project Code: 305001173-EN-GS-001
Drawn By: RA, Checked By: MM
Rev: 07 | Date: 2024-11-08

Legend

- REF construction boundary
- 80% Design freeze
- Stormwater design
- Cadastre
- Operational footprint
- Staged pedestrian crossings
- Ancillary facility for construction
- Shared pathway

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial Imagery (Metromap, Sept 2024)
2. Watercourse and Cadastre (NSW SS, 2023)



0 15 30 45 60 75 Metres

Scale at A3: 1:1,900

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3.2 Design

3.2.1 Design criteria

The concept design has been developed from the following standards and specifications:

- Austroads Guides to Road Design and Roads and Maritime Supplements to Austroads
- Austroads Guide to Bridge Technology: Part 8 Hydraulic Design of Waterway Structures
- Australian Standards (AS) and associated Roads and Maritime Supplements to AS
    - AS1742.1 to AS1742.15 and AS1743
    - AS5100:2017 Series Bridge Design
- Roads and Maritime Services (RMS) Technical Directions and Other Reference Documentation
- Transport QA Specification PS200 series
- Transport Technical Directions (including bridge technical direction manual)
- Transport Bridge Design Aesthetics Design Guideline.

The design criteria for the proposal has been summarised in Table 3-1.

Table 3-1 Design criteria

Design element	Design criteria
Speed limit	Posted speed: • 80km/h on Richmond Road from 200 m north of the bridge over Bells Creek to 20 m north of the Hollinsworth Road / Townson Road intersection. • 70km/h on Richmond Road between Yarramundi Drive and 200 m north of the bridge over Bells Creek. • 60km/h on flyover bridge, M7 Motorway Rooty Hill Road North off-ramp and Townson Road. • 50km/h on Hollinsworth Road.
Typical cross section (refer Figure 3-2 and Figure 3-3)	• Lane width – 3.5 m (minimum). • Left and right turn auxiliary lane width – 3.5 m (minimum). • Median width – 1.8 m (minimum) adjacent to right turn lanes on Richmond Road and 1.5 m (minimum) adjacent to right turn lanes on Hollinsworth Road and Townson Road. • Nearside (outside) shoulder width – 2 m (minimum) on Richmond Road, 2.5 m (minimum) on M7 Motorway off-ramp and 3 m (minimum) adjacent to barriers on M7 Motorway Rooty Hill Road North off ramp. • Offside (median) shoulder width – 1.2 m on Richmond Road and 1 m on M7 Motorway Rooty Hill Road North off-ramp.
Design vehicle	• 26 m B-Double vehicles (Level 2 Performance based standards) for all intersections.
Flyover bridge	• Minimum vertical clearance – 5.4 m. • 2.5 m wide inside shoulder, 1.0 m wide outside shoulder. • Design life – 100 years.
Bells Creek bridge	• Serviceable during the 0.2% average exceedance probability (AEP) design storm event. • 0.5 m shoulder. • Shared path – 4.3 m. • Design life – 100 years.
Bicycle and pedestrian facilities	• Richmond Road – shared path, 2.5 m (minimum) to 4 m in width. • Hollinsworth Road – footpath, 1.5 m in width.

Design element	Design criteria
Drainage	• Minor AEP for pavement drainage system – 10%. • Major AEP for pavement drainage system check and design AEP for pipe culverts – 1%. • Minimum longitudinal pipe size / minimum transverse pipe size – 375 mm / 450 mm. • Minimum pipe grade - 0.5%.

Flooding	• Freeboard – edge of road to be 300 mm above the 500 year average recurrence interval (ARI) flood level.
	• Flood level (height) afflux:
	  ○ less than 10 mm increase for any assessed flood event for all land zoned residential, commercial and industrial
	  ○ less than 100 mm increase for any assessed flood event for land zoned rural, primary production and public recreation.
	  ○ for land zoned grazing, forested lands and other rural areas: less than 50 mm increase for floods up to 5% AEP and less than 100 mm increase for floods between 5-100% AEP with localised increases of up to 250 mm considered acceptable where the increase occurs across no more than 5 ha, in all floods up to and including the 1% AEP event.
	  ○ nil for critical infrastructure.
	• Flood hazard (velocity-depth) – velocity-depth to remain in the zone for 'low hazard'. For increases greater than the 'low hazard' no more than 10% increase are acceptable provided flood level and flood velocity criteria are met.
	• Flood duration – No more than 5% increase for areas with an inundation depth of more than 1 m in the critical duration flood. Nil for critical infrastructure.
	• Flood direction – No significant change to the direction of watercourses or the direction of flood flows except for constriction into and expansion out of discrete openings (culverts and bridges).
	• Emergency management – no adverse impact on the community flood emergency management plans. Bells Creek to be above the 500 year ARI flood level to meet the Richmond Road flood evacuation route requirements.

Water quality	Post development pollution reduction targets (percentage of post development annual average load). The reduction targets are presented as a percentage of the annual average load had the water quality measures not been introduced: • Total suspended solids – 85%. • Total phosphorous – 65%. • Total nitrogen – 45%.

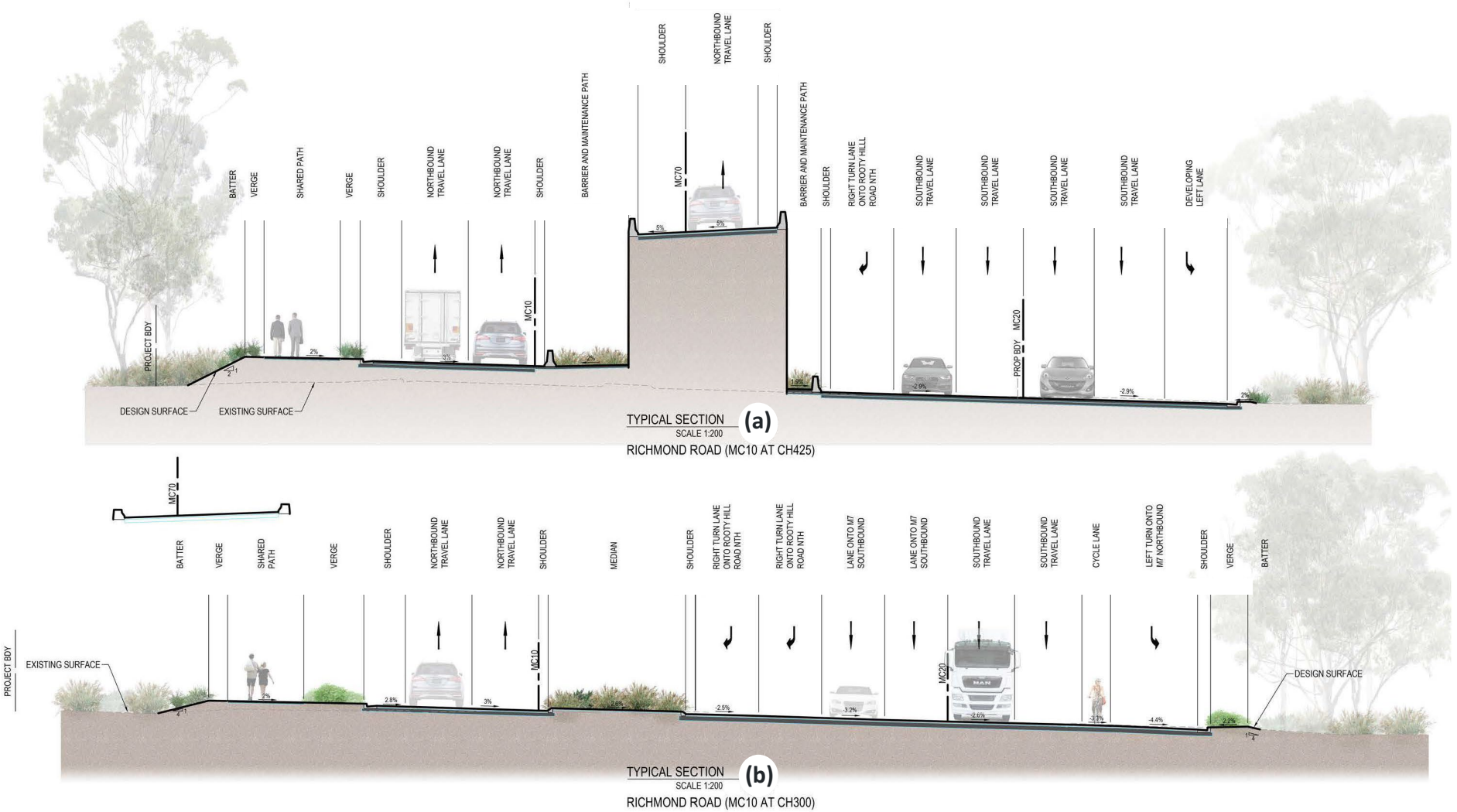


Figure 3-2 Typical cross sections of Richmond Road around (a) 175 metres and (b) 50 metres north of the Rooty Hill Road North / M7 Motorway on/off ramps intersection

Figure 3-3 Typical cross sections of Richmond Road around (a) 350 metres north and (b) 50 metres south of the Langford Drive / Alderton Drive intersection

Connecting with Country

Knowledge, cultural values, and stories about Richmond Road and the North West area are being gathered and incorporated into the design of the proposal, with the aim of sharing knowledge and strengthening local identity and culture. This process is Aboriginal led and endorsed, and follows the *Connecting with Country Framework* (Government Architect NSW, 2023). The key items being considered are:

- Research and analysis of Aboriginal history and stories of the Marsden Park and Colebee area.
- Engagement of local Aboriginal communities through meetings and workshops.
- Development of Aboriginal design principles to inform the design of the proposal.
- Identification of opportunities and constraints to incorporate Aboriginal design principles into the design.

The Aboriginal design principles for the proposal are described in section 2.3.3.

3.2.2 Engineering constraints

Table 3-2 lists the key engineering constraints to the proposal and describes how they have been addressed in the concept design. The locations of the constraints are shown in Figure 3-4.

Table 3-2 Engineering constraints

Constraint	Constraint description	Concept design provision
M7 Motorway Rooty Hill Road North off-ramp and toll gantry	The existing M7 Motorway Rooty Hill Road North off-ramp needs to be maintained in the final design and during construction. The toll gantry would need to remain operational.	The M7 Motorway Rooty Hill Road North off-ramp and toll gantry has been maintained in the design and during construction. Consultation with Westlink M7 has been undertaken and will continue as the design progresses.
Blacktown Native Institution land owned by the Dharug Strategic Management Group (DSMG)	The Blacktown Native Institution land owned by DSMG (Lot 5004 DP 1244410) is located north-west of the intersection of Richmond Road and Rooty Hill Road North. The site is currently informally accessed from Richmond Road. The Blacktown Native Institution land owned by DSMG forms the southern portion of the Blacktown Native Institution listing on the State Heritage Register (SHR No. 01866). A part of this heritage listing is located within the existing road corridor.	There would be no property acquisition of the Blacktown Native Institution land owned by the DSMG. The informal access currently on Richmond Road would be closed and a new access would be provided on Rooty Hill Road North, in consultation with the DSMG. A temporary access to maintain access during construction would be provided with the final location of a permanent access to be confirmed during further consultation with the DSMG and Blacktown City Council with reference to their future plans for this site. The proposal would impact the Transport owned north-eastern portion (Lot 1 DP 1043661) of the Blacktown Native Institution listing on the SHR (No. 01866). This portion of the SHR item has site-specific exemptions for road work. Refer section 4.2.4 for further information.
Plumpton Sewage Pumping Station SP0394	The Sydney Water Pumping Station is located on the eastern side of Richmond Road approximately 250 m north of the Richmond Road / Rooty Hill Road North intersection. The pump station is currently accessed from Richmond Road.	There would be no property acquisition, however, the existing driveway would be adjusted to ensure levels are consistent with the proposed design. Consultation with Sydney Water has been undertaken and will continue as the design progresses.

Constraint	Constraint description	Concept design provision
717 Richmond Road Lot 49 / DP1104950	Private property located at 717 Richmond Road approximately 130 m north of the Richmond Road / Rooty Hill Road North intersection. The property boundary and access are within the proposal footprint.	The existing property fence would be relocated, and driveway access would be reinstated. Consultation with the landowner has been undertaken and will continue as the design progresses. Full acquisition of this property is proposed.
Existing and proposed bridge over Bells Creek	The existing bridge over the Bells Creek is to be retained for use as the Richmond Road southbound carriageway. The proposed road alignment must match the vertical and horizontal alignment across the bridge. The new bridge proposed for the northbound carriageway requires the same vertical soffit level as the existing bridge.	The vertical soffit level of the existing bridge would be maintained during the upgrade of the Richmond Road southbound carriageway. The new Bells Creek bridge on the northbound carriageway would have the same vertical soffit level.
Colebee and Nurragingy Land Grant	The SHR protected site (SHR No. 01877) is located south-east of 27 Summerland Crescent.	Impacts to the SHR site have been avoided.
Construction staging	Richmond Road, M7 Motorway, Rooty Hill Road North and the connecting local roads would need to remain operational during construction of the proposal.	Construction staging has been considered to minimise impacts on existing traffic, enable safe construction access and egress and to minimise the duration of construction activities. Section 0 describes the indicative construction staging and work methodology for the proposal. Construction staging would be refined further during detailed design.
Castlereagh Connection corridor	The Castlereagh Connection corridor must be kept clear to future-proof the design and construction of the Castlereagh Freeway.	No permanent structures would be constructed in the corridor. Median widths have been altered to accommodate future turning lanes if required. Design levels have been maintained to not alter any previous investigations or studies into the Castlereagh Freeway.

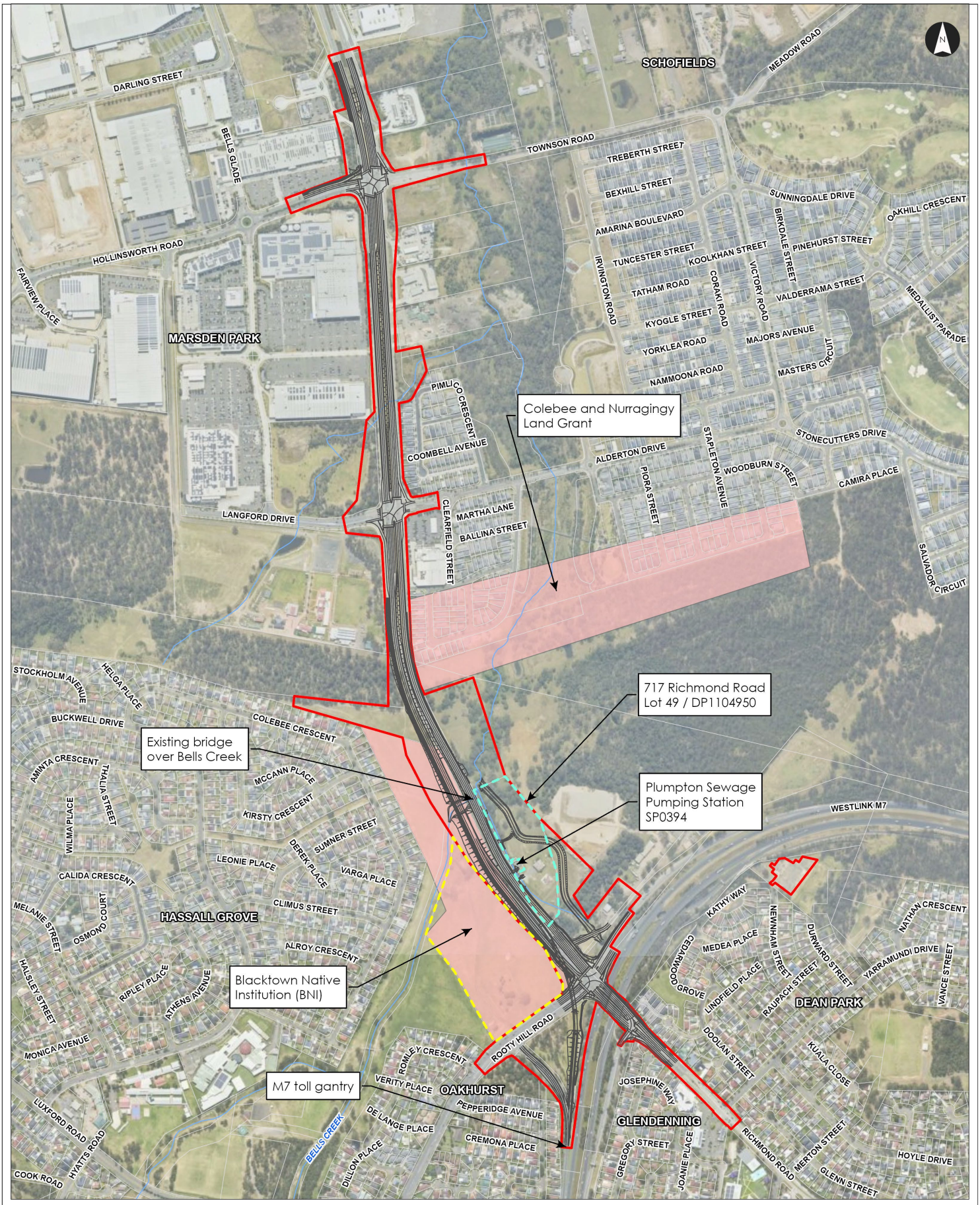


Figure 3-4: Engineering constraints

Richmond Road Upgrade between M7 Motorway and Townson Road

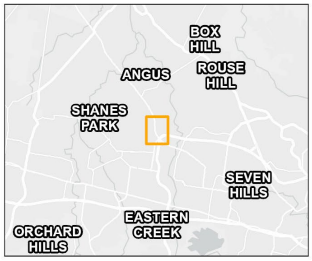
Project Code: 305001173-EN-GS-003
Drawn By: RA, Checked By: AS
Rev: 03 | Date: 2024-11-07

Legend

- REF construction boundary
- 80% Design freeze
- Watercourse
- Cadastre
- Lot 5004 / DP1244410
- Lot 49 / DP1104950
- State heritage register - curtilages

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial Imagery (MetroMap, Sep 2024)
2. Watercourse and Cadastre (NSW SS, 2023)
3. SHR Curtilage (NSW DCCEEW, 2024)



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0 100 200 300 Metres
Scale at A3: 1:7,500

3.2.3 Major design features

Richmond Road upgrade overview

M7 Motorway to Langford Drive / Alderton Drive intersection

The proposed Richmond Road upgrade between the M7 Motorway and 150 metres south of the Langford Drive / Alderton Drive intersection would include widening of the road corridor by up to 30 metres on the western side and up to 20 metres on the eastern side to increase the number of northbound and southbound lanes from two to three lanes in each direction.

The northbound carriageway would include two lanes (between the M7 Motorway and just south of Bells Creek) and the new flyover exit lane from the M7 Motorway (which would land in the median), creating three northbound travel lanes. The flyover bridge would connect the M7 Motorway Rooty Hill Road North off-ramp to Richmond Road prior to Bells Creek. A new bridge over Bells Creek would be constructed to accommodate the new three lanes of the northbound carriageway. The three lanes would continue north to the Langford Drive / Alderton Drive intersection and beyond (as existing).

The southbound carriageway currently has two lanes, with the additional third lane being added at the intersection of Richmond Road and Rooty Hill Road North and would extend to the intersection with Langford Drive / Alderton Drive.

Langford Drive / Alderton Drive intersection to Townson Road / Hollinsworth Road intersection

The Richmond Road upgrade from 150 metre south of the Langford Drive / Alderton Drive intersection to 250 metres north of the Townson Road / Hollinsworth Road intersection would include widening in the median by around 10 metres to increase the number of northbound and southbound lanes from two to three lanes each direction. The road corridor would not expand outwards in this section of the alignment.

Intersections

Four intersections along Richmond would be upgraded as a part of the proposal. Upgrades to each individual intersection are outlined below. The intersections are:

- Richmond Road / Rooty Hill Road North / M7 Motorway northbound on-ramp and southbound off-ramp
- Richmond Road / M7 Motorway southbound on-ramp
- Richmond Road / Langford Drive / Alderton Drive
- Richmond Road / Hollinsworth Road / Townson Road.

Richmond Road / Rooty Hill Road North / M7 Motorway northbound on-ramp and southbound off-ramp

The upgrade at the Richmond Road intersection with Rooty Hill Road North and M7 Motorway northbound on-ramp and southbound off-ramp would include:

- Richmond Road southbound approach - The changes would include:
    - Increasing the number of lanes from five lanes to seven lanes. The number of right turn lanes onto Rooty Hill Road North would increase from one to two. The additional right turn lane would be around 100 metres long, the same length as the existing right turn lane. An additional through lane on Richmond Road would be provided increasing the Richmond Road and M7 Motorway lanes from three to four lanes.
    - Increasing the storage length of the left turn lane onto the M7 Motorway northbound on-ramp from around 65 metres to around 75 metres. This allows for the additional storage of three cars without impacting the through lanes on Richmond Road.
- Rooty Hill Road North left turn onto Richmond Road would have the acceleration lane on Richmond Road removed. The construction of the flyover would reduce traffic making this movement which reduces the need for the acceleration lane. Vehicles turning left from Rooty Hill Road North onto Richmond Road would need to join directly onto the two northbound Richmond Road lanes.
- Removal of the long northern pedestrian crossing on Richmond Road. Connectivity between the two sides of Richmond Road would be provided by a new crossing located around 160 metres south at the Richmond Road / M7 southbound on-ramp intersection.

The proposed layout of the new intersection of Richmond Road with Rooty Hill Road North and M7 Motorway is shown in Figure 3-5.

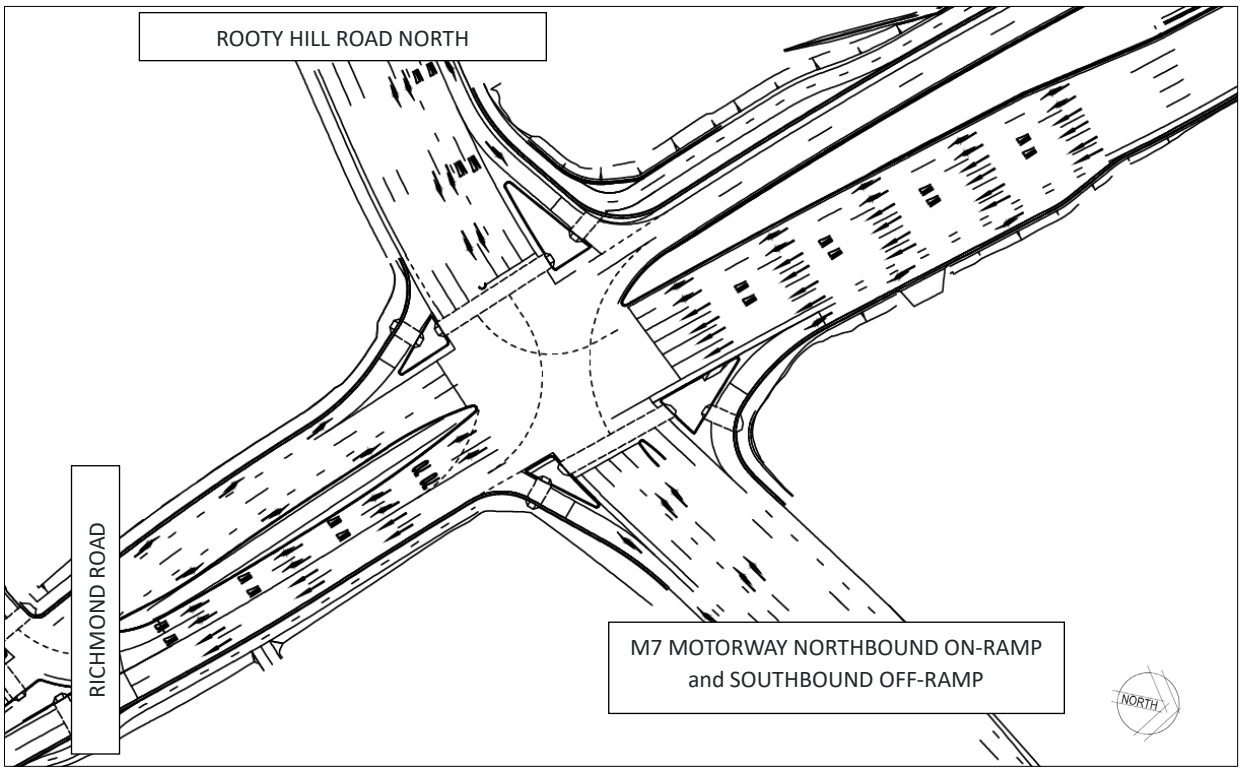


Figure 3-5 Plan view of the proposed Richmond Road / Rooty Hill Road North intersection

Richmond Road / M7 Motorway southbound on-ramp

The intersection between Richmond Road and the M7 Motorway southbound on-ramp would maintain the existing lane configuration after the proposed works are completed.

A new staged crossing connecting the eastern and western side of Richmond Road is proposed and would replace the existing long crossing approximately 160 metres to the north. This would include the existing crossing over the northbound left turn lane from Richmond Road to the M7 Motorway southbound on-ramp. An additional two crossings, over the northbound and southbound Richmond Road carriageways would be constructed to provide pedestrian connectivity between Dean Park on the northern side of Richmond Road and Glendenning on the southern side. The new staged crossings would be signalised and fencing would be provided in the median to ensure pedestrian safety. This new crossing is required as the existing long pedestrian crossing at the Richmond Road / Rooty Hill Road North intersection would be removed to improve safety, traffic flow and congestion. The proposed pedestrian crossing at the M7 Motorway southbound on-ramp is shown in Figure 3-6.

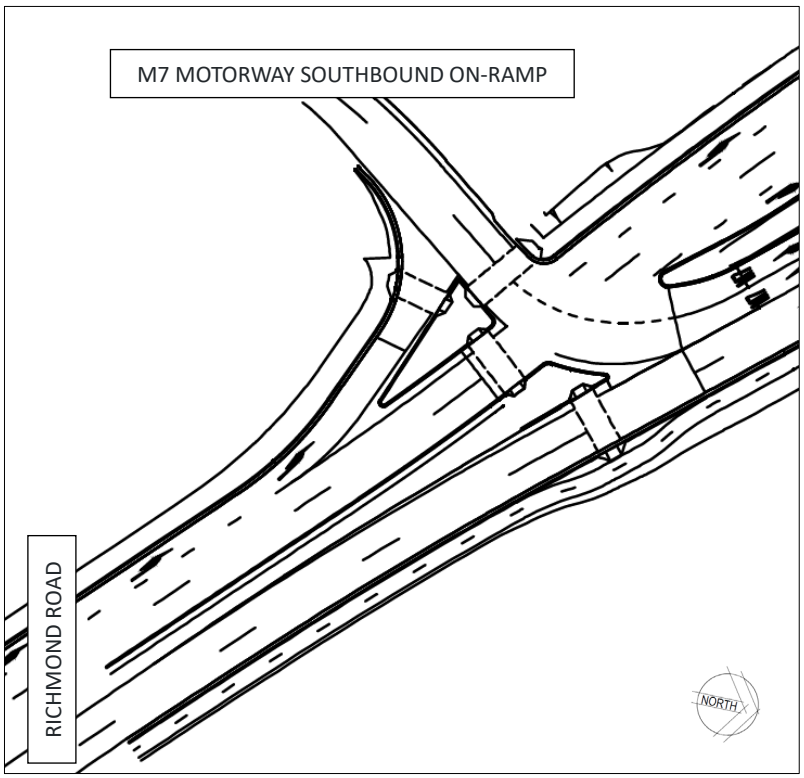


Figure 3-6 Plan view of the proposed staged pedestrian crossing at Richmond Road / M7 Motorway southbound on-ramp

Richmond Road / Langford Drive / Alderton Drive

The upgrade at the Richmond Road intersection with Langford Drive and Alderton Drive would include:

- Richmond Road northbound approach - Widening in the median by around three metres to provide space for an additional third northbound through lane to be constructed whilst shifting across the existing dual right turn lanes onto Alderton Drive. The left turn lane onto Langford Drive and the bus lane would be retained.
- Richmond Road northbound departure - Widening in the median by around three metres to provide space for an additional third northbound through lane. The existing bus stop would be retained.
- Richmond Road southbound approach - Widening in the median by around three metres to provide space for an additional through southbound lane. The existing single right turn lane onto Langford Drive would be shifted slightly to the west. The existing left turn lane to Alderton Drive would be retained.
- Richmond Road southbound departure - Widening in the median by around three metres to provide space to provide an additional southbound lane, increasing the total from two to three lanes. The existing bus stop would be retained.
- Staged crossings across Richmond Road on both the northern and southern sides of the intersection - Staged crossings would improve pedestrian safety and traffic flow as pedestrians cross a single carriageway at a time, as opposed to crossing Richmond Road in a single movement. Pedestrians would pause in the middle median and wait for the next green light before crossing the final carriageway. The new staged crossings would be signalised and fencing would be provided in the median to ensure pedestrian safety.

The proposed layout of the new intersection of Richmond Road with Langford Drive and Alderton Drive is shown in Figure 3-7.

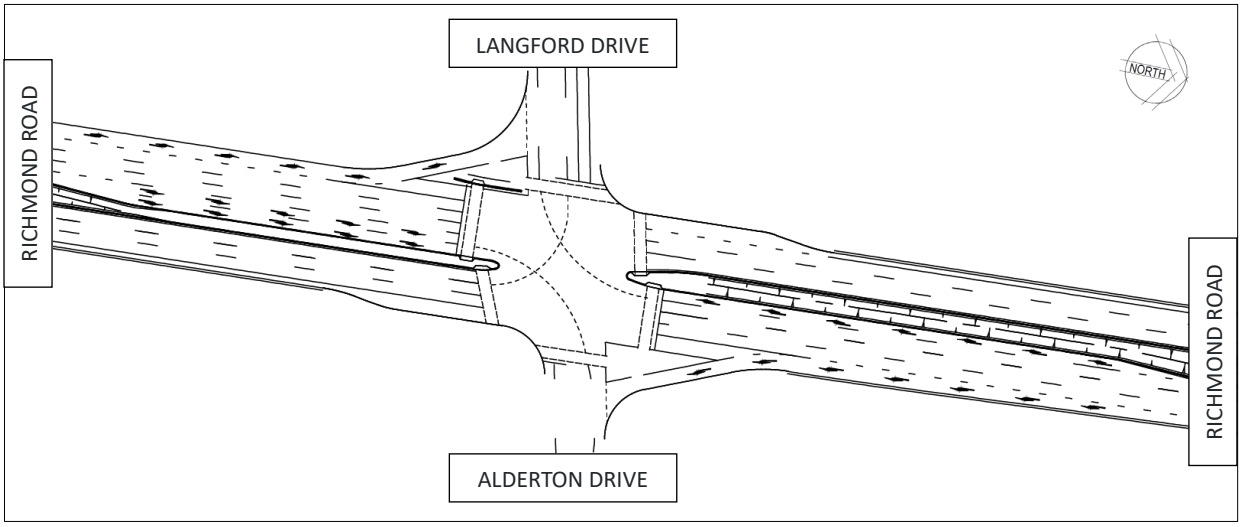


Figure 3-7 Plan view of the proposed Richmond Road / Langford Drive / Alderton Drive intersection

Richmond Road / Hollinsworth Road / Townson Road

The upgrade at the Richmond Road intersection with Hollinsworth Road and Townson Road would include:

- Richmond Road northbound approach - Widening in the median by approximately three metres to enable a third northbound through lane, increasing the number of lanes from two to three northbound lanes. The two existing right turn lanes onto Townson Road would be maintained but shifted slightly east towards the median. The left turn lane onto Hollinsworth Road would not be changed.
- Richmond Road northbound departure - Widening in the median by around three metres to enable a third northbound lane to be constructed. The existing bus stop would be maintained. The proposed Hollinsworth Road left turn lane onto Richmond Road would join in the lane adjacent to the bus stop. After the bus stop, the left most lane would start to merge resulting in two northbound Richmond Road lanes at the northern extent of the proposal.
- Richmond Road southbound approach - Widening in the median by around three metres to enable an additional second right turn lane onto Hollinsworth Road. The additional right turn lane would be around 100 metres long, the same length as the existing right turn lane. Three through lanes would be maintained as well as the bus lane and left turn slip lane onto Townson Road.
- Richmond Road southbound departure - The lane configuration would not change.
- Hollinsworth Road - Widening on the kerb side by around 20 metres to provide space to construct a left turn slip lane from Hollinsworth Road onto Richmond Road northbound. The existing through / left turn lane would be changed into only a through lane onto Townson Road. The existing right turn lanes onto southbound Richmond Road would be maintained.
- Townson Road- Townson Road would not be changed as part of this proposal.
- Staged crossings across Richmond Road are proposed on both the north and south sides. Staged crossings would improve pedestrian safety and traffic flow as pedestrians cross a single carriageway at a time as opposed to crossing Richmond Road in a single movement. Pedestrians would pause in the middle median and wait for the next green light before crossing the final carriageway. The new staged crossings would be signalised and fencing would be provided in the median to ensure pedestrian safety.

The proposed layout of the new intersection of Richmond Road with Hollinsworth Road and Townson Road is shown in Figure 3-8.

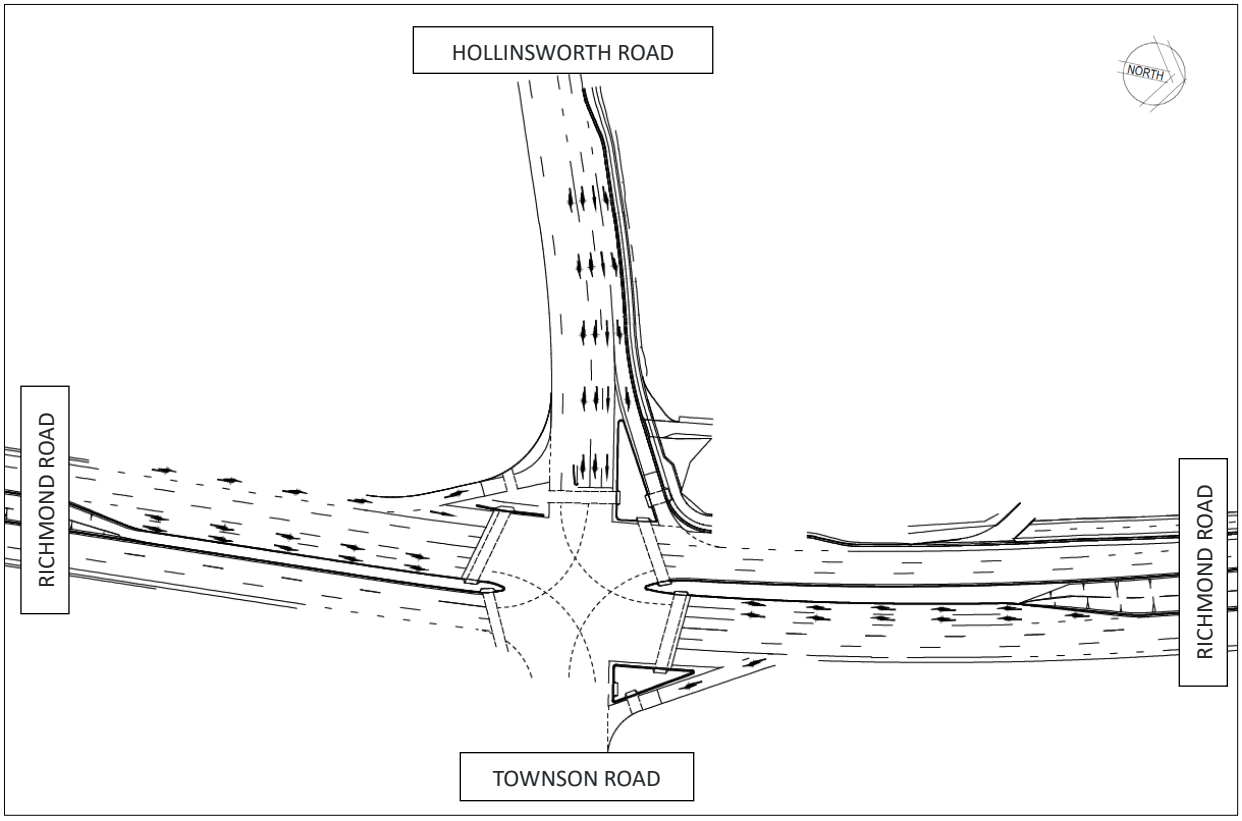


Figure 3-8 Plan view of the proposed Richmond Road / Townson Road / Hollinsworth Road intersection

Active transport

Pedestrian and cyclist facilites

Proposed changes to the existing pedestrian and cyclist facilities, either as footpaths or shared paths, on Richmond Road are as follows:

- The shared paths on the southern and northern sides of Richmond Road between Yarramundi Drive and the intersection with Rooty Hill Road North / M7 Motorway northbound on-ramp would be retained.
- A new four metre wide shared path on the western side of the Richmond Road between Rooty Hill Road North / M7 Motorway on/off-ramps and Langford Drive / Alderton Drive intersections. The existing path would be removed during the planned road widening. The new shared path would provide the same connectivity as the existing shared path. The section of the existing shared path on the eastern side of Richmond Road to the south of the Langford Drive / Alderton Drive intersection would be maintained.
- All pedestrians and cycling facilities on Richmond Road north of the Langford Drive / Alderton Drive intersection would be maintained as per the existing configuration.

Pedestrian crossings

Staged crossings are proposed on Richmond Road either side of the Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road intersections. The existing northern pedestrian crossing on Richmond Road at the intersection of Rooty Hill Road North / M7 Motorway northbound on-ramp would be relocated around 160 metres south to the intersection to the Richmond Road / M7 Motorway southbound on-ramp intersection.

The five staged crossings would replace the existing long crossings, enabling pedestrians to cross Richmond Road from one side to the other in two movements. The new staged crossings would be signalised and allow pedestrians to cross one carriageway before stopping in the median, and then crossing the second carriageway. Fencing would be provided in the median to ensure pedestrian safety.

Bus stops and bus lanes

There are currently seven bus stops along the length of the upgraded road. This includes two bus stops on Rooty Hill Road North, and five bus stops on Richmond Road. No bus stops would be changed or removed as part of the proposal.

The two bus stops on Rooty Hill Road North are south-west of the Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp intersection. These bus stops service the 747 and 750 bus routes. Neither bus stops would be impacted by the proposed works. Of the five bus stops on Richmond Road two are located immediately after the northbound and southbound departures from the Richmond Road / Langford Drive / Alderton Drive intersection. There is one bus stop located immediately after the southbound departure from the Richmond Road / Hollinsworth Road / Townson Road intersection. These bus stops service the 747 and 751 bus routes. Two bus stops are located on either side of Richmond Road slightly north of Yarramundi Drive. These bus stops service the 750 bus route. No bus stops would be impacted by the proposed work.

The intention is for bus stops to remain in operation, with potential slight relocation during construction. Final details would be confirmed during detailed design.

The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Townson Road / Hollinsworth Road would be maintained.

Bridges

Flyover bridge

The proposed single lane flyover bridge would connect the M7 Motorway to Richmond Road northbound. The flyover bridge would start on the existing the M7 Motorway Rooty Hill Road North off-ramp, after the existing toll gantry. Instead of beginning to veer left towards Rooty Hill Road North, vehicles could continue straight, up onto the flyover bridge. The flyover bridge curves left, over Rooty Hill Road North and lands in between the proposed northbound and southbound Richmond Road carriageways. The flyover bridge lane would continue and become its own lane on the new Richmond Road bridge over Bells Creek, therefore traffic using the flyover bridge would not be required to merge. The location of the flyover bridge is shown in Figure 3-1 (d).

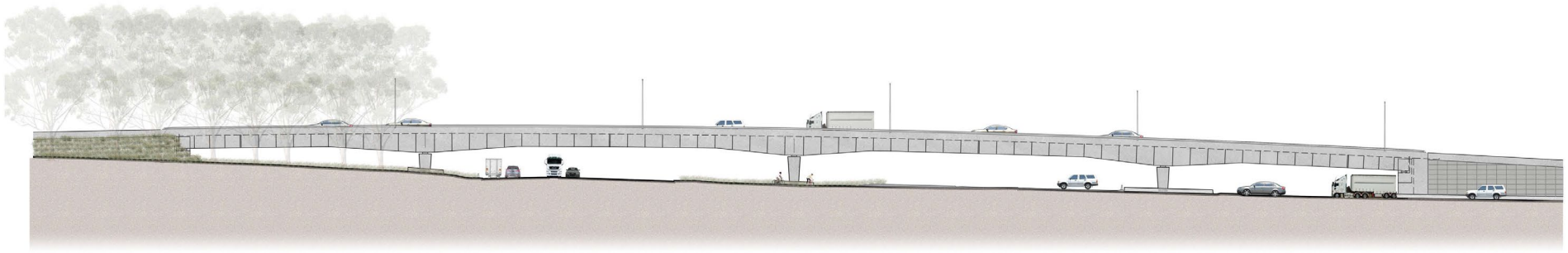
The bridge would be around 250 metres in length, likely consisting of a concrete four span deck of varying lengths with concrete three piers and abutments on either end. The first pier would be located on the southern side of Rooty Hill Road North around 45 metres from the intersection with Richmond Road. The second pier would be located on the western corner of the Rooty Hill Road North / Richmond Road intersection, immediately behind the existing shared path. The shared path would be relocated as necessary to accommodate the proposed second pier. The third pier would be located in between the proposed new northbound and southbound Richmond Road carriageways. The highest point of the bridge would provide 6.2 metres vertical clearance above Rooty Hill Road North. The long section of the bridge and indicative pier locations are provided in Figure 3-9.

One of the flyover bridge abutments is located within the triangle parcel of land between Rooty Hill Road North and the M7 Motorway. This road leading up to the abutment consists of a roughly 170 metre spillthrough batter beginning at the M7 Motorway Rooty Hill Road North off-ramp. The batter slope would be around 2:1.

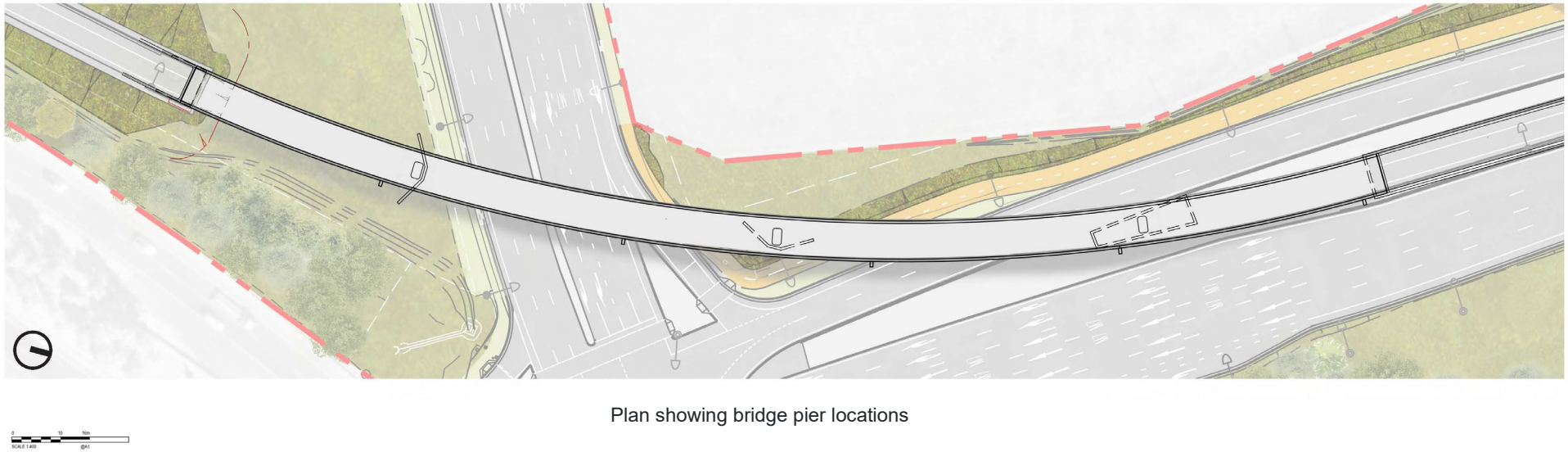
The other abutment is proposed to be located inbetween the new northbound and southbound carriageways. This would be over the existing southbound carriageway which is proposed to be shifted during the proposed works on Richmond Road. The abutment would consist of a 151 metre long retaining wall. At its highest point, the retaining wall would be around 8.4 metres high. The retaining wall would gradually decrease in height as the flyover bridge ramps down to ground level and merges with Richmond Road.

The total bridge width would be approximately 8.4 metres and includes a single 3.8 metre wide traffic lane, 2.5 metre wide inside shoulder and a 1.0 metre outside shoulder. Traffic barriers would be installed along both sides of the bridge. The cross section at the pier of the bridge is provided in Figure 3-10.

The material, finish, and texture of the bridge would be determined during detailed design, but would likely match with the the nearby M7 Motorway bridge structures and the surrounding environment. There are opportunities for artwork on the bridge walls and batters which would be developed in consultation with local knowledge holders.



Elevation showing haunched superstructure



Plan showing bridge pier locations

Figure 3-9 Long section and plan view of the flyover bridge (indicative concept design)

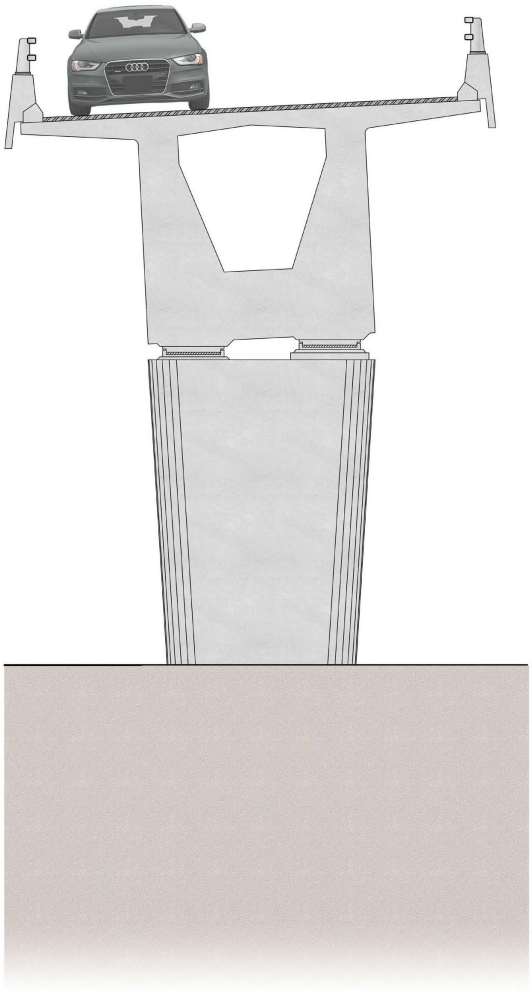


Figure 3-10 Cross section at pier of the flyover bridge (indicative concept design)

Bells Creek bridge

A new bridge over Bells Creek for the northbound carriageway with an integrated shared path along the western side would be constructed as part of the proposal. The proposed Bells Creek bridge would be located approximately 14 metres west of the existing Bells Creek bridge as shown in Figure 3-1 (c).

The concrete bridge would be approximately 29 metres in length and would be approximately 18 metres in width. The bridge would include three 3.5 metre northbound traffic lanes and a four metre wide shared path on the western side. Barriers would be installed along both sides of the carriageway. The proposed long section and cross section of the new bridge over Bells Creek are provided in Figure 3-11 and Figure 3-12, respectively.

The bridge abutments would comprise reinforced concrete beams and concrete piles. The bridge would have the same vertical soffit level as the existing bridge over Bells Creek. The material, finish, and texture of the bridge would be determined during detailed design, but would likely match with the adjacent existing bridge over Bells Creek, the nearby M7 Motorway bridge structures and the surrounding environment.

The existing boardwalk bridge next to the northbound Richmond Road carraigeway would be demolished as a part of the proposed widening. Shared pedestrian and cycling facilities would be provided as part of the new northbound Richmond Road bridge over Bells Creek.

The existing bridge structure over Bells Creek would be retained for southbound traffic on Richmond Road. The bridge would undergo minor resurfacing works as part of the proposal. This would ensure the bridge surface ties into the new pavement on either side of the bridge.

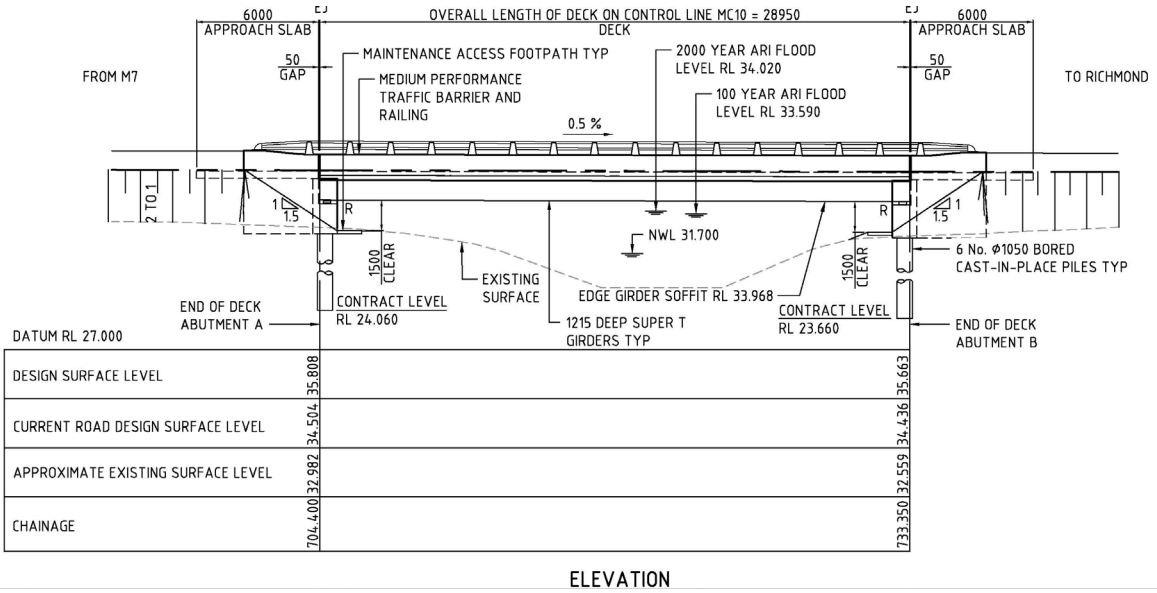


Figure 3-11 Long section of the proposed Bells Creek bridge (indicative concept design)

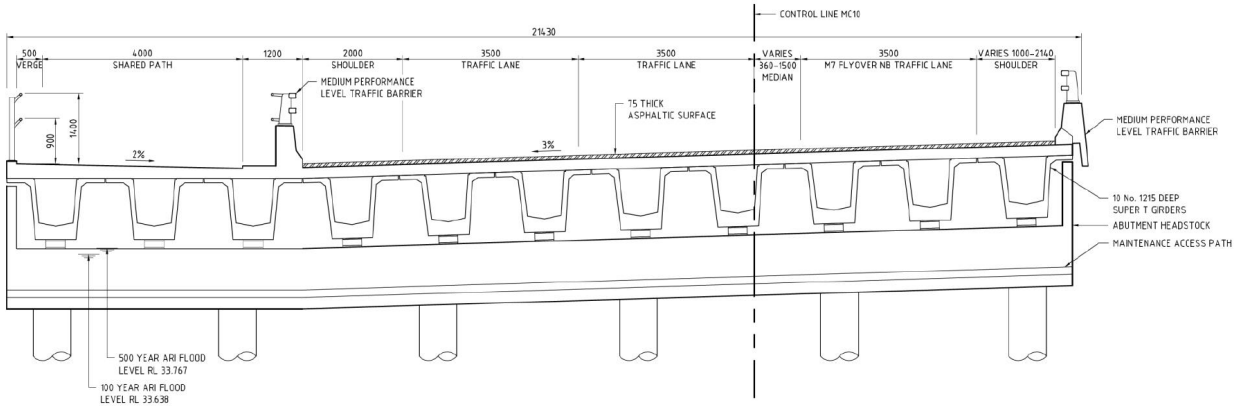


Figure 3-12 Typical cross section of the proposed Bells Creek bridge (indicative concept design)

Urban design and landscape

The urban and landscape design strategy for the proposal aims to enhance the experience of all road users and the community through landscape regeneration of the natural environment along the Bells Creek catchment corridor with respectful integration with nearby sites of cultural and heritage significance. Design features with respect to the landscape character and urban design are further described in Appendix I and include the following features:

- Revegetation of disturbed areas using local native species, particularly around Bells Creek to maintain its natural ecosystem.
- Structures and bridges designed to help recede the built form into the surrounding landscape and utilise common elements across the alignment.
- Maintained and enhanced landscape views across the Bells Creek floodplain.
- Potential opportunities to express connection to Country such as integration of art work on project structures, an interaction with the Blacktown Native Institution site and/or through cultural plantings. Further consultation with the DSMG on the opportunities will be undertaken.
- Water sensitive urban design features and use of native plant species that respond to the local climate, amongst others, to achieve sustainability for the proposal.

The urban design objectives and supporting principles for the propsoal are described in section 2.3.2.

Water management

Drainage structures

The proposal would include various drainage structures including longitudinal drains, cross drainage culverts and an open flooding channel. All drainage requirements have been designed in accordance with relevant guidelines and standards and relevant Australian rainfall and runoff data. The design criteria are outlined in section 3.2.1. The potential effect arising from climate change has also been considered in the design.

The proposed drainage structures for the proposal would include (refer Figure 3-1 (a) to 3-1 (e)):

- Longitudinal drainage which consists of a pit and pipe network primarily to drain the pavement and adjacent verge along the road. Where feasible existing drainage would be retained, however, new drainage would be required where the road corridor is widened and the existing drainage is no longer sufficient.
- Cross-drainage culverts including installation of scour protection at the outlets. Scour protection would prevent erosion and scour and would likely comprise either turf, jute matting, rock lining or concrete lining, depending on the design velocity in the channel. Cross drains and scour protection would be installed and/or modified at the following locations:
    - Culvert outlet at the start of the flyover bridge. The proposed culvert would be 450 millimetres in diameter with scour protection of around 1.5 metres by 2.9 metres.
    - Colebee Yard culvert crossing located to the north-east of the intersection of Richmond Road / Rooty Hill Road North / M7 Motorway on/off-ramps. The culvert would consist of three pipes each 900 millimetres in diameter with around eight metres by 17 metres of rock lining protection on either side of culvert. The culvert would flow into the open flooding channel, ultimately draining into Bells Creek.
    - Culvert outlet on the north-eastern side of Richmond Road, around 80 metres north of the Plumpton Sewage Pumping Station. The proposed culvert would have a 1050 millimetre diameter outlet with scour protection of around 6.5 metres by 6.8 metres. This location would include a gross pollutant trap (GPT).
    - Culvert outlet on the north-eastern side of Richmond Road, around 100 metres north of the bridge over Bells Creek. The proposed culvert would have a 600 millimetre diameter outlet with scour protection of around 1.5 metres by 2.9 metres. This location would include a GPT.
    - The existing culvert at the intersection of Richmond Road and Hollinsworth Road would be extended by around 10 metres and a new headwall constructed. The culvert outlet would include rock lining in the waterway with an area of around seven metres by 11 metres.
- Vegetated drainage channels would be located along the along the western side of Richmond Road from around 100 metres north of the Richmond Road / Rooty Hill Road North intersection draining to Bells Creek, and from around 100 metres north of Bells Creek draining to Bells Creek. There would also be a channel in the triangular piece of land between the M7 Motorway, the M7 Motorway Rooty Hill Road North off-ramp and Rooty Hill Road North.
- Open flooding channel starting north-east of the intersection of Rooty Hill Road North / Richmond Road / M7 Motorway on/off-ramps, and run in a northerly direction for around 450 metres before discharging into Bells Creek. The channel would be vegetated and would be around 450 metres long, with a 10 metre base width and 2:1 slopes, and 2.5 metres wide. The depth of the channel would be approximately 1.2 metres. The flooding channel's purpose is to provide water a flow path during storm events to Bells Creek. The open flooding channel would provide enough freeboard under the new and proposed bridges over Bells Creek in one per cent AEP storm events.
- The new flyover bridge would include one direction crossfall that would direct water into scuppers along the side of the bridge. The scuppers would feed into a separate drainage pipe under the bridge where the water would be directed into the Richmond Road drainage infrastructure.

The location and design of the drainage structures would be refined during further design development.

During construction, additional erosion and sediment controls would be needed including water diversions, sediment fences, sediment basins and/or sediment traps. Erosion and sediment controls are used during construction to prevent sediment, nutrients and pollutants from entering and polluting local waterways. These would be designed in accordance with *The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 2* (DECC, 2008).

Water quality control structures

Gross pollutant traps (GPT) are structures that use physical processes to trap solid waste such as litter and coarse sediment. Sump type GPTs will also capture some finer pollutants such as sediment and suspended solids. Two gross GPT are proposed

to be installed as part of the proposal. One GPT is located around 80 metres north of Bells Creek and the other one is located 100 metres south of Bells Creek as shown in Figure 3-13. The GPTs would be located prior to the discharge of stormwater run-off from the road before ultimately draining into Bells Creek.

One existing GPT located near the driveway to the Colebee Yard, would be decommissioned as part of the proposal as shown in Figure 3-13. The proposed GPT to the south of Bells Creek would treat the water that was previously directed through the GPT that would be removed.

The existing GPT located on the northern-western corner of the intersection of Richmond Road and Hollinsworth Road would be relocated approximately six metres to the north to accommodate the new left turn slip lane.

Water quality treatment for the proposal would be refined during further design development and guided by Blacktown City Council requirements.

Figure 3-13 Water quality treatment locations

Roadside furniture

The specifics of the supporting road infrastructure, signage and line marking would be confirmed during design development. However, it would likely include:

- Lighting – existing light poles would be retained where possible or relocated when impacted by the proposed design. New lighting would be provided along the M7 Motorway Rooty Hill Road North off-ramp and the new flyover bridge. The lighting design has been developed to comply with Australian Standard *AS/NZS 1158 Lighting for Roads and Public Spaces* and other Transport lighting requirements.
- Safety barriers – various barrier types would be installed along Richmond Road including flexible safety barriers, concrete barriers and guardrails. The flyover bridge would have concrete parapets installed along both sides of the bridge.
- Line markings – line marking would be provided in accordance with Australian Standard *AS1742 Manual of Uniform Traffic Control Devices and Transport Road Design Guidelines*.
- Signs – existing signs (subject to condition assessment) would be either removed, retained or relocated. The existing directional sign at the existing M7 Motorway Rooty Hill Road North off-ramp would be updated to suit the new flyover bridge.

- Fencing – existing fencing impacted by the proposal would be relocated to the boundary of the road reserve and private land, as required to demarcate land ownership. Fencing includes pedestrian and wire fencing and would match, as best as possible, to the existing fences using the latest Transport fencing standards. Pedestrian fencing would be installed on the medians at the staged crossings to ensure pedestrian safety.

3.3 Construction activities

This section provides a summary of the likely construction methodology, work hours, plant and equipment and associated activities that would be used to construct the proposal.

3.3.1 Work methodology

Construction activities would be carried out in accordance with a Construction Environmental Management Plan (CEMP) that would be prepared to ensure construction work is carried out to Transport's specifications and legislative requirements.

The appointed Contractor would confirm the final construction methodology in discussion with Transport. An indicative work methodology is described in Table 3-3 and has been used for the purposes of this environmental assessment. Should the work method substantially differ from what is proposed in this REF, the Contractor would consult with Transport to determine if additional impact assessment is needed.

Table 3-3 Indicative construction activities

Construction activities	Work methodology
Site preparation	• Notify all property owners and stakeholders before commencement of work • Obtain all licences and permits • Establish no go zones for construction, particularly Tree Protection Zones, sensitive ecological areas and sensitive cultural heritage areas • Establish temporary erosion and sediment control and drainage devices for stormwater management • Install traffic management controls including any diversions
Ancillary site set-up	• Demarcate site compounds, set equipment storage and fencing, establish access requirements
Protection and/or relocation of existing services	• Adjust/relocate utility infrastructure (water, gas, electricity, and telecommunications) where required
Surface preparation	• Carry out all pre-clearance surveys • Vegetation clearing, tree trimming, grubbing of scrub • Remove and mulch vegetation in stages along the new road alignment • Strip and stockpile topsoil in stages • Prepare the surface using graders, dozers and other equipment
Earthworks	• Ensure all existing utility locations are known prior to breaking ground • Relocate any infrastructure/utilities as required • Implement traffic management controls • Strip topsoil and subsoils and implement stockpile management/dust suppression • Excavate cutting and create fill embankments • Ensure any material to be disposed of offsite is sampled and tested for waste classification purposes • Manage fill importing, grading and compaction • Install drainage devices, pipes, and culverts as per the design • Install any water sensitive urban design (WSUD) features – swales, detention basins

Construction activities	Work methodology
Drainage	• Install/extend culverts • Install drains, pipes and channels • Install scour protection
Road pavement construction	• Install retaining walls • Cut and fill related activities • Prepare and level subgrade materials • Lay pavement material and compact • Install footpaths and adjacent surfaces • Install new kerbs and any stormwater/drainage devices
Bridge construction	• Install erosion and sediment control devices as required • Install abutment foundations • Construct abutments and any retaining walls/batters • Install load bearing structure, and pavement and any drainage features
Finishing works	• Conclude property access • Complete tie-ins • Install safety barriers • Rehabilitate disturbed areas and landscape in accordance with the landscaping planting strategy • Install line marking, signs and guideposts • Install street lighting and signage
Site clean-up	• Decommission temporary facilities (e.g. compound sites) • Clean-up the site and dispose of all surplus waste materials

3.3.2 Construction staging

The construction staging of the proposal would carefully consider constructability to minimise impact on existing traffic, allow for safe construction access and egress and minimise the construction duration. The construction staging for the proposal would be split into two construction stages as follows (refer Figure 3-14):

- Stage 1 Northern section – Richmond Road between 150 metres south of the Langford Drive and Alderton Drive intersection and 250 metres north of the Hollinsworth Drive and Townson Road intersection.
- Stage 2 Southern section – Richmond Road between M7 Motorway southbound on-ramp and 150 metres south of the Langford Drive and Alderton Drive intersection.

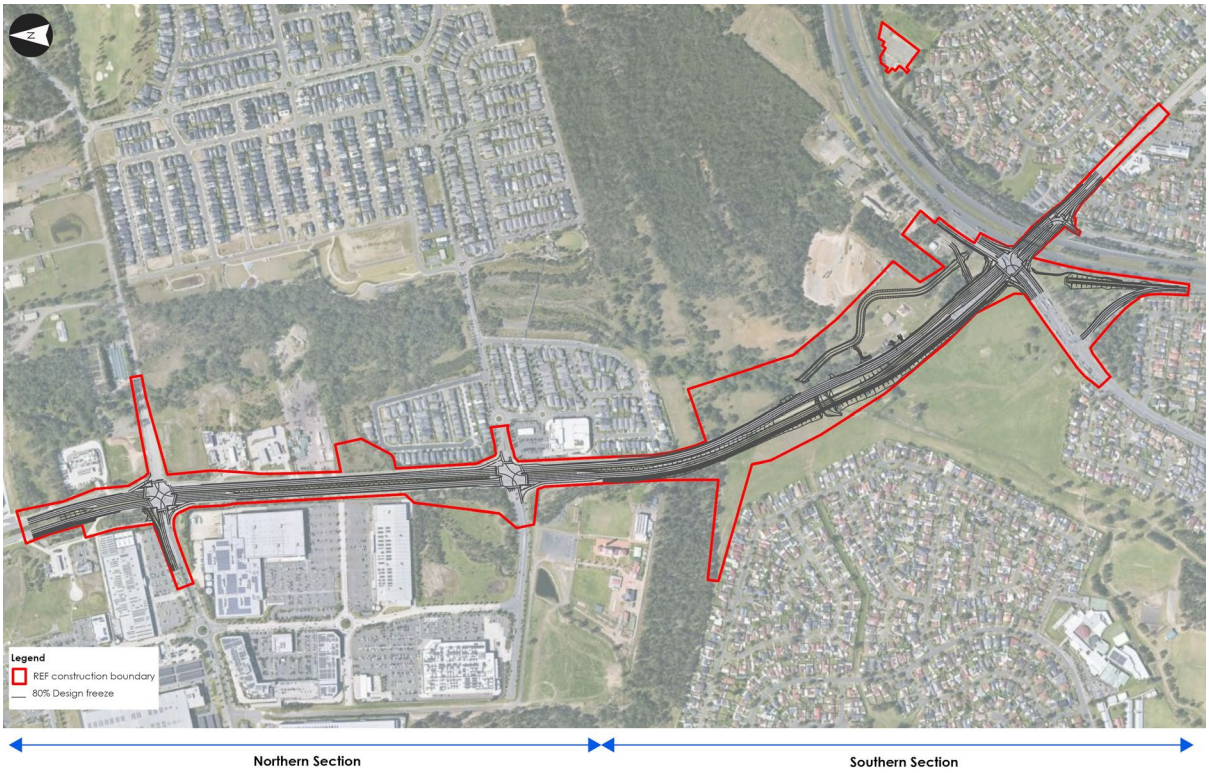


Figure 3-14 Richmond Road construction staging Stage 1 (northern section) and Stage 2 (southern section)

The construction stages have been divided into four components for each stage as outlined in Table 3-4. The likely construction activities, hours of work and duration associated with each stage are also provided in Table 3-4. The construction staging would be refined further during the detailed design and pre-construction planning.

Table 3-4 Construction staging and activities

Stage	Stage description	Construction activities	Hours of work	Duration (months)
Stage 1A	• Earthworks and road surfacing of the existing medians to accommodate the widening of Richmond Road. • Construction of the Hollinsworth Road left turn slip lane.	• Ancillary site set-up of sites 1 and 3 • Mobilisation and site establishment • Protection and/or relocation of existing services • Surface preparation • Earthworks • Drainage • Road pavement construction • Finishing works • Site cleanup	Day work	7
Stage 1B	• Road resurfacing on the northbound Richmond Road carriageway and Hollinsworth Road.	• Mobilisation and site establishment • Protection and/or relocation of existing services • Earthworks • Drainage • Road pavement construction • Finishing works	Mostly night work	2

Stage	Stage description	Construction activities	Hours of work	Duration (months)
		• Site cleanup		
Stage 1C	• Road resurfacing on the southbound Richmond Road carriageway and at the Langford Drive / Alderton Drive intersection.	• Mobilisation and site establishment • Earthworks • Drainage • Road pavement construction • Finishing works • Site cleanup	Night work	2
Stage 1D	• Finalisation of any remaining minor resurfacing works, pavement markings, road furniture, footpaths.	• Road pavement construction • Finishing works • Site cleanup	Night work	1
Stage 2A	• Earthworks and road surfacing associated with the road widening on either side of the existing Richmond Road carriageways. • New northbound bridge over Bells Creek. • Open flooding channel earthworks. • Flyover bridge embankment earthworks.	• Ancillary site set-up of site 2 • Mobilisation and site establishment • Protection and/or relocation of existing services • Surface preparation • Earthworks • Drainage • Road pavement construction • Bridge construction • Finishing works • Site cleanup	Mostly day work	8
Stage 2B	• Richmond Road proposed design between Bells Creek bridge and Langford Drive / Alderton Drive intersection. • Flyover bridge construction including retaining wall and tie-in. • Re-surfacing of the M7 Motorway northbound off-ramp.	• Mobilisation and site establishment • Protection and/or relocation of existing services • Earthworks • Drainage • Road pavement construction • Bridge construction • Finishing works • Site cleanup	Mostly night work	8
Stage 2C	• Richmond Road northbound proposed design between Rooty Hill Road North and Bells Creek Bridge. • Flyover bridge tie-in with Richmond Road.	• Mobilisation and site establishment • Protection and/or relocation of existing services • Earthworks • Drainage • Road pavement construction • Finishing works • Site cleanup	Mostly day work	4
Stage 2D	• Median and verge construction between Bells Creek and Alderton Drive.	• Mobilisation and site establishment • Protection and/or relocation of existing services • Earthworks	Day and night work	4

Stage	Stage description	Construction activities	Hours of work	Duration (months)
	• Works at the intersection of Richmond Road and Rooty Hill Road North.	• Drainage • Road pavement construction • Finishing works • Site cleanup		

3.3.3 Construction boundary

The construction boundary outlines the area where construction activities may be required including road construction, construction ancillary sites, landscaping, culvert extensions and the open flooding channel. The construction boundary follows the existing road corridor of Richmond Road and the associated side roads where possible. However, the boundary has been extended into private properties where the design has required additional space to accommodate the additional lanes and/or widening, landscaping, culvert extensions and the open flooding channel. The construction boundary is shown in Figure 1-1.

The construction boundary from 250 metres north of the Richmond Road / Hollinsworth Road/ Townson Road intersection and the Richmond Road / Langford Drive / Alderton Drive intersection largely follows the existing road corridor. The boundary is locally widened at the Richmond Road / Hollinsworth Road intersection to facilitate the construction of the left turn slip lane and the culvert extension. The boundary is also widened around 290 metres north of Alderton Drive and immediately north of Langford Drive. The boundary extends 170 metres up Hollinsworth Road, 220 metres up Townson Road and 70 metres up both Langford Drive and Alderton Drive.

Between the Richmond Road / Langford Drive / Alderton Drive intersection and the Richmond Road / Rooty Hill Road North intersection, the construction boundary widens to around 190 metres to accommodate the road widening and the open flooding channel that feeds into Bells Creek. The boundary includes an ancillary construction compound on the western side of Richmond Road, approximately 230 metres long. The construction boundary does not impact the Blacktown Native Institution site and extends around 260 metres down Rooty Hill Road North. The triangle parcel of land between the M7 Motorway, Rooty Hill Road North and Richmond Road is included in the boundary to facilitate the construction of the flyover. The construction boundary then follows the existing road corridor until Yarramundi Drive.

3.3.4 Construction workforce

The construction workforce would vary depending on the stage of construction and associated activities. It is expected that certain construction activities would require a higher workforce to be present on the site such as the works around Bells Creek which would be undertaken off-line. About 60 personnel at any given time is expected during the construction period. The final number of construction workers at any one time would be identified by the Contractor in order to meet need and delivery timeframes.

3.3.5 Construction hours and duration

Construction of the proposal would be undertaken in two stages, noting the durations would be dependent on weather and staging requirements:

- Stage 1 Northern section – from the end of 2025 to the end of 2026 (12 months)
- Stage 2 Southern section – from the end of 2026 to the end of 2028 (24 months).

Where possible, construction would be carried out in accordance with standard construction hours as defined in the *Interim Construction Noise Guidelines* (ICNG)(DECC, 2009): Monday to Friday (7am to 6pm), (Saturday 8am to 1pm), no work on Sundays or public holidays. However, to minimise disruption to the traffic along Richmond Road and local roads and surrounding land owners and businesses, and to provide a safe working environment, it would be necessary to carry out a large portion of the works outside of standard construction hours. The expected hours of work for each construction stage are outlined in Table 3-4.

The following activities are likely to be conducted outside of standard working hours:

- intersection and tie-in activities including the flyover bridge retaining wall and tie-in to Richmond Road
- placement of pavement along Richmond Road
- delivery of oversized plant, materials or structures including bridge elements

- utility relocation and installation work
- line marking and placement of new signage, fences and other road furniture.

Any work carried out outside of standard working hours would be in accordance with the ICNG and the *Construction Noise and Vibration Guideline (Roads)* (CNVG-R) (TfNSW, 2023e). There is the potential for some works to be undertaken up to five nights per week.

3.3.6 Plant and equipment

The plant and equipment needed to build the proposal would be typical of any major road construction site. An indicative list of plant and equipment is provided in Table 3-5. The construction activities and plant and equipment list would be finalised by the Contractor following detailed design.

Table 3-5 Indicative plant and equipment

Construction activities	Indicative plant and equipment	
Ancillary site set-up	• Franna crane • Excavators • Front end loader • Small cranes and lifting equipment	• Generators • Road truck • Light vehicles • Generator
Site preparation	• Excavator • Front end loader • Light vehicle • Bulldozer • Grader • Watercart	• Dump truck • Fuel truck • Road truck • Pneumatic hammer/drill • Concrete saw • Small handheld equipment
Protection and/or relocation of existing services	• Excavators • Backhoes • Front end loaders • Dump trucks • Road trucks	• Light vehicles • Agitator trucks • Jack hammers • Concrete saws • Small handheld equipment
Surface preparation	• Excavator • Articulated dump truck • Bulldozer • Grader • Front end loader • Watercart	• Vibratory roller • Road truck • Scraper • Light vehicle • Hand-held compactor
Earthworks	• Excavator • Bulldozer • Grader • Watercart • Front end loader • Vibratory roller	• Dump truck • Road truck • Utilities locating plant • Fuel truck • Light vehicle • Compactor
Drainage	• Excavator • Mobile crane • Front end loader • Vibratory roller	• Road truck • Light vehicle • Hand-held compactors and other small tooling
Road pavement construction	• Grader • Profiler • Rollers	• Road sweeper • Rubber-tyre roller • Fuel truck

Construction activities	Indicative plant and equipment	
	• Vibratory roller • Asphalt/bitumen truck, paver and sprayer • Excavator • Bulldozer • Watercart • Front end loader • Compactors	• Road truck • Line marking machine • Light vehicle • Pneumatic hammer/drill • Concrete saw • Compactor • Other small handheld equipment
Bridge construction	• Excavator • Elevated work platform • Mobile crane • Agitator trucks • Piling rig • Concrete pump	• Vibratory roller • Road truck • Light vehicles • Compactors • Other small handheld equipment
Finishing works	• Excavator • Franna crane • Concrete truck • Road truck • Line-marking machine • Elevated work platform	• Light vehicle • Mobile crane • Pneumatic hammer/drill • Compactors • Other small handheld equipment
Site clean-up	• Generator • Truck	• Crane • Light vehicle

3.3.7 Earthworks

The proposal would require earthworks along Richmond Road to create the required levels for the proposed design Earthworks generally involve removal and temporary stockpiling of suitable material for fill and grading work elsewhere. Movement of materials between work sites would be required, from cutting, to fill and embankment areas, and batter treatments.

The approximate volumes of the cut and fill earthworks across the proposal are outlined in Table 3-6, based on available information when preparing this REF. Exact cut and fill volumes would be further identified during detailed design.

Table 3-6 Approximate cut / fill locations and quantities

Works area	Cut (m^3)	Fill (m^3)	Balance (m^3)
Northern section	-11,369	729	-10,640
Southern section (including open flooding channel)	-29,493	26,506	-2,987
Total	**-40,862**	**27,235**	**-13,627**

Northern section – 150 metres south of the Langford Drive and Alderton Drive intersection and 250 metres north of the Hollinsworth Drive and Townson Road intersection.
Southern section – M7 Motorway southbound on-ramp and 150 metres south of the Langford Drive and Alderton Drive intersection.

If the material excavated during construction is not suitable for reuse as fill, imported fill would be used. This material would be obtained from local suppliers in the region where possible.

Excavated materials would be managed and stored (stockpiled) in accordance with Transports protocol. This would include the testing and classification of material in accordance with the *Waste Classification Guidelines* (EPA, 2014).

3.3.8 Source of materials

Various standard construction materials that are readily available across NSW would be needed to build the proposal. Certain design components, such as the bridge structures and kerb and drainage infrastructure, would arrive pre-formed, while other materials, such as stone and aggregate, would be delivered to one of the ancillary sites. Construction materials are generally sourced from off-site suppliers and where feasible and reasonable, local sources of construction materials would be used to minimise haulage distances and support the local economy.

Material proposed for construction includes:

- earthworks materials (e.g. sand, gravel, topsoil, imported fill material, general fill, verge material, rocky fill) and selected material for road formation
- bitumen and aggregates (e.g. stone, sand, gravel) for pavement production
- cement and aggregates (e.g. fly ash, gravel, crushed rock) for concrete used in drainage construction, pavement construction, and miscellaneous work such as barrier kerbs, kerbs and gutters, paving and signpost footings
- precast concrete elements for drainage construction (pipes, pits and headwalls) and miscellaneous work
- precast bridge structure elements for the concrete box girder flyover bridge
- precast bridge structure elements for the super T concrete northbound carriageway over Bells Creek
- steel for barrier railings and reinforcement in concrete
- landscaping materials including trees, seedlings, chippings and turf.

The quantity of materials required to build the proposal would be confirmed during detailed design.

3.3.9 Traffic management and access

Traffic management and access controls would be developed during future design stages and implemented under a construction traffic management plan (TMP). The TMP would be prepared in accordance with the *Traffic Control at Work Sites Manual Version 6.1* (TfNSW, 2022c) and approved by Transport before implementation. The TMP would provide details of the traffic management to be implemented during construction to ensure traffic flow on the surrounding network is maintained where possible.

Staging and traffic management

The purpose of building the proposal in stages is to minimise impacts on traffic on Richmond Road and surrounding local roads whilst providing a safe environment for construction. An indicative traffic staging process is provided in Table 3-4 and would be confirmed by Transport, relevant stakeholders, the proposal's design team and Contractor. Certain work activities would also likely take place at night to minimise any traffic-related impacts.

Construction traffic and workforce vehicles

The proposal would generate an increase in heavy vehicle movements travelling to, from and within the construction zone from existing Richmond Road, M7 Motorway and local roads. These heavy vehicle movements would mainly be associated with:

- delivery of construction materials
- import of fill material for earthworks
- spoil and waste removal
- delivery and removal of construction equipment and machinery.

It is estimated that the proposal would generate about 132 heavy vehicle movements per day. The proposed access to the ancillary sites would be via Richmond Road and the M7 Motorway as detailed in Table 3-7.

In addition, the proposal would generate around 60 light vehicle movements associated with the workforce travelling to, from and within the construction zone.

Property access

Properties which have existing driveway access from Richmond Road would continue to have driveway access during the construction phase. There are four properties located on Richmond Road between the intersection of Rooty Hill Road North and Bells Creek where new and/or modified driveways are required to accommodate the road widening. Details of the adjustments are outlined in section 3.6. The adjustments would be made at the start the Stage 2 works.

Final staging and any temporary adjustments to access during the construction period would be determined during detailed design.

Parking

There are no existing provisions for parking along either side of Richmond Road or on either side of the connecting local roads within the construction boundary. 'No Stopping' signs are erected on both sides of the road along the entirety of Richmond Road, Rooty Hill Road North, the M7 Motorway northbound on-ramp, and the connecting local roads (Alderton Drive, Langford Drive, Hollinsworth Road, Townson Road) within the construction boundary.

Sufficient off-road parking would be provided for construction workers at the ancillary facilities outlined in section 3.4 so that workers do not need to park on public roads. It is not expected that surplus parking demand from construction activities would reduce the availability of surrounding public parking or commercial parking. Final parking arrangements for construction vehicles and machinery would be determined and confirmed during the detailed design and outlined in the TMP.

3.4 Ancillary facilities

The construction of the proposal would involve the establishment and continued use of three ancillary facilities for the duration of the construction period. Details on the potential uses and access arrangements for each ancillary facility are described in Table 3-7. The locations of the facilities are shown Figure 3-15.

Table 3-7 Ancillary facilities

Ancillary facility	Location	Potential uses	Potential access	Approximate size (m²)
Site 1	On the western side of the existing Richmond Road approximately halfway between Bells Creek and the Langford Drive / Alderton Drive intersection with Richmond Road. Located directly adjacent to the proposed road upgrade work.	This would be the main ancillary facility for construction and could accommodate: • site offices, sheds, workshops • plant laydown and storage area • materials laydown and storage • stockpiling of spoil / mulch • heavy vehicle access and turn around areas • water tank loading areas • construction employee parking • temporary water quality controls.	Via Richmond Road (left in / left-out)	10,700
Site 2	To the west of the flyover bridge, within the triangular piece of land between the M7 Motorway, M7 Motorway off-ramp and Rooty Hill Road North.	This facility would support construction of the flyover bridge and could accommodate: • site offices, sheds, workshops • plant laydown and storage area • materials laydown and storage • stockpiling of spoil / mulch • heavy vehicle access and turn around areas • water tank loading areas • construction employee parking • temporary water quality controls.	Via the M7 Motorway off ramp (right-in / right out).	5500

Ancillary facility	Location	Potential uses	Potential access	Approximate size (m²)
Site 3	Approximately 500 metres north-east of the Richmond Road / Rooty Hill Road North intersection.	The site would be used for site offices only and could accommodate: • site offices and sheds • employee parking areas.	Via Yarramundi Drive, Durward Street, Raupach Street and Newnham Street (right-in / left-out).	4400

Figure 3-15 Location of ancillary facilities

Where feasible and reasonable, the locations of the ancillary sites were selected in disturbed areas with low ecological and heritage significance, located away from waterways, flood prone lands, and residential dwellings, located on relatively flat ground and owned by Transport. Sites were also selected for proximity to construction works.

The stockpile areas would be managed in accordance with *Waste Management Guidelines* (TfNSW, 2023f) and Transport *QA Specification R44 – Earthworks*.

The ancillary sites would be securely fenced with temporary fencing and lighting installed. Signs would be erected advising the general public of access restrictions and contact details in the event of emergency or incident.

Where amendments or additional ancillary facilities are identified as being required during construction the Contractor would consult with Transport to confirm the suitability of the proposed changes, and whether any additional environmental assessment and approval would be required. Notification of residents or relevant stakeholders would occur if required in line with the proposals' Communications and Stakeholder Engagement Plan (CSEP).

Following construction, the ancillary sites, work areas and stockpiles would be removed, and the sites would be cleared of all rubbish and materials and rehabilitated to their existing condition or as otherwise agreed with the landowner on completion of work.

3.5 Utility adjustment

There are a number of existing water, sewer, electrical, gas and communication utilities within the construction boundary. The proposal where possible would apply utilities treatments to avoid impact on utilities, protect utilities in existing locations and relocate the impacted utility where needed.

Table 3-8 lists the utilities type and owners within the construction boundary, along with the proposed treatment. For any utilities where potential for relocation has been identified, further consultation with utility asset owners would be carried out during detailed design. Should utility adjustments require work outside of the construction boundary and vegetation clearing limits additional environmental assessment may be required prior to the commencement of work.

Table 3-8 Utilities

Asset owner	Asset type	Location	Treatment type (retention, relocation or protection)
Sydney Water	W001 – DN450 trunk water main	Eastern verge of Richmond Road north from the Rooty Hill Road North intersection to the northern limit of works.	Relocation to new western footpath on Richmond Road where impacted.
Sydney Water	W008 – DN150 reticulation water main	Western verge of Richmond Road from 200 m south of the Rooty Hill Road North intersection to 200 m north.	Relocation to new footpath on western verge before crossing to eastern verge.
Sydney Water	S001 – DN 300 gravity sewer main	Surrounding the Bunnings site between Hollinsworth Road and Richmond Road.	Retention within the proposed roadworks.
Sydney Water	S003 – DN300 sewer transfer main	Pipes pass underneath Richmond Road north of Bells Creek for the Quakers Hill Transfer Sewer.	Retention within the proposed roadworks.
Sydney Water	S005 – DN300 gravity sewer main	Runs from SP0394 within Richmond Road before exiting on the eastern verge and crossing the M7 Motorway on-ramp.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S007 – OD560 sewer rising main	Runs along the eastern verge of Richmond Road from Yarramundi Drive to the Plumpton Sewage Pumping Station.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S008 – DN450 sewer rising main	Located on the eastern side of Richmond Road between Yarramundi Drive and the Plumpton Sewage Pumping Station, including transversely crossing the northbound M7 Motorway southbound on-ramp.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S011 – SP0394 sewer pump station	Located on the eastern side of Richmond Road at the Plumpton Sewage Pumping Station.	Retention of existing pump station and relocation of affected mains.
Sydney Water	S013 – DN900 gravity sewer main	Transversely crosses Richmond Road from west to east connecting to the Plumpton Sewage Pumping Station.	Protection.

Asset owner	Asset type	Location	Treatment type (retention, relocation or protection)
Endeavour Energy	E002 – 11kV high voltage cables	Runs along the western side of Richmond Road from 150 m north of the intersection of Rooty Hill Road North to the northern limit of works.	Relocation to the western side of the road corridor.
Endeavour Energy	E006 – 11kV high voltage cables	Runs from Hollinsworth Road / Townson Road intersection before crossing Richmond Road and heading west down the northern verge of Hollinsworth Road.	Relocation outside of the proposed roadworks.
Endeavour Energy	E021 – HV & LV power supply	Runs up the M7 Motorway southbound on-ramp and continues north along the eastern verge until 115 m north of the Richmond Road / Rooty Hill Road North intersection.	Relocation to the eastern verge of Richmond Road.
Jemena	G004 – DN150 secondary gas main (high pressure)	Located within in the verge, and below Richmond Road, between Yarramundi Drive to Townson Road.	Relocation of around 350 m of the main to the eastern verge of Richmond Road. Rest of gas main to be retained.
Jemena	G010 – DN150 secondary gas main	In the median of the southern side of Richmond Road between Rooty Hill Road North and the M7 Motorway southbound on-ramp.	Protection.
Telstra	C005 – Telstra conduit bank	Located within Richmond Road from Yarramundi Drive to the intersection of Richmond Road and Hollinsworth Road.	Relocation to the verges of Richmond Road.
Amplitel	C041 – Amplitel Telecom Tower	Northern corner of Richmond Road / Rooty Hill Road North intersection, roughly 115 m up Richmond Road.	Retention as outside the primary works zone.

DN: Diameter Nominal

3.6 Property impacts

The proposal has been designed and developed to minimise property acquisitions and prioritise the use of Transport owned land. However, the full and/or partial acquisition of three properties would be required as outlined in Table 3-9.

The land acquisition process has commenced and will be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and supporting NSW Government Land Acquisition Reform 2016 and Land Acquisition Information Guide (RMS, 2014).

Properties which have existing driveway access from Richmond Road would continue to have driveway access during the construction phase. The five properties along Richmond Road which would require modified or relocated access are as follows:

- Modified access to Colbee Yard, private landowner, Sydney Water pump station and maintenance access for Blacktown City Council
- Relocated access for the Blacktown Native Insitution from Richmond Road to Rooty Hill Road North.

The property acquisition and changed access arrangements required for the proposal are outlined in Table 3-9 and shown in Figure 3-16 and Figure 3-17.

All proposed ancillary facilities would be located on land owned by Transport. Should additional construction areas be identified during detailed design, any lease agreements and temporary impacts would be identified and potential impacts assessed if required.

Table 3-9 Proposed property impacts

Lot / DP	Name	Assumed ownership	Impact and management		Approximate area to be acquired (m²)
			Impact type	Description and management	
Lot 5004 / DP1244410	Blacktown Native Institution	Dharug Strategic Management Group (DSMG)	Relocated access	State listed heritage site. The widened road would be located over the top of the existing kerb opening used for site access. Due to proposed changes in lane configuration re-instatement of access at the same location is not possible. Site access would be relocated to Rooty Hill Road North. An indicative location, adjacent to the M7 Motorway Rooty Hill Road North off- ramp / Rooty Hill Road North intersection, has been proposed with the final location to be decided in consultation with DSMG.	0
Lot 50 / DP1104950	Plumpton Sewage Pumping Station SP0394	Sydney Water	Property adjustment	A sewage pumping station. The road widening would impact the existing driveway access. A new access would be provided at the same location as the existing.	0
Lot 101 / DP1109052	Colebee Yard, Richmond Road Colebee	Transport	Property adjustment	NSW Government property used primarily as a works depot. The proposed road widening and the open flooding channel would be located in this property, however, acquisition is not required as this is Transport owned land. The boundary of the property would be adjusted, and a new property fence, gate and driveway access (in the same location as existing) would be provided.	0
Lot 49 / DP1104950	717 Richmond Road, Colebee	Private property	Full acquisition	Rural lot containing a residential house, shed and cleared lands. Full acquisition of this property would accommodate the road widening and the open flooding channel. Adjustments to the existing fence, gate and driveway access would be required.	25,134
Lot 2 / DP1198299	Richmond Road, Marsden Park	Blacktown City Council	Partial acquisition	An area of drainage infrastructure associated with the culvert under Hollinsworth Road. Partial acquisition of this property would accommodate the proposed left turn slip lane from Hollinsworth Road onto Richmond Road northbound. Adjustments to the existing culvert, pedestrian fence and maintenance access gate would be required.	1572
Lot 101/ DP1169158	Bunnings Marsden Park	Private property	Partial acquisition	Large format hardware and garden center retail chain. Partial acquisition of this property would accommodate the proposed left turn slip lane from Hollinsworth Road onto Richmond Road northbound. There would be no impact to existing car park.	625

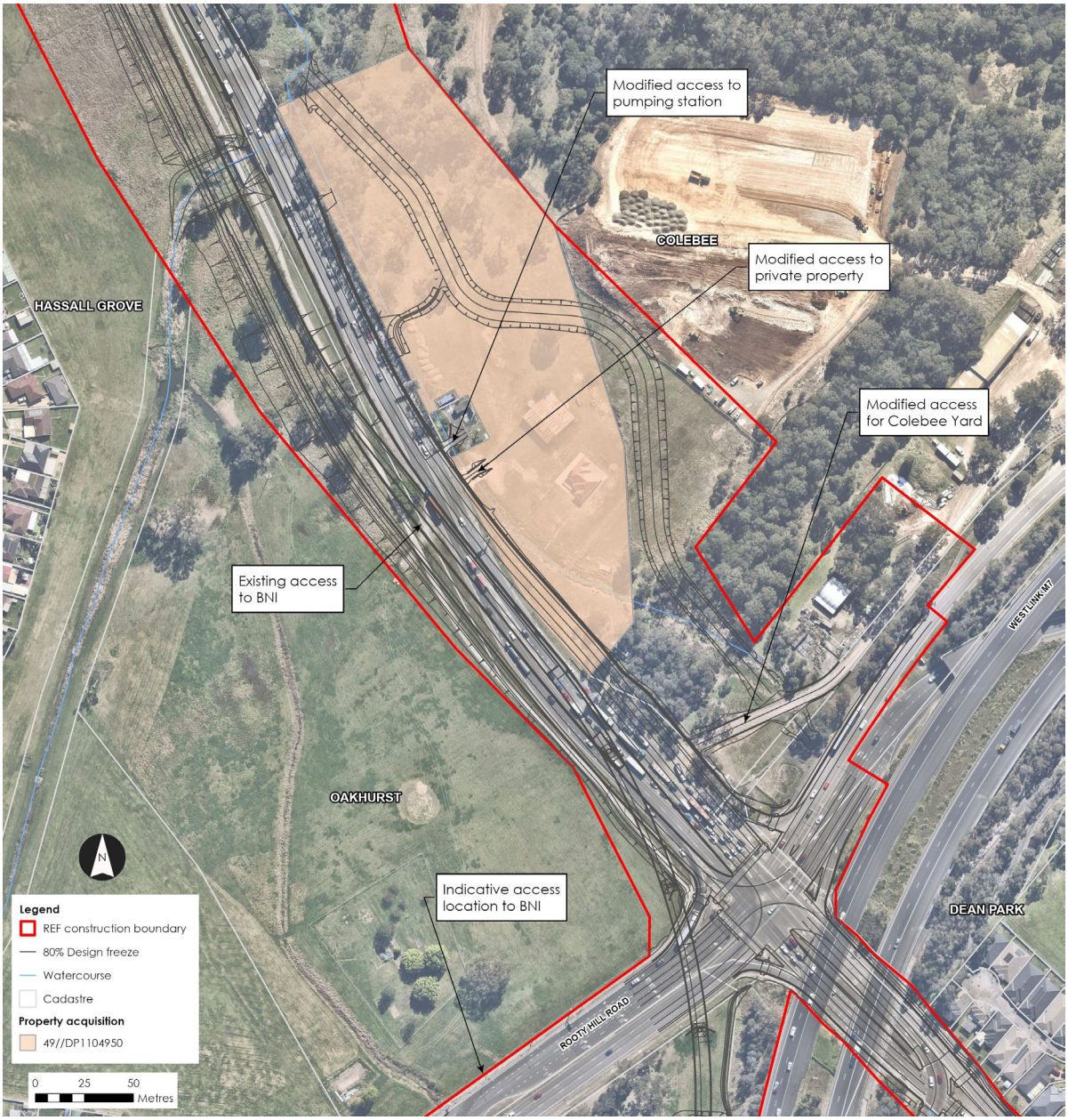


Figure 3-16 Property impacts - Lot 5004 / DP1244410, Lot 50 / DP1104950, Lot 101 / DP1109052 and Lot 49 / DP1104950

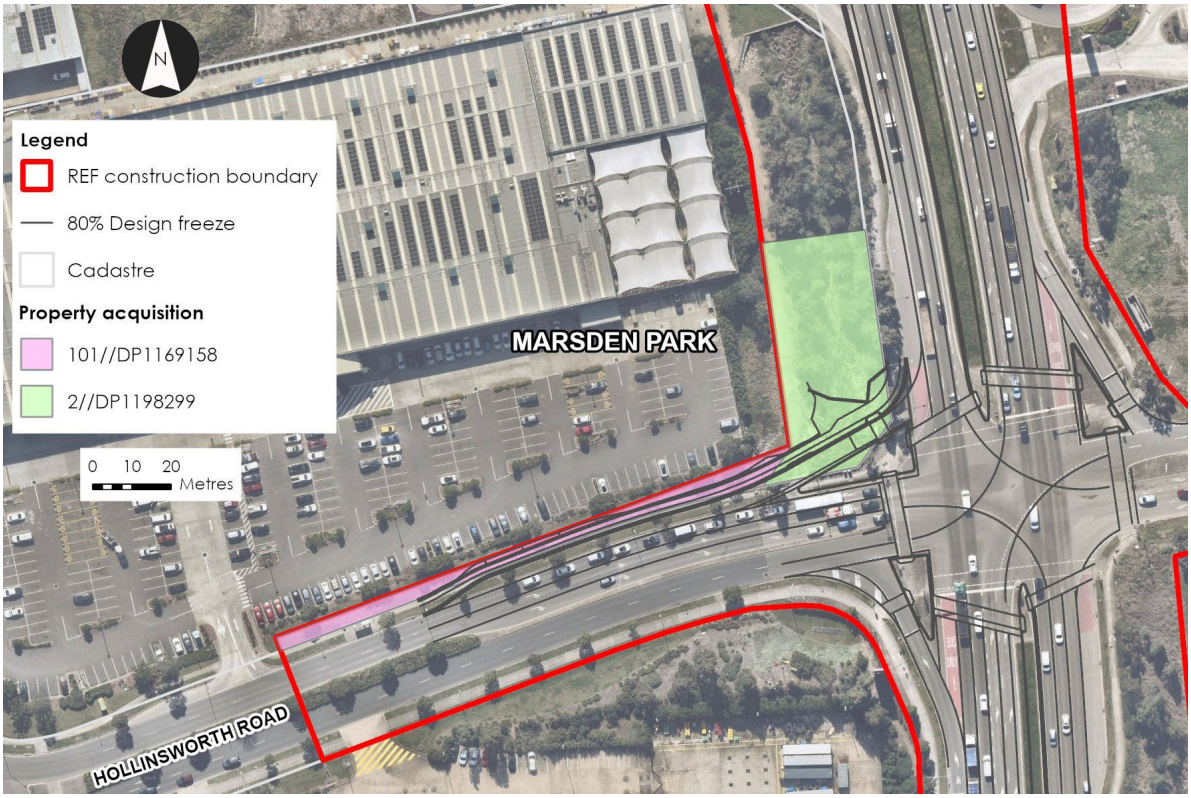


Figure 3-17 Property impacts - Lot 2 / DP1198299 and Lot 101/ DP1169158

4. Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

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 proposal is for a road and is to be carried out on behalf of Transport, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
- 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 section 5.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 6 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP (Biodiversity and Conservation)) relates to four water catchments in NSW. The proposal is located within the Hawkesbury-Nepean Catchment.

The proposal does not require development consent under the SEPP (Biodiversity and Conservation), however, the matters listed under part 6.2 that apply to the proposal have been considered. Table 4-1 addresses these matters as they apply to the proposal.

Table 4-1 Consideration of the provisions of the SEPP (Biodiversity and Conservation)

Consideration	Comment
Section 6.6 Water quality and quantity	An assessment of water quality, and flooding during the construction and operation of the proposal is provided in section 6.2. The operation of the proposal would involve an increase in impervious area as the widening of the road and the addition of a new flyover bridge requires extension of the impermeable pavement. The increase in surface runoff and associated pollutants have been considered in the design and gross pollutant traps (GPTs) are proposed to reduce the pollutant loading of stormwater prior to discharging to Bells Creek. Although the proposal would result in a minor increase of pollutant loads (phosphorus/nitrogen) compared to the existing scenario, the increases would have a relatively negligible impact to the long-term water quality of Bells Creek given the size of the wider catchment. Overall, the proposal would not have a significant impact on flood behaviour downstream and would improve the flood immunity of Richmond Road.

Consideration	Comment
Section 6.7 Aquatic ecology	A biodiversity assessment was prepared for the proposal which identifies, assesses and mitigates impacts to terrestrial, aquatic and migratory animals and vegetation (refer section 6.8). An assessment of the water quality impacts including sedimentation is provided in section 6.2. The proposed bridge over Bells Creek would require removal of riparian vegetation and may require the temporary obstruction of the waterway during construction. The requirements for permits and approvals are discussed in section 4.2.2. Overall, it is concluded that the proposal is unlikely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* (BC Act), *Fisheries Management Act 1994* (FM Act) or ***Environment Protection and Biodiversity Conservation Act 1999*** (EPBC Act) providing the mitigation measures in section 6.8 are implemented.
Section 6.8 Flooding	The proposal includes a bridge structure over Bells Creek, additional culvert structures, and a realigned open flooding channel which would change the existing flood behaviour in proximity to the proposal. The impacts of the proposal on flooding, as well as appropriate mitigation measures are provided in section 6.2. Overall, the proposal would not have a significant impact on flood behaviour downstream and would improve the flood immunity of Richmond Road.
Section 6.9 Recreation and public access	Due to the nature of the proposal, and surrounding land uses, it is not expected that the proposal would impact on recreational land uses, and it is expected that access to and around the Bells Creek waterway would be maintained as per its current state. Overall, the impact of the proposal on recreation and public access is expected to be negligible.
Section 6.10 Total catchment management	The proposal is located within the Blacktown LGA. Transport has consulted with Blacktown City Council throughout the design phases of the proposal as outlined in section 5.5. The design of the proposal has considered drainage, flooding and water quality which have the potential to impact adjacent and downstream LGAs. This REF outlines the potential impacts of the proposal and identifies mitigation measures to minimise the likelihood of the proposal having any adverse environmental impacts. It is not expected that the proposal would negatively impact the overall catchment.
Section 6.11 Land within 100 metres of natural waterway body	The proposal would include a bridge structure over Bells Creek. Impacts to this waterway have been identified, assessed and mitigated as part of this REF. Refer sections 6.2 and 6.8. It is not anticipated that the operation of the new bridge structure would have a significant impact on the waterway that is greater than already exists.
Section 6.12 Riverine Scenic Areas	The proposal is not located within a Riverine Scenic Area under the SEPP (Biodiversity and Conservation). Nonetheless, the proposal would not impact on the scenic quality of the riverine corridor. The visual impact of the proposal including proposed landscaping is assessed in section 6.9.
Section 6.13 Hawkesbury-Nepean conservation area sub-catchments	The proposal is located within the South Creek sub-catchment which is not one of the five identified conservation sub-catchments. Nonetheless, impacts of the proposal on native vegetation and scenic quality have been considered in sections 6.8. and 6.9, respectively. Mitigation measures have been identified to maintain and enhance native vegetation in the sub-catchment. The urban design and landscaping for the proposal aims to minimise risk to the scenic quality of the locality.

Chapter 13 of the SEPP (Biodiversity and Conservation) relates to the planning controls for the strategic conservation planning area. The purpose of the controls is to ensure that development in the nominated areas is consistent with the BC Act, the EPBC Act and the commitments and actions of the Cumberland Plain Conservation Planning (CPCP).

The southern section of the proposal falls within the CPCP area boundary, and the approach to the proposed flyover bridge also falls within the Greater Penrith to Eastern Creek Investigation Area. This investigation area is one of the four areas nominated for urban development in Western Sydney.

The lands within the proposal footprint are land mapped as (refer Figure 4-1):

- certified – major transport corridor
- excluded land
- major transport corridor (strategically assessed only) (this corridor is not within a nominated area).

The proposal does not fall on land mapped as 'avoided land', 'strategic conservation area' or 'certified urban capable land' under the SEPP (Biodiversity and Conservation).

Biocertification (Cumberland Plain Conservation Plan)

The Minister for Environment and Heritage made an order conferring biodiversity certification - CPCP under Part 8 of the BC Act. The biodiversity certification applies to 'certified-urban capable land' and 'certified-major transport corridors' in each nominated area. Development can proceed in these certified areas without further NSW biodiversity approvals if the necessary development consent is obtained, prescriptions or conditions of approval are met, and any unavoidable impacts are addressed through the conservation program.

On 26 March 2024, the minister approved all actions associated with the Western Sydney Strategic Assessment. These actions are described in the *Cumberland Plain Conservation Plan* (CPCP)(DPE, 2022b) and include the Western Sydney major transport corridors. No approval under the EPBC Act is required for impacts on threatened species and communities listed the EPBC Act within certified areas.

With regards to mapped lands in the vicinity of construction boundary the following is noted:

- Certified – major transport corridor. Major transport corridors within nominated areas (with the exception of the tunnel sections) that have been certified for development under the BC Act. Certified-major transport corridors have been strategically assessed and approved under the EPBC Act, in this case the M7 Motorway / Ropes Crossing Link Road.
- Excluded land. Excluded land is land that has been excluded from the CPCP and for which NSW strategic biodiversity certification and approval through the federal strategic assessment will not be sought.
- Major transport corridor (strategically assessed only). Major transport corridors outside of nominated areas, and the tunnels both inside and outside of the nominated areas are not certified under the BC Act through the CPCP. However, all of the major transport corridors included in the CPCP (including tunnel sections) have been strategically assessed and approved under the EPBC Act.

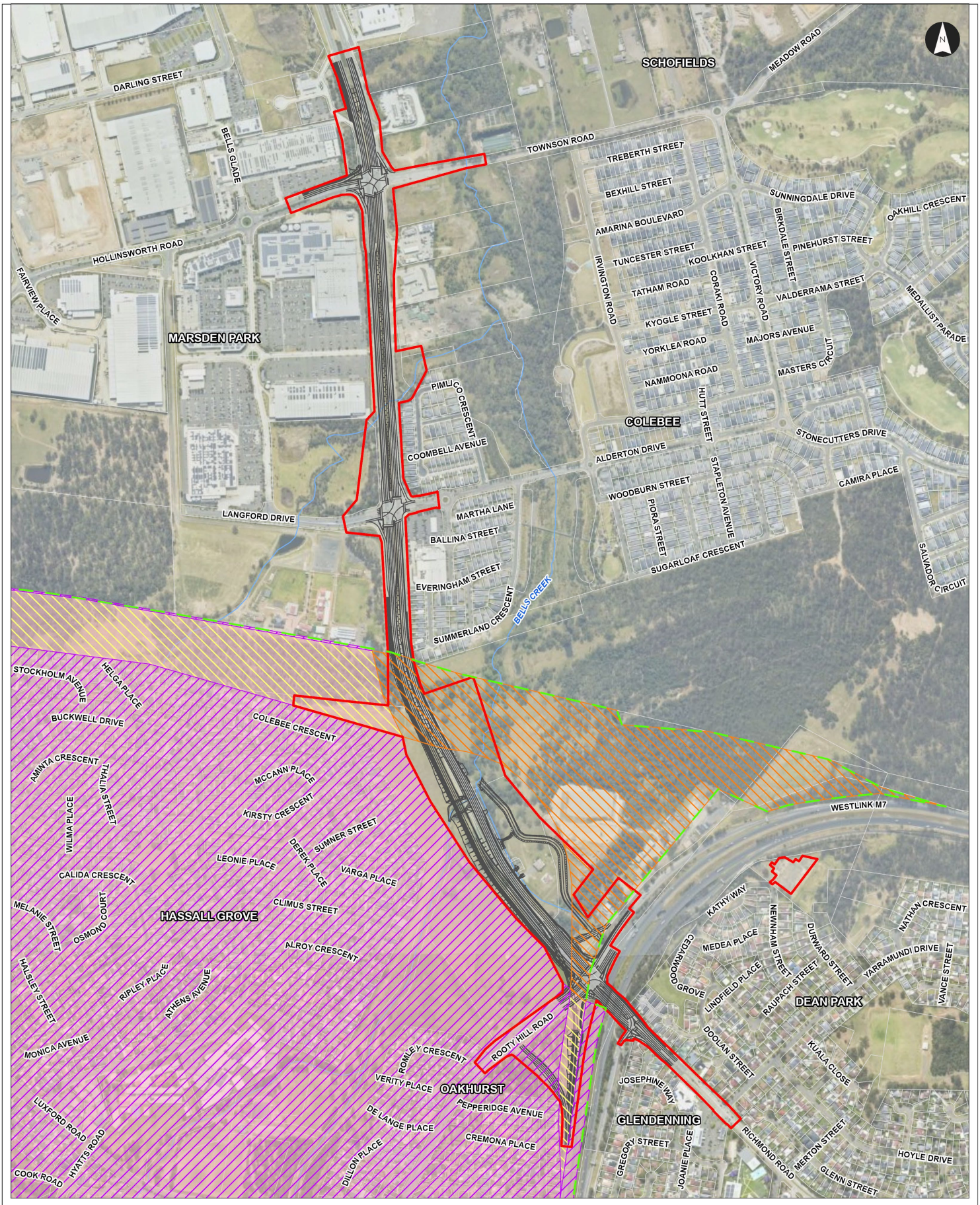


Figure 4-1: SEPP (Biodiversity and Conservation) - Strategic conservation planning

Richmond Road Upgrade between M7 Motorway to Townson Road

Project Code: 305001173-EN-GS-007
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-07

Legend

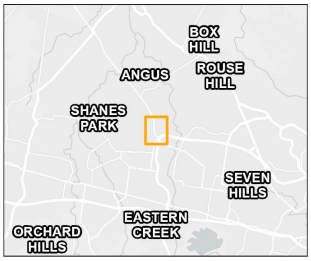
- REF construction boundary
- 80% Design freeze
- Watercourse
- Cadastre
- Cumberland Plain Conservation Planning (CPCP) Area boundary
- CPCP - Nominated areas

CPCP - Land category

- Certified - major transport corridor
- Excluded land
- Major transport corridor (strategically assessed only)

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial Imagery (MetroMap, Sep 2024)
2. Watercourse and Cadastre (NSW SS, 2023)
3. CPCP Area boundary, CPCP - Nominated areas, CPCP - Land category (NSW DPE, 2022)



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State Environmental Planning Policy (Precincts – Central River City)

Chapter 3 of the *State Environmental Planning Policy (Precincts – Central River City) 2021* (SEPP (Central River City)) includes provisions that relate to development within the Central River growth centres areas. The northern portion of the proposal falls within the NWGA within the Marsden Park Industrial Precinct as shown in Figure 4-2.

Appendix 13 of the SEPP (Central River City) refers specifically to the Marsden Park Industrial Precinct.

Biocertification (growth centres)

Under section 126G of the now repealed *Threatened Species Conservation Act 1995* (TSC Act), the Minister applied Biodiversity Certification to the growth centre areas. Certification aims to achieve landscape-scale big picture conservation, moving away from site-by-site decision-making and providing greater certainty in land-use planning. The certification removes the need to undertake threatened species assessments for developments or activities within the area subject to certification. Biodiversity certification that was conferred on land under the now repealed TSC Act and that was in force on the repeal of that Act is taken to be biodiversity certification conferred on the land under Part 8 of the BC Act.

On 28 February 2012, the Commonwealth Environment Minister approved all actions associated with development of the Sydney Growth Centres as described in the Sydney Growth Centres Strategic Assessment Program Report (NSW Government, 2010). This endorsement removes the requirement for site by site approvals under the EPBC Act as long as proposed actions are consistent with the endorsed Program. No approval under the EPBC Act is therefore required for impacts on threatened and migratory biota listed under the EPBC Act within certified areas.

The proposal footprint located within the NWGA areas is mapped as 'existing certified' as shown in Figure 4-2. Under Part 8 of the BC Act, an activity proposed to be carried out on biodiversity certified land is taken to be an activity that is not likely to significantly affect any threatened species. As such, further assessment of these areas has not been undertaken. A small area of non-certified land occurs within the northern portion of the construction boundary, where Bells Creek crosses Townson Road, however no works would be undertaken in this area.

Land zoning

The northern portion of the proposal is zoned under the SEPP (Central River City) and the construction boundary is predominately zoned as SP2 Infrastructure. The land use zones applicable to the proposal, the corresponding objectives for the zones and a description of the proposals consistency with the objectives are provided in Table 4-2. Land use mapping is provided in Figure 6-20.

Table 4-2 Relevant SEPP (Central River City) land zones

Zone	Objectives of the zone	Proposal consistency
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.	The proposal is a road infrastructure upgrade, aiming to provide and accommodate for a predicted increase in population growth within the local area, and wider NWGA. The proposal would provide for other infrastructure such as utilities and stormwater to be relocated and upgraded where necessary.
R2 – Low Density Residential	• To provide for the housing needs of the community within a low density residential environment. • To enable other land uses that provide facilities or services to meet the day to day needs of residents. • To allow people to carry out a reasonable range of activities from their homes, where such activities are not likely to adversely affect the living environment of neighbours. • To support the well-being of the community, by enabling educational, recreational, community, religious and other activities where compatible with the amenity of a low density residential environment.	The proposal would improve the efficiency of the road network to accommodate predicted population growth and support housing needs. Residences would be provided with improved transport infrastructure to meet their day to day needs. The proposal has been designed to minimise its impact on the amenity of the neighbourhood. A small section of the existing road at the intersection of Richmond Road and Alderton Drive is zoned R2.

Zone	Objectives of the zone	Proposal consistency
B5 -Business Development	• To enable a mix of business and warehouse uses in locations that are close to, and that support the viability of, centres. • To allow development that is compatible with the scale, form and character of existing buildings and the surrounding area.	The proposal would support the viability of centres, businesses, and warehouse uses by improving capacity and travel times, safety, and connectivity of the transport network surrounding these businesses. The proposal has been designed with consideration of the scale and character of the existing and surrounding built environment. The existing road corridor would remain largely the same as widening would occur within the median for the northern portion of the proposal. A small section of the existing road at the intersection of Richmond Road Langford Drive is zoned B5.
IN2 Light Industrial	• To provide a wide range of light industrial, warehouse and related land uses. • To encourage employment opportunities and to support the viability of centres. • To minimise any adverse effect of industry on other land uses. • To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area.	The proposal would support the viability of centres, businesses, and warehouse uses by improving capacity and travel times, safety, and connectivity of the transport network surrounding these businesses. A small section of land zoned IN2 would be impacted by the new left turn slip lane from Hollinsworth Road onto Richmond Road.

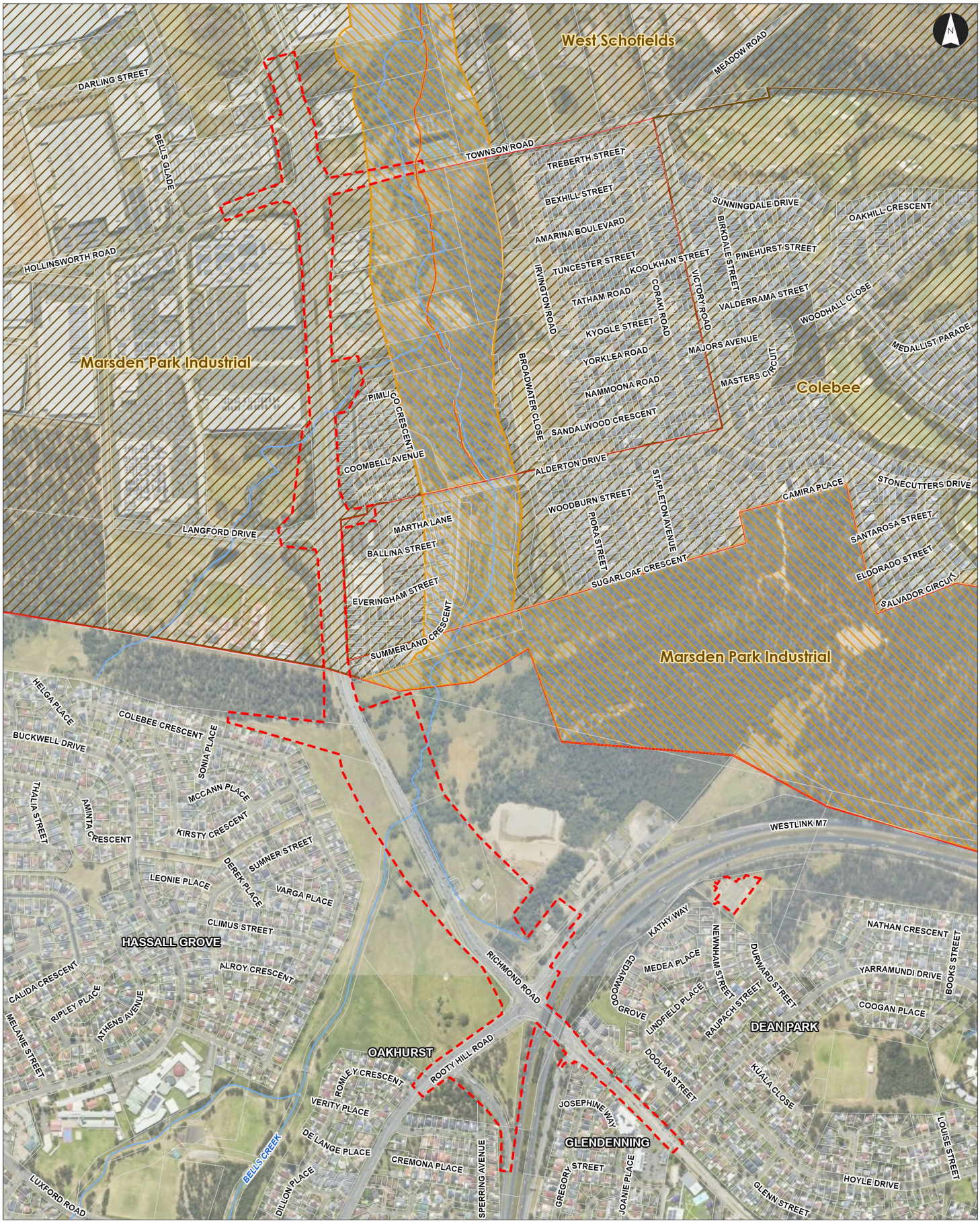


Figure 4-2: SEPP (Central River City)

Richmond Road Upgrade between M7 Motorway to Townson Road

Legend

- REF Construction Boundary
- Watercourse
- Cadastre

North West Growth Area

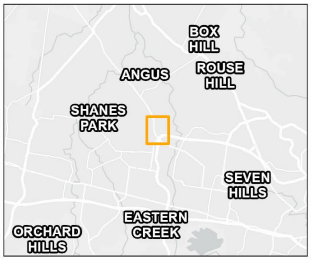
- Existing Certified
- Existing Non Certified

Precincts - Central River City

- Land Application

Notes:
1. *Map displayed in GDA2020 MGA Zone 56*
2. *Entire map extent is included within the Cumberland IBRA Sub-Region (BAP, 2016)*

References:
1. *Aerial imagery (MetroMap, Sep 2024)*
2. *North West Growth Area (DPE, 2023)*
3. *Precincts - Central River City (DPE, 2022)*
4. *Watercourse and Cadastre (NSW SS, 2023)*



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Project Code: 305001173-EN-GS-006
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-07

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4.1.2 Local Environmental Plans

Blacktown Local Environmental Plan 2015

The southern portion of the proposal is located within the City of Blacktown LGA on land subject to the *Blacktown Local Environmental Plan 2015* (Blacktown LEP) and is predominately zoned as SP2 Infrastructure. The land use zones applicable to the proposal, the corresponding objectives for the zones and a description of the proposals consistency with the objectives are provided in Table 4-3. Land use mapping is provided in Figure 6-20.

Table 4-3 Relevant Blacktown LEP land zones

Zone	Objectives of the zone	Proposal consistency
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. • To ensure that development does not have an adverse impact on the form and scale of the surrounding neighbourhood.	The proposal is a road infrastructure upgrade, aiming to provide and accommodate for a predicted increase in population growth within the local area, and wider NWGA. The proposal would provide for other infrastructure such as utilities and stormwater, to be relocated and upgraded where necessary. Although the proposal would increase the road corridor in the southern portion of the proposal and include a new flyover bridge, the structures have been designed to match the existing nearby M7 Motorway bridge structures and the surrounding environment.
R2 – Low Density Residential	• To provide for the housing needs of the community within a low density residential environment. • To enable other land uses that provide facilities or services to meet the day to day needs of residents. • To enable certain activities to be carried out within the zone that do not adversely affect the amenity of the neighbourhood.	The proposal would enable housing needs to be met by improving the efficiency of the road network to accommodate predicted population growth. Residences would be provided with improved transport infrastructure to meet their day to day needs. The proposal has been designed to minimise its impact on the amenity of the neighbourhood. The parcel of land between the M7 Motorway and Rooty Hill Road North is zoned as R2 and would be impacted by the proposal.
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 that development does not prejudice the orderly and economic development of future urban land. • To ensure that development is sympathetic to the ecological attributes of the area.	The proposal would support local and regional primary industries by providing infrastructure to transport produce and production. The overall road upgrade would allow for future connectivity within the local community and the NWGA, aiding in a smoother road network facility for those travelling within the road network for purposes such as employment. The design of the proposal has minimised its impact on primary production lots within the area. The proposal would acquire one lot of land zoned as RU4.

Transport has consulted with Blacktown City Council. Details of consultation are provided in Chapter 5.

As the proposal is permitted without consent under the SEPP (Transport and Infrastructure), the consent requirements of the Blacktown LEP do not apply and as such, the proposal would be assessed under Division 5.1 of the EP&A Act.

4.2 Other relevant NSW legislation

4.2.1 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development (ESD).

If an activity potentially affects any flora or fauna species, populations or ecological communities listed by the BC Act, a test of significance under section 7.3 of the BC Act is required. If the proposal is likely to significantly impact threatened species, then Transport would need to prepare a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR).

For threatened species that were considered to have a moderate or higher likelihood of occurring in the biodiversity study area, assessments of significance under the BC Act were completed. No threatened species listed under the BC Act were considered to have the potential to be significantly impacted by the proposal. Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination. Section 6.8 provides further details.

Under Part 8 of the BC Act, an activity proposed to be carried out on biodiversity certified land is taken to be an activity that is not likely to significantly affect any threatened species, populations or ecological communities, or their habitats under the BC Act. The southern portion of the proposal falls partially with the boundaries of the CPCP certification under the SEPP (Biodiversity and Conservation). The northern portion of the proposal falls within the NWGA and includes certified areas under the SEPP (Central River City). Further assessment under the BC Act is not required in these certified areas, provided that the development occurs in accordance with the relevant biocertification orders. Refer section 4.1.1 for further information on the certifications.

4.2.2 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) applies to all waters within the State of NSW, except where Commonwealth legislation applies. The FM Act aims to promote sustainable resource conservation and equitable resource allocation principles to the management of the state's aquatic resources.

Any species, populations and ecological communities listed on Schedules 4, 4A and 5 of the FM Act likely to occur in the study area, or known to use habitat in the study area, are subject to an assessment of significance. In determining the significance of the potential impacts, the determining authority must consider the matters listed in section 220ZZ of the FM Act. No threatened species, populations or ecological communities or their habitats listed under the FM Act were considered to have a moderate or higher likelihood of occurrence. As such, an assessment of significance was not undertaken.

The carrying out, without a licence, of activities that damage habitats or harm threatened species, populations or ecological communities is prohibited under Part 7A Division 4 of the FM Act.

The proposal would require the construction of a bridge over Bells Creek. Although the bridge would span the width of the creek, temporary work for bridge construction may obstruct fish passage. The requirement for a permit under section 219 of the FM Act would be determined during detailed design.

Consultation with Department of Primary Industries and Regional Development (DPIRH Fisheries) under section 199 of the FM Act to undertake dredging and reclamation works would be undertaken during detailed design. No significant impacts to the aquatic environment are anticipated. Section 6.8 provides further details.

4.2.3 National Parks and Wildlife Act 1979

The *National Parks and Wildlife Act 1979* (NPW Act) aims to conserve nature, objects, places or features of cultural value within the landscape. The NPW Act is the primary legislation regulating Aboriginal cultural heritage in NSW.

Items of Aboriginal cultural heritage (Aboriginal objects) or Aboriginal places (declared under section 84) are protected and regulated under the NPW Act. Aboriginal objects are protected under section 86 of the Act. An Aboriginal heritage impact permit (AHIP) is required under section 90 of the NPW Act to harm or desecrate an Aboriginal heritage object.

The Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared for the proposal identified that four Aboriginal archaeological sites that would be at least partially impacted by the proposed work. As such an AHIP would be required for the proposal. Section 6.4 provides further details.

4.2.4 Heritage Act 1997

The *Heritage Act 1997* (Heritage Act) aims to provide for the identification, registration and conservation of items of State heritage significance. Approval from the Heritage Council would be sought before the potential disturbance or excavation of items, relics and artefacts with historic heritage significance. The *Unexpected Heritage Items Procedure* (TfNSW, 2024b) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered during construction.

The Statement of Heritage Impact (SoHI) prepared for the proposal identified that the proposed work would be within the curtilage of the one site listed on the State Heritage Register (SHR): Blacktown Native Institution (SHR No. 01866) site.

The proposed work would be limited to Lot 1 DP 1043661 (eastern portion of the Blacktown Native Institution site) which has been granted a site-specific exemption under subsection 57(1) of the Heritage Act as follows:

> ***Exemption 1.*** *The carrying out of road work or traffic control work, within the meaning of the* Roads Act 1993*, in connection with the Rooty Hill Road, Richmond Hill Road and / or the proposed Castlereagh Freeway, on land described as Lot 1 in Deposited Plan 1043661, Lot 5002 in Deposited Plan 869400 and / or Lot 5003 in Deposited Plan 869400, is exempt from subsection 57(1) of the* Heritage Act 1977*, subject to all excavation or disturbance of land being carried out in accordance with any archaeological management plan with which compliance is required by any approval for those works issued under the* Environmental Planning and Assessment Act 1979*.*
>
> *Reason/Comment - Should archaeological relics or deposits be uncovered during excavation work, all work must cease in the immediate area. A suitably qualified and experienced archaeologist must be contacted to assess the archaeology and the Heritage Branch should be informed immediately ('Blacktown Native Institution' 2011).*

Although the proposed works generally meet the criteria of this site-specific exemption consisting of road works and facilitating activities), it has been determined in consultation with Transport that the scope and scale of the proposed works requires additional third-party assessment. This is because Transport believes that the intent of the site-specific exemption is to allow road maintenance activities and road widening activities for this part of the Blacktown Native Institution site. When the site-specific exemptions were made, they focused on managing physical (archaeological) impacts to the site. Transport understands that the site contains significant cultural values and that the proposed design may intersect with the site and its cultural values which exist beyond its archaeology. Although the exemption could be pursued, Transport will seek independent approval of the application section 60 of the Heritage Act for transparency. As such, the decision has been made to proceed with a section 60 application for the proposal.

4.2.5 Roads Act 1993

The *Roads Act 1993* (Roads Act) provides for the classification of roads and the declaration of public authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads, the process for acquisition of land for the purposes of road widening and dedication of land for roads.

Under section 71 and section 73 of the Roads Act, Transport may construct the proposal. Before construction, a notice must be placed in the local newspaper allowing for any submissions to be made by any person in accordance with the following sections of the Act:

- section 22 – Preparation of road widening plan
- section 29 – Fixing the levels of public road.

Under section 138 consent from the road authority is required for carrying out various activities in, on and over public roads. Richmond Road is classified as a State road managed by Transport. Transport would obtain a Road Occupancy Licence (ROL) for work on these roads and the closure of traffic lanes and the movement of over-sized vehicles during the construction.

4.2.6 Water Management Act 2000

The objects of *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations including protecting, enhancing and restoring water sources, their associated ecosystems, ecological processes and biological diversity and their water quality.

Licences and approvals under the WM Act are:

- Water Access Licence (section 56, 60A) – to take surface or ground water where a statutory water sharing plan is in place.
- Water Use Approvals (section 89, 91A) – the use of water.
- Water Management Approvals (section 90) - undertaking any work involving water supply, drainage or flood works.
- Activity Approvals (section 91) – undertaking a controlled activity within waterfront land or aquifer interference activity during excavations.

The proposal is covered by the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2023* and the Water Sharing Plan for the *Greater Metropolitan Region Groundwater Sources 2023*. The proposal is therefore subject to the provisions of the WM Act. Of relevance to the proposal:

- Water Access Licence - under section 21 and schedule 4 of the *Water Management (General) Regulation 2018* (WM Regulation), Transport, as a roads authority, is exempt from the need to obtain a water access licence in relation to water required for road construction and road maintenance.
- Water Use Approvals – under clause 34 and schedule 4 of the WM Regulation roads authorities are exempt in relation to taking water required for road construction and road maintenance.
- Water Management Approvals - clause 47(1) of the WM Regulation provides that Transport as a determining authority, is exempt from a flood work approval.
- Activity Approval: the proposed works are located on waterfront land, however, under section 41 of the WM Regulation public authorities are exempt and do not require a controlled activity approval to carry out works in, on or under waterfront land.

Although the proposal is not anticipated to include the extraction of more than three mega litres per year or lower the groundwater table by more than two metres, the need for an aquifer interference licence would be determined during detailed design. In addition, the need for a water supply approval would also be determined.

Transport would consult with the DCCEEW Water to ensure that all applicable licences and/or approvals for any impacts to surface and ground water are obtained prior to construction.

4.2.7 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a process for the EPA to identify, investigate and (where appropriate) order the remediation of land if the EPA considers the land to be significantly contaminated under division 2, part 3. Section 60 of the CLM Act outlines the duty to report contamination requirements.

The preliminary site investigation (PSI) prepared for the proposal identified a number of potential sources of contamination in the proposal footprint. The PSI recommends further investigations to confirm the presence and extent of contamination. Section 0 provides further details. Investigations would be documented in the Submissions report and undertaken prior to determination of the proposal.

4.2.8 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the procedures for issuing licenses for environment protection in relation to aspects such as waste, air, noise and water pollution control.

The owner or occupier of the premises engaged in scheduled activities is required to hold an environment protection license (EPL) and comply with the conditions of that license. Clause 35 of Schedule 1 states that for road construction activities an EPL would be required in a regulated area if the proposal results in one or more of the following:

- the extraction or processing (over the life of construction) of more than 50,000 tonnes of materials in the cases of premises in the regulated area
- the existence of four or more lanes of traffic for one kilometre of freeway in a metropolitan area, or three kilometres of main road (but not a freeway or tollway) in a metropolitan area, or five kilometres of main road, freeway or tollway not in a metropolitan area.

The proposal is located within the regulated area and in a metropolitan area. The proposed upgrade would result in the existence of four or more lanes of traffic on a main road for a length of 2.2 kilometres. The requirement for an EPL would be confirmed during detailed design once final design extraction and processing volumes of material are known.

If standard controls set out in Transport guidelines and quality assurance specification are implemented and monitored, there is unlikely to be any material harm, water, noise, or air pollution impact (refer section 6).

4.2.9 Waste Avoidance Recovery Act 2001

The *Waste Avoidance Recovery Act 2001* (WARR Act) provides for the avoidance and reduction of waste and resource management. The WARR Act establishes a waste hierarchy, which requires that resource management options are considered against a hierarchy of the following order: Avoidance of unnecessary resource consumption, Resource recovery (including reuse, reprocessing, recycling and energy recovery) and Disposal.

Waste generation and disposal reporting would be undertaken during the construction of the proposal. As the proposal would generate waste it is required to consider the waste management hierarchy referred to in this WARR Act. Section 6.11 provides further details.

4.2.10 Biosecurity Act 2015

The objective of the *Biosecurity Act 2015* is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

Twenty weeds were observed within the biodiversity study area during the field survey. These weeds would be managed and controlled to prevent, eradicate contain and/or minimise their economic, environmental and/or social impacts during the implementation of the proposal. Section 6.8 provides further details.

4.2.11 Land Acquisition (Just Terms Compensation) Act 1991

The *Land Acquisitions (Just Terms Compensation) Act 199*1 applies to the acquisition of land (by agreement or compulsory process) by a public authority authorised to acquire the land by compulsory process. It provides a guarantee that, when a public authority requires the acquisition of land, the amount of compensation will not be less than the market value of the land.

The proposal would require the full acquisition of one property and the partial acquisition of two properties. Section 3.6 provides further details.

4.2.12 Crown Land Management Act 2016

The *Crown Land Management Act 2016* provides the legislative framework for the administration of land that is vested in the Crown in NSW. Ministerial approval is required to grant a 'lease, licence, permit, easement or right of way over a Crown Reserve'. There is no Crown Land located within the construction boundary.

4.2.13 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) recognises the traditional ownership and occupation of the land by Aboriginal peoples and the importance of their connection to land. Through the ALR Act vacant Crown land not lawfully used or occupied, or required for an essential purpose or for residential land, can be acquired and managed by Aboriginal Land Councils. In accordance with Section 42B of the ALR Act, land vested in an Aboriginal Land Council can only be acquired by Transport through an Act of Parliament. No claimable Crown lands would be affected by the proposal.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix A and section 6.

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

Potential impacts to these biodiversity matters are also considered as part of section 6.8 and Appendix H.

Findings - matters of national environmental significance

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

Findings - nationally-listed biodiversity matters (where the strategic assessment applies)

The assessment of the proposal's impact on nationally-listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Seasonal targeted surveys are currently being undertaken for an additional five threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination. Section 6.5 provides further details.

Section 6 describes the safeguards and management measures to be applied.

4.3.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The *Native Title Act 1993* covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affective native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the *Native Title Act 1993*, a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was undertaken on 6 September 2024, with no Native Title holders/claimants identified.

4.4 Confirmation of statutory position

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

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

5. Consultation

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

A *Community and Stakeholder Engagement Plan* (CSEP) (TfNSW, 2023a) has been prepared for the proposal to outline communications objectives, delivery methods and key stakeholders whose views would be specifically sought. It also details specific communications and engagement tools, key messages and processes to be implemented to inform the design of the proposal. It also presents specific communications and engagement tools, key messages and processes to support the delivery of the proposal.

The communication and engagement objectives are to:

- build and maintain trust with external stakeholders through genuine and relevant communications channels
- create stakeholder understanding of the proposal particularly before asking for feedback
- provide timely and relevant work updates to all proposal stakeholders about activities
- inform stakeholders of relevant and potential impacts across the life of the proposal
- develop positive working relationships with the community to support the completion of the proposal
- provide regular and targeted information to build awareness about the proposal and the impacts and benefits
- provide clear direction to the community and stakeholders about whether we are providing information or seeking feedback so that expectations are clear at all stages of engagement
- ensure community and stakeholder views are continuously fed into the proposal's development and used to understand and effectively assess impacts
- collaborate with government agencies and local councils to ensure a whole-of-government approach and consistent key messages
- engage in a manner that is collaborative, innovative, adaptive, and sustainable.

The key stakeholders identified in the CSEP include:

- Government stakeholders including the Department of Planning, Housing and Infrastructure (DPHI)
- State and Federal Ministers and Member of Parliament
- Blacktown City Council
- Aboriginal groups including Deerubbin Local Aboriginal Land Council, Blacktown Native Institution - Dharug Strategic Management Group (DSMG), Colbee and Nurragingy Land Grant, registered Aboriginal Parties
- emergency services including the State Emergency Service (SES)
- potentially impacted residents/property owners and businesses
- the wider community / community groups and facilities
- transport services including bus operators.

This REF is on public display for comment between November and December 2024. Stakeholders and the community would be encouraged to participate, provide feedback and make a submission on the REF as outlined in section 5.6.

5.2 Community involvement

Transport consulted with the community and key stakeholders on early design features from Friday 14 June to Friday 5 July 2024 to (TfNSW, 2024a):

- seek comment, feedback, ideas, and suggestions including consultation outcomes to be considered when developing the proposal, the concept design and REF
- build a database of interested and concerned community members for Transport to continue engaging during the proposal's development and delivery.

The community members and stakeholders were encouraged to provide feedback and make submissions on the early design using the following consultation tools:

- letterbox drop – a community update was distributed to 4206 residents and businesses in the local area on Friday 14 June 2024
- emails – emails were sent to Blacktown City Council and those who had subscribed to Transport's email updates
- webpage – project webpage was updated with the latest information
- social media – three geo-targeted Facebook posts were uploaded running from 14 June to 2 July 2024
- live information session – information session held on Tuesday 25 June 2024, with 40 people in attendance.

Transport received 77 submissions across all communications channels; the breakdown of which is as follows:

- 29 per cent (22) were supportive of the proposal
- 14 per cent (11) were either opposed to all or some aspects of the proposal
- 57 percent (44) requested further information or provided suggestions outside the scope of the proposal.

Key issues raised by the community are summarised in Table 5-1, along with a response and where the issues have been addressed in the REF.

Table 5-1 Summary of issues raised by the community

Item	Issue raised	Response / where addressed in REF
Proposal description	The community requested further information on the proposal design including the new flyover bridge and changes at the key intersections.	Chapter 3 of this REF provides a detailed description of the key features of the proposal including the flyover bridge, intersection upgrades, shared pathway, road gradings, fencing and signage.
	The community requested further information on duration and staging of construction.	Construction of the proposal would be undertaken in two stages for the durations outlined in section 3.3.5.
	The community requested more information on the change to road elevations.	The road elevations on Richmond Road would remain the same between the intersection with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road, as the proposed widening works would occur within the median. The flyover bridge is proposed to go over Rooty Hill Road North and Richmond Road with a 6.2 metre clearance.
	The community requested more information on future consultation activities and how residents would be informed if there would be impact(s) on their property.	This REF is on public display for community feedback providing further opportunity for the community to comment on the proposal. Further information on ongoing and future consultation is provided in section 5.6. Acquisition and property impacts including modified/relocated access are outlined in

Item	Issue raised	Response / where addressed in REF
		section 3.6. Consultation with landowners directly impacted by the proposal has commenced and will continue throughout detailed design.
	The community requested more information on the bike paths and pedestrian crossings.	There would be no change to the shared user path connections with exception of the western shared user path, which is proposed to be relocated further west as a result of the upgrade works. Five staged pedestrian crossings would be provided as part of the proposal as outlined in section 3.2.3.
Proposal justification	The community requested justification on: • limited extent of the proposal (e.g., why the proposal does not extend further north and south) • start and end points of the proposed flyover • value for money / rationale of the proposal and whether money could be better spent on other projects. The community also raised concerns that problems relating to traffic flow and congestion would not be solved but shifted from Rooty Hill Road North to Richmond Road and other roads in the surrounding network. Concern was also raised about the traffic congestion at the start and end points of the proposal due to the added lanes, and how these would be managed.	The proposal forms part of a broader strategy of work to improve transport in the NWGA. The strategic context of the proposal is provided in section 2.1. A number of options/alternatives were considered during development of the concept design including the location of the proposed flyover (refer section 2.4). A cost benefit analysis (CBA) undertaken for the proposal determined that the proposal is economically feasible and identified a number of benefits associated with the proposal and its ability to support residential and commercial development in the immediately surrounding localities. During operation, the network performance would improve indicating a reduction in congestion. In general, intersection performance would remain comparable to the 'Do-Minimum' scenario with a reduction in queuing and delay. Existing traffic conditions and expected traffic improvements are outlined in section 6.1.
Safety	The community raised safety concerns for: • pedestrians near the Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp due to the mix of vehicle types (trucks, semi-trailers, utes, etc.) • traffic congestion in peak periods near the Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp leading to an increase in accidents. • pedestrians crossing Richmond Road.	One of the objectives of the proposal is to improve safety for all road users. Road safety standards have been incorporated into the design as outlined in section 3.2.1. The proposed flyover would reduce traffic at the Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp intersection therefore optimising it. No other improvements are proposed for this intersection at this time. Transport will continue monitoring the state of the road network and investigate opportunities for improvement. New staged crossings on Richmond Road at the intersection with Langford Drive / Alderton Drive, Hollinsworth Road / Townson Road and the M7 Motorway southbound on-ramp would make it easier for pedestrians and bike riders to move safely in and around the area. Details are provided in section 3.2.3.

Item	Issue raised	Response / where addressed in REF
Property	The community requested more information on future consultation activities and how residents will be informed if there would be impact(s) on their property.	This REF is on public display for community feedback providing further opportunity for the community to comment on the proposal. Further information on ongoing and future consultation is provided in section 5.6. Three properties would require acquisition, and an additional three properties would require modified/relocated access as outlined in section 3.6. Consultation with landowners directly impacted by the proposal have commenced and will continue throughout detailed design.
Environmental impacts	The community raised concerns about noise and vibration impacts on residential receivers during construction, particularly at night.	The noise and vibration assessment assessed the potential impacts of the proposal on sensitive receivers for both construction and operation of the proposal. This included assessment of both standard and night time construction activities. Mitigation measures are proposed to minimise noise and vibration impacts. Further information is provided in section 6.7.
	The community raised concerns about impacts on kangaroo populations and birds.	The biodiversity assessment considers the potential impacts of the proposal on the local biodiversity, including native flora and fauna and kangaroos (refer section 6.8).
	The community raised concerns about the visual amenity of the proposal, particularly via the introduction of concrete infrastructure such as the proposed flyover.	An options assessment was prepared to determine the most suitable type of structure for the new bridge structures (refer 2.4). Structures and bridges have been designed to help recede the built form into the surrounding landscape and utilise common elements across the alignment. An assessment of the impacts of the proposal on visual amenity is provided in section 6.9.
	The community raised concerns about the impact of the proposal on heritage sites including the Blacktown Native Institution and Colebee and Nurragingy Land Grant.	There would be no impacts to the Blacktown Native Institution land owned by the Dharug Strategic Management Group (DSMG) or the Colbee Colebee and Nurragingy Land Grant. The current informal access to the Blacktown Native Institution site would be relocated to Rooty Hill Road North. An assessment of the impacts of the proposal on heritage is provided in section 6.4 and section 6.5.
	Concerns about the proposal impacts on the surrounding transport network during construction.	Existing traffic conditions, expected traffic conditions during construction and expected traffic improvements during operation are outlined in section 6.1.
	Concerns about the proposal impacts on the surrounding local road network once the proposal is complete.	

Item	Issue raised	Response / where addressed in REF
Surrounding transport network	The community raised concerns about the general state of the surrounding transport network including: • the proposal would not assist with existing traffic congestion on Richmond Road, particularly north of the proposal • requested detail on considerations for future proposed transport infrastructure, such as Castlereagh Connection, Townson to Burdekin Road project and North West Metro • vehicles 'rat running' through adjacent suburbs (such as Colebee, Dean Park, Hassall Grove, Oakhurst, Glendenning, Dean Park) to avoid going through congested spots such as the Rooty Hill Road North / M7 Motorway on/off-ramps intersection. • frequency that roads in the area will require to be resurfaced as traffic continues to increase over time.	• The proposal forms part of a broader strategy of work to improve transport in the NWGA as described in section 2.1. The expected traffic improvements during operation are outlined in section 6.1. • The proposed design layout considers and does not preclude the future proposed transport infrastructure including the Castlereagh Connection and the Townson Road Burdekin Road project. • The proposal would increase the capacity and traffic flow on Richmond Road as outlined in section 6.1 which is anticipated to reduce the number of road users taking detours through the surrounding road network. • The NSW Government and local councils have an ongoing program to maintain road assets that includes pavement rehabilitation and development works across the transport network.
Suggested alternative options	Suggest bicycle paths and walking paths to be included on the eastern side of the proposal.	The proposal includes a shared path on the western side of Richmond Road between Rooty Hill Road North / M7 Motorway on/off-ramps and Langford Drive / Alderton Drive intersections. A shared path on the eastern side of Richmond Road was also considered but removed during design refinements. Further information is provided in section 2.4.5.
	Suggestions for a different configuration of Richmond Road / Hollinsworth Road / Townson Road intersection including: • two dedicated left turn lanes from Hollinsworth Road onto Richmond Road northbound. • additional lane for vehicles wanting to continue straight from Hollinsworth Road onto Townson Road.	The objective of the proposal is to ease congestion and improve travel time along the corridor. The Richmond Road / Hollinsworth Road / Townson Road intersection proposed works include: • additional northbound through lane on Richmond Road • additional right turn lane on Richmond Road into Hollinsworth Road • new northbound left turn slip lane from Hollinsworth Road onto Richmond Road • new staged pedestrian crossings • optimisation of the traffic signals phasing based on future growth and traffic demands.
	Suggestions for a grade separation at all key intersections on Richmond Road.	The road elevations would remain the same between Alderton Drive and Townson Road, as proposed widening works would occur within the median. The flyover bridge is proposed to go over Rooty Hill Road North and Richmond Road with a 6.2 metre clearance.

Item	Issue raised	Response / where addressed in REF
		Transport will continue monitoring the state road network and investigate opportunities for improvement.
	Suggestions for a different configuration and traffic signal optimisation of Richmond Road / Langford Drive / Alderton Drive intersection including: • changing Alderton Drive intersection westbound from two lanes to three lanes by providing a dedicated straight lane • a left turn slip lane from Alderton Drive into Richmond Road southbound • optimisation of light phasing for the left turn from Alderton Drive to Richmond Road.	The objective of the proposal is to ease congestion and improve travel time along the corridor. The Richmond Road / Langford Drive / Alderton Drive intersection proposed works include: • additional through lane on Richmond Road in both directions (northbound and southbound) • new staged pedestrian crossings • optimisation of the traffic signals phasing based on future growth and traffic demands.
	Suggest a new bridge crossing for pedestrians and bike riders over Richmond Road near Bells Creek in the proposal.	The new bridge over Bells Creek would include an integrated shared path along the western side. Pedestrians and bike riders would be able to cross Richmond Road via the new staged pedestrian crossings at the intersection with Langford Drive / Alderton Drive, Hollinsworth Road / Townson Road and the M7 Motorway on/off-ramps.
	Suggestions for an upgrade or reconfiguration of Richmond Road / Rooty Hill Road North intersection including improvements to left hand turning arrangements from Rooty Hill Road onto Richmond Road.	The objective of the proposal is to ease congestion and improve travel time along the corridor. The new flyover bridge from the M7 Motorway would directly connect to Richmond Road and reduce the number of vehicles turning right at the Rooty Hill Road North intersection. An additional dedicated right turn lane from Richmond Road southbound onto Rooty Hill Road North would also be provided.
	Suggestions for an underpass beneath the existing M7 Motorway bridge for southbound traffic to reduce congestion.	The current scope of this proposal is along Richmond Road between the M7 Motorway and Townson Road. The road widening would improve safety for all road users and optimisation of the signal phasing will improve traffic flow through the intersections on Richmond Road.
	Suggestions for an additional bridge structure to support road users using M7 Motorway in all directions (northbound, eastbound, southbound), adjacent the proposed flyover.	
	Suggest the proposed flyover to join into Richmond Road further north, connecting with Marsden Park industrial area.	The start and end points of the proposed flyover were defined to minimise impacts as outlined in section 2.4.
Request for consideration of additional works	The community requested consideration of additional works outside of the scope of this proposal including (but not limited to): • upgrade or reconfiguration of Romley Cresent / Rooty Hill Road North intersection for safe entry and egress	The current scope of this proposal is along Richmond Road between the M7 Motorway and Townson Road. The request for additional upgrades and improvements is noted but is outside the scope of this proposal.

Item	Issue raised	Response / where addressed in REF
	• upgrade of Richmond Road / Knox Road / Quakers Hill Parkway intersection • suggestion for an upgrade of Richmond Road / Symonds Road intersection • suggestions for a new exit point for M7 Motorway, to join with Quakers Hill Parkway • traffic signal optimisation of Richmond Road / Yarramundi Drive intersection • detail on how residents in the area would access the new Western Sydney Airport.	Transport will continue monitoring the road network and investigate opportunities for improvement. Where relevant, comments were passed to specific stakeholders for their information.
	Suggestions related to new road connections as alternative options to Richmond Road including: • eastbound exit onto Quakers Hill Parkway from the M7 Motorway • opening up of Daniels Road (which remains closed) and extending it to reach Richmond Road • building new roads to connect Richmond Road to Luxford Road / extend roads in Marsden Shopping to Luxford Road in Hassall Grove area.	The request about new road links is noted but is outside the scope of this proposal. Transport will continue monitoring the state road network and investigate opportunities for improvement. Traffic flows outside the proposal for Richmond Road, on local roads, are under the care and control of Blacktown City Council. Community members are encouraged to contact Council. Matters raised during consultation that are not within Transport's area of responsibility have been forwarded to the relevant authority.

5.3 Aboriginal community involvement

Transport is committed to effective consultation with Aboriginal communities regarding Transport activities and their potential for impact on Aboriginal cultural heritage.

5.3.1 Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Consultation with Aboriginal people has been carried out for the proposal in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS, 2011). The PACHCI is outlined in Table 5-2.

Table 5-2 Summary of Transport's Procedure for Aboriginal Cultural Heritage Consultation and Investigation

Stage	Description
Stage 1	Initial assessment by Transport
Stage 2	Site survey and further assessment
Stage 3	Formal consultation and preparation of a cultural heritage assessment report
Stage 4	Implement environmental impact assessment recommendations

The PACHCI was developed to provide a consistent means of effective consultation with Aboriginal communities regarding activities which may impact on Aboriginal cultural heritage and a consistent assessment process for Transport activities across NSW. The aim of consultation is to integrate cultural and archaeological knowledge and ensure registered Aboriginal parties have information to make decisions on Aboriginal cultural heritage. The PACHCI assists Transport in meeting its legislative responsibilities regarding consultation and investigation of the potential impacts on Aboriginal cultural heritage.

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged by Transport to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) (KNC, 2024) for the proposal in accordance with Stage 3 of the PACHCI, the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a).

Stakeholder identification and registration of interest

Preparation of the ACHAR, involved consultation with people who were identified as the appropriate Aboriginal cultural knowledge holders in the study area. The stakeholder identification occurred in Stage 3 of the PACHCI (TfNSW, 2011) for the proposal. This consultation was undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the requirements of section 60 of *the National Parks and Wildlife Regulation 2019*.

Advertisements were placed in newspapers (The Blacktown News and The Koori Mail) and notifications were sent to the required organisations as per the legislation seeking Aboriginal people who may have an interest in the proposal and who hold cultural knowledge about objects and places in the study area. Following this, a letter of notification was sent to the relevant Aboriginal groups or persons identified by these organisations providing an opportunity for them to register an interest to be consulted, which then forms the Registered Aboriginal Parties (RAPs) list for this proposal.

Preparation of the ACHAR involved consultation with the following Aboriginal community groups:

- Deerubbin Local Aboriginal Land Council
- Amanda Hickey Cultural Services
- Bariyan Cultural Connections
- Colin Gale
- Darug Custodian Aboriginal Corporation
- Dharug Strategic Management Group
- Dharramalin
- Didge Ngunawal Clan
- Gilay Consultants
- Ginninderra Aboriginal Corporation
- Gunjeewong Cultural Heritage
- Kamiloroi Yankuntjatjara Working Group
- Koori Digs
- Mundawari Heritage Consultants
- Muragadi
- Ngambaa Cultural Connections
- RAW Cultural Healing
- Wailwan group
- Wori Wooilywa
- Wurrumay
- Yurrandaali Cultural Services.

Three additional Aboriginal stakeholders have registered for the proposal but have chosen to withhold their details in accordance with item 4.1.5 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a).

Archaeological field surveys of the study area were carried out by archaeologists from KNC and representatives from Deerubbin Local Aboriginal Land Council (DLALC) on 19 June 2020 and 21 August 2023. The formal consultation process included:

- advertising for registered Aboriginal parties
- government agency notification letters
- notification of closing date for registration
- ongoing compilation of registrants list

- provision of project information
- provision of proposed cultural heritage report assessment methodology (allowing 28 day review) outlining the proposed test excavation and PACHCI Stage 3 assessment methodologies
- provision of draft ACHAR and test methodology to registered stakeholder for review (a 28 day review period was provided). Stakeholders were requested to review the information and provide any comments or cultural information that may affect, inform or refine the methodology
- an Aboriginal Focus Group (AFG) meeting was held on 27 March 2024 to discuss the findings of the test excavation program, the draft ACHAR and the proposed mitigation
- ongoing consultation with the local Aboriginal community including regular project updates.

The issues raised by the Aboriginal community are outlined in Table 5-3, along with a response and where the issues have been addressed in the REF.

Table 5-3 Issues / comments raised through Aboriginal community consultation

Group	Issue / comments raised	Response / where addressed in REF
Dharug Strategic Management Group (DSMG)	• Identified themselves as the title holder of the former Blacktown Native Institution and stated that they would "raise strenuous objection to any proposal that fails to protect the site's heritage values and its capacity to link to the wider Dharug cultural landscape and its importance to the growing population of the region". • Advised that the new Bells Creek bridge is being built within the Blacktown Native Institution heritage curtilage and the driveway is being impacted. • Advised that Dharug Ngara (Country) is not just the soil, it is the animals, birds, insects (comment in AFG held on 27 March 2024).	Transport has committed to work with the DSMG in order to resolve these issues and consultation is ongoing. The cultural significance of the study area is discussed in section 6.4. The proposed works do not impact on the physical remains of the structures associated within the Blacktown Native Institution and are restricted to the heritage curtilage adjoining Richmond Road. Alternate driveway locations have been discussed with DSMG. Final design is subject to the outcome of ongoing discussion. Aboriginal heritage is considered further in section 6.4 and Appendix E.
Kamiloroi Yankuntjatjara Working Group	• Advised "There are tangible and intangible aspects to the area and surrounding area, theses aspects are what makes up our culture not only is there physical aspects relating to our resilience and continuing culture. Rejuvenating and conserving the site is an aspect that is relevant when proposing to develop a site. As Aboriginal people we have to protect conserve and rejuvenate country and we are obliged to care for country". • Advised that Plumpton Ridge was significant to Aboriginal people and requested salvage excavation be undertaken. • Advised "the land is highly significant and spiritual to us Aboriginal people" and advised that "the water ways and others nearby are significant as they provided drinking water and with them comes an abundance of resources".	The cultural significance of the study area is discussed in section 6.4. Salvage would be undertaken at Aboriginal archaeological sites impacted by the proposal. As Plumpton Ridge is located to the east of the study area and would not be impacted by the proposal salvage is not proposed at that location. A significance assessment for the Aboriginal archaeological sites identified within the study area was undertaken in the ACHAR. The assessment focused on the social/cultural, historic, scientific and aesthetic significance of Aboriginal heritage values as identified in the *Burra Charter* (Australia ICOMOS, 2013). Refer to sections 6.4 and Appendix E for further information.

Group	Issue / comments raised	Response / where addressed in REF
Koori Digs	Advised that there were several significant sites in the region with artefacts that "provide insight into the cultural practices and lifestyles of the Aboriginal communities who lived in the region for thousands of years" and that the "preservation and protection of these sites and artifacts are crucial to ensure that they are remembered and respected to create a better future".	The ACHAR provides an overview of the landscape, ethnohistoric and archaeological context of the study area. This includes a description of the Aboriginal sites within and in close proximity to the study area. Salvage would be undertaken at Aboriginal archaeological sites impacted by the proposal. The long term management of recovered Aboriginal objects would be in accordance with relevant guidelines. Aboriginal heritage is considered further in section 6.4 and Appendix E.
All groups	Some of the Aboriginal cultural heritage values expressed by stakeholders for the study area and wider region include: • ancestral association with the land, including connection and descendance from the original traditional owners • responsibility to look after the land, including the heritage sites, plants and animals, creeks, rivers and the land itself • artefact sites and landscape features • culturally modified trees • connectivity of sites throughout the landscape • creek lines, particularly landscape features and waterways, such as Bells Creek • indigenous plants and animals • general concern for burials, as their locations are not always known, and they can be found anywhere.	The cultural significance of the study area is discussed in section 6.4. The significance assessment for the Aboriginal archaeological sites identified within the study area focused on the social/cultural, historic, scientific and aesthetic significance of Aboriginal heritage values identified in the *Burra Charter* (Australia ICOMOS, 2013). Further details are provided in section 6.4 and Appendix E.

5.3.2 Connecting with Country

A Connection to Country process is being undertaken to better understand Aboriginal stakeholders' primary concerns and aspirations for the area surrounding the proposal. The primary aim of Connecting with Country is to ensure that NSW developments are not only sensitive to but also deeply respectful of Aboriginal culture, heritage, and community needs.

The Connecting with Country process is being carried out and follows the *Connecting with Country Framework* (Government Architect NSW, 2023). The Framework is a guide for good practice in planning, designing and delivering built environment projects, by responding to Country. It encourages practitioners to research, undertake cultural awareness training, and work with Aboriginal communities to develop projects.

Engagement as part of the Connecting with Country process is currently being carried out with knowledge-holders from the Dharug Strategic Management Group (DSMG). Engagement to date has focussed on listening, learning and seeking validation on the themes and design principles that have emerged. Overall, the aim of the engagement is to understand the Country of the proposal not just in its historical sense but also its contemporary cultural context, such that the proposal can better respond to place. Outcomes from the consultation undertaken to date is presented in Table 5-4.

The Connecting with Country design principles, that are the outcome of the engagement, would be used to inform the design and are provided in Table 2-2.

5.3.3 Dharug Strategic Management Group

Consultation with the DSMG as a key stakeholder for the proposal has been undertaken during development of the concept design. The consultation has been undertaken to obtain feedback and address concerns as part of the design. Further discussions with the DSMG that have been undertaken since September 2024 have not been included in the outline below, however, the outcomes of that consultation and all subsequent consultation will continue to inform the proposal design development.

Issues and comments that have been raised as a result of consultation with DSMG are outlined in Table 5-4. The table also provides a response as to where the issues / comments have been addressed in the REF.

Table 5-4 Issues /comments raised through DSMG consultation

Area	Issue / comment raised	Response / where addressed in REF
Design development (from late 2023)	• Existing access is directly impacted by road widening. New access will be needed that caters for events on site. • Works should have a minimal disruption to the significant areas within the Blacktown Native Institution site. • Works need to incorporate the vision and future planning for the Blacktown Native Institution site.	• Alternate driveway locations have been discussed with DSMG. Final design is subject to the outcome of ongoing discussion. Existing access would be reinstated on a like for like basis. • The proposed works would not directly impact the Blacktown Native Institution land owned by DSMG (Lot 5004 DP 1244410). • Further consultation with the DSMG will be undertaken on the potential opportunities for the proposal to express connection to Country. This may include integration of artwork on proposal structures or an interaction with the *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024).
Connecting with Country (8 August 2024)	The discussion and emerging themes from the consultation include: Place for culture, place for ceremony • Participants stressed the deep cultural significance of the Blacktown Native Institution site within the wider region, and of parts of the site being particularly important to protect and to enable access to. This cannot be overstated – it is at the heart of any vision and design principles. • Ongoing cultural ceremony is critical to the living culture of the Dharug people and this site is key to that as a place of cultural safety and learning. • Any new site entry for Blacktown Native Institution land must avoid the most culturally significant places – these should not be about cars. Dharug identity: • Participants spoke of the importance of truth telling and of the importance of the places and spaces that create the opportunity for truth-telling (including of trauma). • People wanted to see acknowledgement of Dharug language, for example through naming on new structures, and prefer a local Dharug artist for any commission. • It is important to honour the children and celebrate the spirit of childhood, as part of an	The *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024) is a core consideration for Connecting with Country for the proposal. The visioning document seeks to articulate a sense of place, to continue practices of belonging and connecting (particularly with the Blacktown Native Institution site, but also for the wider area that includes the proposal) through healing, learning and supporting environmental relationships and custodianship. The aspirations of the traditional knowledge-holders and Elders of the DSMG and the local Dharug community include the ultimate layout and design of the edge condition (impacted by the proposal). Consultation would continue with DSMG throughout detailed design and construction. DSMG input would be sought on: • the location and design of the interim and potential permanent driveway relocation • the opportunity to include cultural interpretations or design into the proposed road infrastructure (i.e. the flyover bridge or abutments) • the opportunity for culturally sensitive and locally indigenous plantings within the road corridor

Area	Issue / comment raised	Response / where addressed in REF
	ongoing sense of connection and stewardship for future generations. • The community wanted to help create a sense of shelter and safety within the Blacktown Native Institution site, and suggested a landscaped bund wrapping around the eastern corner (this would also mitigate some of the impacts of the road widening project's increased 'hard' infrastructure). An interconnected blue and green network: • Participants spoke of a time when animals would move freely through the green belt and creeks, and when the waterways were naturalised, not in culverts. • Waterways are both traditional connectors of people and also an important food source. • Water can also be a barrier to movement and any future design of the place needs to bridge streams and retain access to and through the Blacktown Native Institution site. Process and protocols: • DSMG expressed disappointment regarding the community consultation process to date, including not feeling heard in terms of their preference for future site entry and car park locations. • A masterplan commissioned for the Blacktown Native Institution site and surrounds should be given status in terms of its aspirations and principles. • Aboriginal community members must continue to be consulted, and to have co-design protocols in place, for future stages of the project. • The recommendations from this project should guide development outside the immediate project scope (i.e. future work possibly by others) so that the core vision and significance of the Blacktown Native Institution site are respected and carried through into the wider precinct.	• the opportunity for the proposal to support the proposed development of the Blacktown Native Institution site in accordance with the *Vision for Country* (COLA, 2024) • the ongoing development of the Connecting with Country assessment.
PACHCI	Refer to Table 5-3.	Refer to Table 5-3.

5.4 SEPP (Transport and Infrastructure) consultation

Transport has undertaken stakeholder consultation in accordance with the provisions of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP (Transport and Infrastructure)). The purpose of the consultation is to seek stakeholders input on the proposal, including any concerns relating to environmental and social impacts associated with the proposal.

Letters were issued to Blacktown City Council and the State Emergency Services (SES) on 6 November 2024 providing detail on the proposal as per the requirements of the SEPP (Transport and Infrastructure). The outcomes of consultation with these stakeholders will be considered by Transport as part of the Submissions report following the consultation period. As noted in section 5.5 broader consultation on the proposal has been undertaken with Blacktown City Council.

Appendix B contains a SEPP (Transport and Infrastructure) consultation checklist that documents how the consultation requirements have been considered.

5.5 Government agency and stakeholder involvement

Regular virtual meetings have been undertaken with key stakeholders during the development of the concept design to obtain feedback and address concerns as part of the design. The list of key stakeholders includes:

- Blacktown City Council
- Westlink M7
- Sydney Business Park.

Issues that have been raised as a result of consultation with these agencies and stakeholders are outlined in Table 5-5, along with a response and where the issues have been addressed in the REF.

Table 5-5 Issues / comments raised through stakeholder consultation

Stakeholder	Meeting details	Issue raised	Response / where addressed in REF
Blacktown City Council	• 12 July 2023 – Introduction to the proposal, pre-20% concept design. • 28 May 2024 – Post 20% and pre 80% concept design review panel. • 27 June 2024 – Pre 80% concept design drainage design meeting. • 23 August 2024 – 80% concept design water quality meeting.	Opportunities for future tree planting.	Roadside barriers have been provided to allow for planting of new trees. Planting is proposed as part of the proposal and are discussed in section 6.9.
		Provision of safe active transport connectivity.	The proposal includes a separated shared path along the western side of Richmond Road to link Rooty Hill Road North to Langford Drive as discussed in section 3.2.3.
		Suitable water quality treatment to protect Bells Creek.	Water quality treatment measures are proposed to align with Blacktown City Council standards including gross pollutant traps (GPTs) and grass lined swales. Water quality GPTs have been provided at the drainage outlets either side of Bells Creek as outlined in section 3.2.3. This approach has been discussed with Blacktown City Council.
		Sufficient flooding freeboard beneath the new northbound carriageway bridge over Bells Creek.	A new open flood channel has been provided on the eastern side of Richmond Road, north of the M7 Motorway, to improve the flood immunity during operation of the proposal. The channel would provide sufficient flood immunity during the 1% average exceedance probability (AEP) storm event. The impacts of the proposal on flooding are provided in section 6.2.
West Link M7	• 8 May 2024 – Post 20% Concept Options review panel.	Potential traffic queuing onto the M7 Motorway during operation of the new flyover bridge especially if an incident occurs on the bridge.	Traffic modelling has been undertaken to demonstrate the traffic impacts in the future year scenarios, 2028 and 2038. Refer section 6.1 for further information.
		Sufficient wayfinding signage is provided on the M7 Motorway.	The existing directional sign at the existing M7 Motorway Rooty Hill Road North off-ramp would be updated to suit the new flyover bridge. Wayfinding signs has been reviewed.
		Consideration of incident management.	An Intelligent Transport System (ITS) Strategy has been prepared based on discussions with West Link M7. Incident

Stakeholder	Meeting details	Issue raised	Response / where addressed in REF
			response would be developed and finalised during later stages of design. The design of the flyover bridge includes sufficient space for an emergency vehicle to pass vehicles. Detours via Rooty Hill Road North, as in the current arrangement, would bypass the flyover.
		Drainage impacts at the interfaces between the existing M7 Motorway drainage and proposal.	Proposed design including drainage have been issued to West Link M7 for comment and review. Following a review by West Link M7, the drainage would be tied in at interfaces.
Sydney Business Park	Consultation via email and phone calls based on 20 % design	Confirmation of vehicle sizes and allowable traffic moments for deliveries and trucks leaving the Sydney Business Park.	There would be no change to the access arrangements for the Sydney Business Park. The proposed designs have been provided to Sydney Business Park for review, comment and confirmation on vehicle sizes and allowable traffic movements.
		Changes to the traffic performance that could impact users ability to access businesses in the area.	There would be no change to the access arrangements for the Sydney Business Park. Traffic modelling has been undertaken to demonstrate the traffic impacts in the future in 2028 and 2038. Refer section 6.1 for further information. As there are no designated freight lanes on Richmond Road in the proposal area the proposals impacts would affect all roads users in similar ways as they all share the same road space.
Landholders affected by property adjustments	Various	Consultation with landholders affected by property adjustments and acquisitions are ongoing. Blacktown City Council notes that the water quality device at the culvert at the intersection of Richmond Road and Hollinsworth Road would need to be relocated.	The land acquisition process has commenced, and concerns raised during this process would be addressed with each impacted land-owner. Relocation of the water quality treatment device has been incorporated in the design.

Consultation with affected utility authorities commenced during 80 per cent concept design development with a coordination workshop held 28 March 2024. Individual project kick-off meetings were held with the majority of the affected providers, with monthly design meetings established to continue design progression. This included Sydney Water (3 meetings), Amplitel (4 meetings), Jemena (3 meetings), Endeavour Energy (2 meetings), Telstra (2 meetings) and Optus (1 meeting). NBN and TPG attended the coordination workshop, however, no individual meetings have been undertaken. Specific discussions relating to their assets will commence during future design stages.

5.6 Ongoing or future consultation

The community would continue to be informed during the development and construction of the proposal as per the Community and Stakeholder Engagement Plan (CSEP) developed for the proposal.

Transport would also continue to consult with relevant government agencies and other stakeholders as the proposal develops. Ongoing consultation is being undertaken with Blacktown City Council and the DSMG around the design of the flyover bridge and its visual impacts, alternate access for the Blacktown Native Institution site and throughout the Connecting with Country process.

This REF is on public display for comment by Government agencies, stakeholders and the community. Documents are available on Transport's website and printed copies are available at certain locations or by request. Staffed displays are also taking place during the public display period. Details are provided in the executive summary of this REF.

Following the public display period, Transport will collate and consider all submissions received and responses will be provided in a Submissions report, which would be made available to the public. After this consideration, Transport will determine whether the proposal should proceed as proposed and will inform the community and stakeholder of this decision.

If the proposal is determined to proceed, Transport will continue to consult with the community and stakeholders prior to and during construction.

6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment, potentially impacted upon by the proposal, are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act.
- The factors specified in the *Guideline for Division 5.1 assessments* (DPE, 2022a) and as required under section 171 of the Environmental Planning and Assessment Regulation 2021 and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996a). The factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021 are also considered in Appendix A.
- Site-specific safeguards and management measures are provided to mitigate the identified potential impacts.

6.1 Traffic and transport

A Traffic and Transport Impact Assessment (TTIA) has been carried out to assess the potential traffic and transport impacts during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix C.

6.1.1 Methodology

The TTIA involved the following tasks to assess the existing performance and the proposal's impact on the transport network.

Identification of the study area

Traffic modelling of the NWGA (mesoscopic model) and the Richmond Road corridor (microscopic model) was undertaken as part of the broader Richmond Road Corridor project. To understand how the proposal would integrate with the broader road network, the study area for the Traffic and Transport Assessment was extended to match the microsimulation model boundary of the Richmond Road Corridor project as shown in Figure 6-1. The traffic model boundary extension:

- provides a better representation of the congestion and traffic demands on the Richmond Road corridor affecting the proposal's operation
- reduces risk and improves design outcomes for the proposal by modelling interactions with interfacing projects along the Richmond Road corridor and within the broader NWGA region.

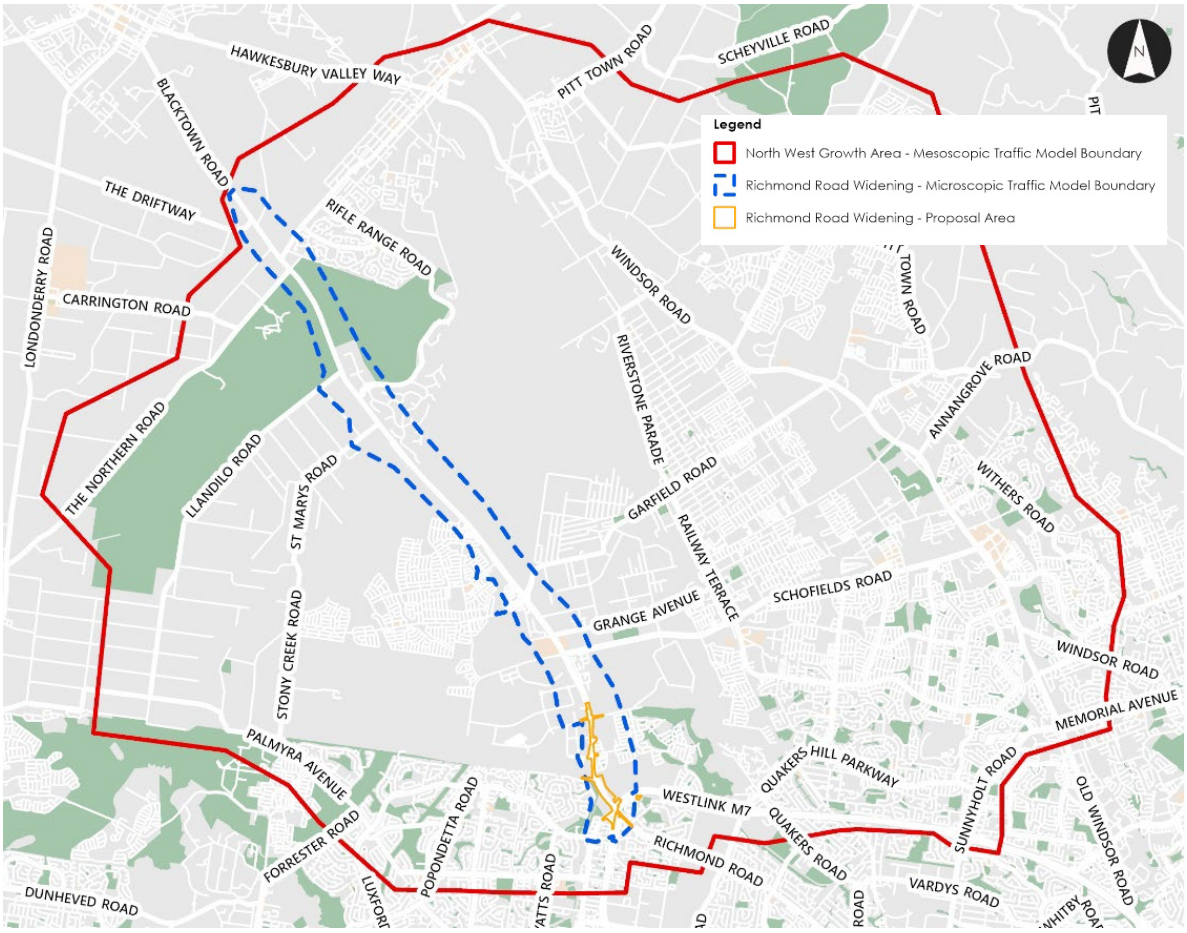


Figure 6-1 Traffic model boundary

Review of existing information

The collation of background information included previous studies, automatic tube counts, classified intersection counts, census data, journey to work data, and crash data. The review of the existing environment included current and future land uses and population data, road network characteristics and hierarchy, and current transport networks (private vehicle, freight, public transport and active transport).

Assessment of existing road network performance

Assessment of the existing road network performance considered the network performance metrics and intersection performance metrics. Road network performance was measured using a microsimulation model developed in Aimsun. This type of model simulates individual vehicles and their interactions with each other and the road environment. Network and intersection performance was quantified using the following metrics:

- Network performance metrics:
  - Total traffic demand - total number of trips that enter the study area in the modelled period.
  - Distance and time travelled by vehicles - distance travelled by all vehicles in the study area and the total travel time of all vehicles that completed their trips.
  - Number of stops - the number of times a vehicle stops across all vehicles in the model.
  - Average speed - average speed for all vehicles in the network.
  - Unreleased demand - the number of vehicles that were unable to enter the modelled network during the modelled period due to queuing that extends to or beyond the boundary of the model.

- Intersection performance metrics:
    - Delay time – average delay experienced by vehicles at the intersections.
    - Level of service (LOS) – an intersection performance metric that is based on delay per vehicle.
    - Queue length – queue length on each intersection approach.

For signalised intersections, the LOS is based on the delay for all approaches. The LOS categories of the performance for the intersections in NSW are provided in Table 6-1.

Table 6-1 Intersection performance classification

Level of service	Description	Delay
A	Good operation	Less than 14 seconds
B	Good operation, with acceptable delays and spare capacity	15 – 28 seconds
C	Satisfactory operation	29 – 42 seconds
D	Near capacity	43 – 56 seconds
E	At capacity	57 – 70 seconds
F	Capacity exceeded	More than 70 seconds

Intersections operating at LOS C or better are usually considered satisfactory. LOS D indicates that the intersection is approaching capacity. LOS E indicates that the intersection is at capacity. LOS F indicates that the intersection is failing and requires additional capacity.

Construction assessment

Anticipated construction activities associated with the proposal may affect the performance of the transport network. The works are proposed to be undertaken as day and night works. The night works is proposed to be undertaken five nights a week (five nights per week has been assessed to determine the worst case scenario, however, this ability would be dependent on other permits such as road occupancy licences (ROLs), consideration of Transports *Construction Noise and Vibration Guidelines* (TfNSW, 2023e) and any community agreements if required). The assessment of these impacts considered construction staging, ancillary sites, construction traffic and vehicle types, lane closures and diversions, temporary speed limit reductions, and public transport and active transport considerations.

Traffic modelling has been undertaken in the Aimsun microsimulation model to determine the relative impacts of construction traffic at key intersections, when compared to conditions without construction of the proposal. A baseline and two construction scenarios were analysed to evaluate the potential impacts on traffic and transport as follows:

- 2028 The Proposal (Stage 1): This scenario was modelled with ‘committed and funded’ and ’indicative’ infrastructure upgrades, and the northern section of the proposal. It serves as the baseline for comparison with the proposed construction scenarios.
- Construction Scenario 1 (Stage 2A): This scenario involves modifications to existing Richmond Road southbound lane configurations to facilitate the construction of future southbound lanes. The northbound lane configuration remains unaltered.
- Construction Scenario 2 (Stage 2B and 2C): This scenario involves shifting the northbound and southbound lane configurations to the southbound lanes of the proposed Richmond Road as part of a temporary traffic alignment. It also includes adjustments to the Rooty Hill Road North / Richmond Road intersection for temporary contraflow.

Appendix C provides more information on the construction staging plan and the works to be undertaken during each stage of construction.

Operational assessment

The Aimsun microsimulation model was used to assess the future performance of the network with the proposal (The Proposal scenario) and without the proposal (Do-Minimum scenario) as set out in Table 6-2. Traffic modelling was used to investigate potential operational impacts associated with the proposal at a network and intersection level. The modelled scenarios are described as follows:

- Existing Base: This scenario was modelled using the existing road network infrastructure.
- Do-Minimum: The Do-Minimum scenarios were modelled with 'committed and funded' and 'indicative' infrastructure upgrades, but without the proposal.
- The Proposal: The Proposal scenarios were modelled with 'committed and funded' and 'indicative' infrastructure upgrades along with the two stages of infrastructure upgrades of the proposal.

Table 6-2 Scenarios and years assessed

Scenario	2023		2028		2038	
Existing Base	✓	✓	-	-	-	-
Do-Minimum	-	-	✓	✓	✓	✓
The Proposal	-	-	✓	✓	✓	✓

The traffic peak hour was determined from classified intersection counts on a typical Thursday (Thursday 9 March 2023). It was assumed that the peak hours were the two hours with the highest traffic volume recorded across all intersections in the network. The model indicates network performance during these busiest hours in each peak. The Aimsun model is based on the following hours:

- AM peak: 7.00am – 9.00am
- PM peak: 4.00pm – 6.00pm.

It is noted that the construction and operational traffic assessment was completed using the assumptions that Stage 1 (the northern section) would be delivered and opened to traffic in 2028 and Stage 2 (the southern section) would be delivered and opened to traffic in 2038 thereby completing the traffic improvements by 2038. Since this assessment was completed (as provided in Appendix C), funding has been provided to complete (pending planning approval) construction of both stages of the proposal consecutively without the 10 year gap in construction. Therefore, as outlined in section 3.3.5, Stage 1 (the northern section) would start construction in 2025 and be open to traffic in 2026 and Stage 2 would start construction in 2026 and open to traffic in 2028.

A review of the traffic modelling for construction and operation assumes that the impacts with the condensed delivery program (that is considered in this REF) is consistent with the findings of the original assessment. This is due to the fact that construction overlap is still not required, therefore would not result in a cumulative construction impacts. Further, providing the identified improvements to traffic flow, congestion and delays as part of operation of the proposal would be brought forward 10 years providing additional benefit as a result of the proposal to the road network and local community.

Identification of mitigation and management measures

Mitigation and management measures are identified to address any negative impacts associated with the proposal, and to enhance the opportunities created by the proposal.

6.1.2 Existing environment

Existing road infrastructure

Richmond Road is classified as a state arterial road providing a north-south connection through the study area, with a speed limit of 80 km/h. It connects the M7 Motorway to new housing and employment areas in the NWGA. Within the study area, Richmond Road is a divided two-way road generally with two lanes in each direction. The intersections are: Rooty Hill Road North / M7 Motorway on/off-ramps, Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road.

Several issues have been identified as part of the TTIA which contribute to the poor performance of the state road. These include crashes, long, slow-moving queues through signalised intersections and operational levels below the benchmarks for general traffic and freight performance.

In addition, traffic on the M7 Motorway Rooty Hill Road North off-ramp extends from the signalised intersection at the end of the ramp and queues back onto the motorway for several hundred metres in the afternoon peak period.

Existing traffic volumes

Existing 2023 traffic volumes were determined from automatic tube count (ATC) survey data along the corridor and surrounding roads in the study area. ATC surveys were conducted between Monday 6 March 2023 to Monday 27 March 2023. Table 6-3 shows the daily traffic volumes along Richmond Road and Rooty Hill Road North through the study area. Vehicles are classified according to the Austroads (1994) vehicle classes.

Table 6-3 Existing traffic volumes through the study area

Level of service	Direction	Light vehicles (Class 1-2)	Heavy vehicles (Class 3-5)	Articulated vehicles (Class 6-12)	Total AADT (veh/day)
Richmond Road (between Townson Road and Alderton Drive)	Northbound	23,500	1502	1060	26,062
	Southbound	30,094	1426	751	32,271
Richmond Road (south of Alderton Drive)	Northbound	30,389	1884	1504	33,778
	Southbound	42,031	2362	1463	45,856
Richmond Road (North of Yarramundi Drive)	Northbound	19,422	485	420	20,327
	Southbound	16,494	365	240	17,100
Rooty Hill Road North (South of Richmond Road)	Northbound	37,823	2423	1779	42,025
	Southbound	21,841	413	322	22,575

Existing network performance

The AM peak is the more critical peak overall, with higher vehicle hours travelled (VHT) results which corresponds to higher average travel times and vehicle delay. The AM peak experiences more congestion, with lower average speeds and higher average number of stops. While the overall traffic demands are higher in the PM peak, overall network performance is worse in the AM peak.

Table 6-4 summarises the existing network performance results for the study area for each peak. These results are used as a baseline to compare different modelled scenarios to assess construction and operation impacts of the proposal.

Table 6-4 Existing network performance

Network performance metric	Unit	AM peak	PM peak
All vehicles			
Total demand	(veh)	25,586	26,158
Vehicle kilometres travelled (VKT)	(km)	108,818	112,425
Vehicle hours travelled (VHT)	(hr)	4055	3291
Total number of stops	(stops)	108,498	94,508
Averages per vehicle			
Average travel time in network	(sec)	600	462
Average number of stops	(stops)	4.46	3.68
Average speed	(km/h)	26.84	34.16

Network performance metric	Unit	AM peak	PM peak
Average delay	(sec)	89	58
Unreleased demand			
Unreleased demand	(veh)	0	0
Proportion of total demand	(%)	0%	0%

Existing intersection performance

The results of the intersection performance for the AM and PM peaks are shown in Figure 6-2. The results are summarised as follows:

- The Richmond Road / Townson Road / Hollinsworth Road intersection performs at level of service (LOS) F by the second hour of both AM and PM peaks. In the AM peak, the intersection experiences a high delay of 186 seconds mainly due to the north approach where the queuing and delay extends to this intersection from the Richmond Road / Rooty Hill Road North / M7 Motorway on/off ramps. In the PM peak, high volumes of northbound and southbound through traffic limit the green time available for movements from Hollinsworth Road and Townson Road, thus creating high delays.
- The Richmond Road / Langford Drive / Alderton Drive intersection operates at LOS E or worse in both peaks. The existing capacity of the road is insufficient to service the high demand southbound in the AM peak and northbound in the PM peak.
- The Richmond Road / Rooty Hill Road North / M7 Motorway on/off ramps operate at LOS F by the second hour of AM peak and experience a high delay of 175 seconds due to the high demand from Richmond Road southbound traffic exceeding the existing capacity of the road. In the PM peak the intersection operates at capacity by the end of the second hour.
- The Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp and the Richmond Road / M7 Motorway southbound on-ramp perform satisfactorily at LOS C or better in both peak periods, except for Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp in the second hour of the AM peak.

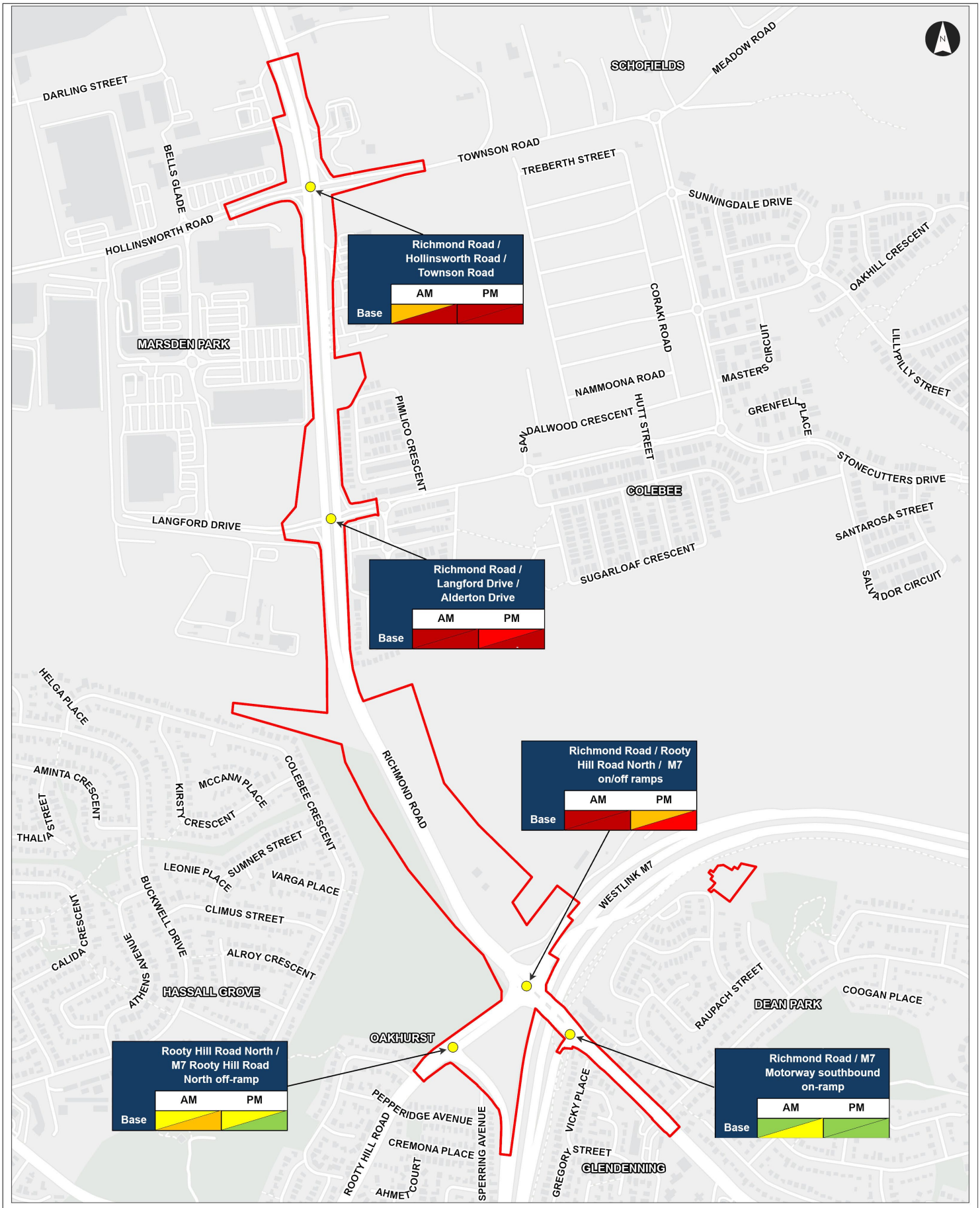


Figure 6-2: Existing intersection performance

Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

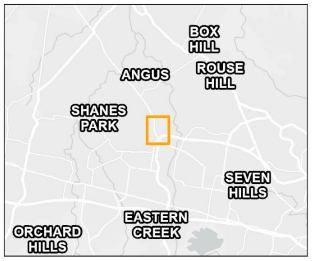
- REF construction boundary
- Intersection

LOS

A B C D E F — Hour 1 / Hour 2

Notes:
1. Map displayed in GDA2020 MGA Zone 56

Reference:
1. Light Gray Base provided by ESRI.



0 100 200 300 400 Metres

Scale at A3: 1:7,500

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Drawn By: RA, Checked By: AS
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Existing travel times

Existing travel times in each direction on Richmond Road were determined in each peak. Travel times and average speeds southbound on Richmond Road are slowest during the AM peak. Capacity limitations caused by the two-lane Richmond Road carriageway result in average travel times of over seven minutes between Hollinsworth Road and Alderton Drive, and average travel times of over four minutes between Alderton Drive and Rooty Hill Road North. The average speed along these sections is also significantly low.

Crash statistics

Historical crash statistics were obtained from Transport for the Richmond Road corridor for the five year period between January 2017 to December 2021.

Over the five year period, 74 crashes occurred on Richmond Road between the intersection with Hollinsworth Road / Townson Road and the M7 Motorway. Thirty of those crashes were located near the intersection of Richmond Road and Rooty Hill Road North, consisting mainly of rear-end crashes. Other crash types included lane change left / right, lane side swipe, other same direction and out of control on a bend.

One crash within the proposal area was fatal. This involved a crash on Richmond Road heading northbound towards the intersection with Townson Road in which a rear end crash occurred between a motorcyclist and a truck. Eleven serious injury crashes occurred within the proposal area including three at the intersection with Rooty Hill Road North.

Modes of travel

The Household Travel Survey (HTS) is conducted by Transport and provides an indication of travel behaviour for a typical weekday for dwellings across the Sydney Greater Metropolitan Area. The HTS includes information relating to the mode in which people make daily trips.

Data for the relevant statistical areas (SA3 i.e. Statistical Areas Level 3 (SA3s) are geographic areas built from whole Statistical Areas Level 2 (SA2s). In general, SA3s are designed to have populations between 30,000 and 130,000 people) within the study area reveals vehicle driver and vehicle passenger were consistently the most population mode choice when travelling within the study area, accounting for 74 per cent in Blacktown – North (relevant to the proposal). Results are shown in Figure 6-3.

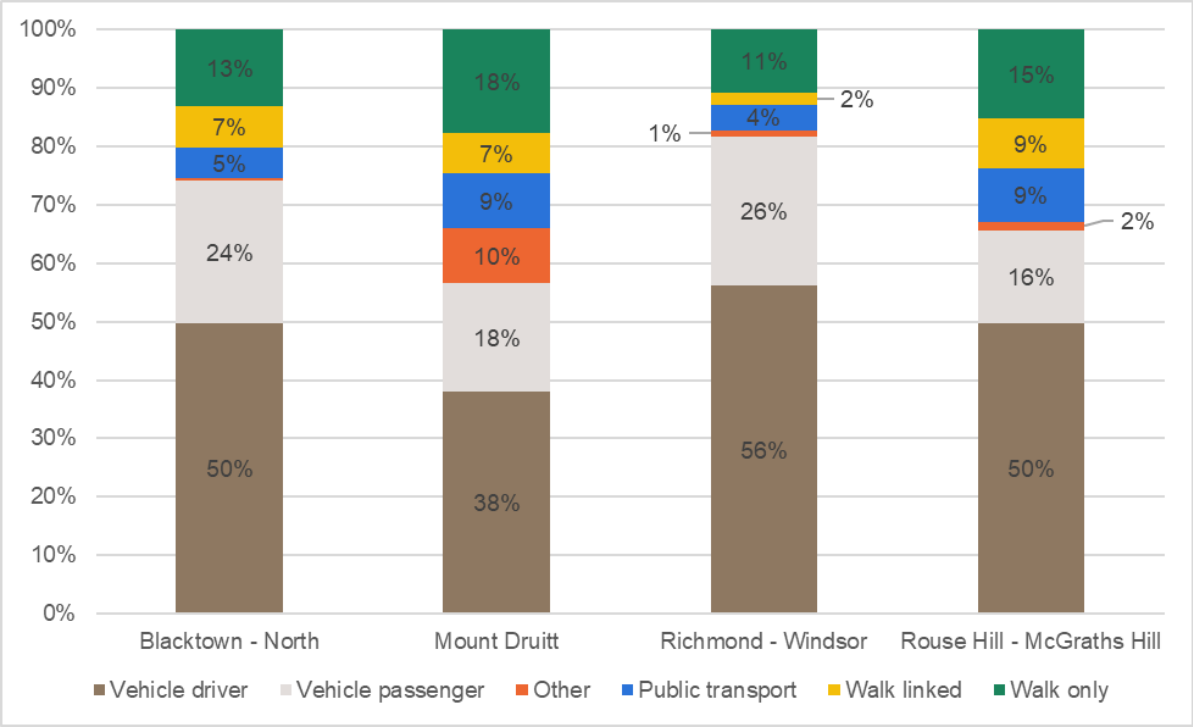


Figure 6-3 Daily trip mode share for each SA3 area (HTS, 2023)

Public transport network

Train

T1 North Shore and Western Line runs north-south, and is located to the east of the proposal, connecting Sydney CBD to Richmond and Emu Plains. T5 Cumberland Line connects Richmond to Leppington via Parramatta. The closest stations to the proposal are Quakers Hill and Schofields (T1/T5 line), located more than three kilometres to the east.

Buses

Bus services within the study area are operated by Busways. Public bus routes that service the proposal are outlined in Table 6-5 and shown in Figure 6-4.

Table 6-5 Bus routes serving Richmond Road

Route	Route name	Frequency - Weekday	Frequency - Weekend
742	Rouse Hill Station to Marsden Park	Every 60mins from 8:06am to 6:28pm	Saturdays: Every 60mins from 9:00am to 5:00pm Sunday & Public Holidays: Every 60mins between 9:00am to 5:00pm
747	Rouse Hill Station to Mount Druitt via Riverstone and Marsden Park	Every 60mins from 6:39am to 9:28pm	Saturday: Every 60mins from 8:34am to 8:34pm Sunday & Public Holidays: Every 60mins from 8:34am to 8:34pm
750	Blacktown to Mount Druitt via Bidwill	Every 20mins from 5:09am to 12:25am	Saturday: Every 30mins from 5:35am to 9:19pm Sunday & Public Holidays: Every 30mins from 8:00am to 6:59pm
751	Blacktown to Melonba via Colebee	Every 30mins from 5:13am to 11:39am	Saturday: Every 60mins from 6:12am to 11:37pm Sunday & Public Holidays: Every 60mins from 7:12am to 11:37pm

Figure 6-4 Existing bus network (Busways, effective August 2024)

There are currently seven bus stops along the length of the proposal as follows:

- Two bus stops are located on Rooty Hill Road North which are south-west of the Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp intersection. These bus stops service the 747 and 750 bus routes.
- Two bus stops are located on Richmond Road immediately after the northbound and southbound departures from the intersection with Langford Drive / Alderton Drive. These bus stops service the 747 and 751 bus routes.
- One bus stop is located on Richmond Road immediately after the southbound departure from the intersection with Hollinsworth Road / Townson Road. This bus stop services the 747 and 751 bus routes.
- Two bus stops are located on either side of Richmond Road slightly north of Yarramundi Drive. These bus stops service the 750 bus route.

There are dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road.

Active transport network

Signalised pedestrian crossings are currently located on Richmond Road at the following intersections:

- one on the northern side of the Rooty Hill Road North / M7 Motorway on/off-ramps intersection
- one on the northern side and one on the southern side of the Langford Drive / Alderton Drive intersection
- one on the northern side and one on the southern side of the Hollinsworth Road / Townson Road intersection.

There is an existing shared path which is located on western side of Richmond Road between the intersection with Rooty Hill Road North / M7 on/off-ramps and the northern extent of the proposal. There are existing shared paths on the southern and northern side of Richmond Road between Yarramundi Drive and the Rooty Hill Road North / M7 Motorway on/off-ramps intersection.

Freight network

Freight routes are categorised into primary, secondary and tertiary routes to facilitate the efficient transportation of goods. Mass limitations are placed on these routes based on vehicle mass and axle group category. Within the study area, these restrictions include:

- Richmond Road: Approved for B-doubles up to 25/26 metres in length
- M7 Motorway: Major interstate freight route running east-west through the study area, allowing all vehicle types.

Marsden Park Industrial Area located in Blacktown is a key freight activity precinct near the proposal and provides various logistics and warehousing facilities, supporting regional and interstate freight activities.

6.1.3 Potential impacts

Construction

Construction is planned to take place over two stages with each stage divided into four components (refer section 0). Construction traffic for Stage 1 (The Proposal), Stage 2A (Scenario 1) and Stages 2B and 2C (Scenario 2) were modelled to assess impacts as they were representative of the worst-case scenarios.

The construction of the proposal would involve the establishment and continued use of three ancillary facilities for the duration of the construction period as outlined in section 3.4 These are:

- Site 1: Richmond Road
- Site 2: M7 Motorway (adjacent to Rooty Hill Road North)
- Site 3: Adjacent to Newman Street.

The intensity of construction related traffic would vary throughout the construction period, depending on the specific requirements of each activity. The most intensive periods for traffic impacts would be the earthworks and road pavement stages. Access to the site for construction vehicles would be via Richmond Road or via the M7 Motorway.

Construction of the proposal would result in impacts to traffic, transport and other stakeholders to a varying degree and duration. These are expected to include:

- Limited, temporary increases to travel times for vehicles, buses and on-road cyclists due to:
    - speed limit restrictions around areas where the proposed works join into existing roads and where construction activities need to be completed under trafficked conditions
    - increased construction traffic resulting from heavy vehicles hauling material to the work areas and additional movements in the vicinity of the construction compounds and laydown areas.
- additional noise from construction traffic
- additional heavy vehicles on network
- increase in general stop-start driving conditions through the temporary work areas
- altered property access arrangements during construction
- pedestrians may use alternative paths to those already being used.

Construction traffic would result in up to 192 additional vehicles per day. Heavy vehicles make up the majority of the additional vehicles at around 69 per cent. Heavy vehicle movements would be generated from the delivery of construction materials, spoil removal, import of fill material for earthworks and delivery and removal of construction equipment and machinery. Light vehicles make up the remainder of the construction traffic. Light vehicle movements would be generated by workers travelling to, from and within the proposal's construction boundary.

Overall, the above identified impacts of construction traffic on Richmond Road are expected to be low as the road already handles a significant amount of traffic and an increase of 192 vehicles per day is not considered to be detrimental to the operation or safety of the road.

Intersection performance

Figure 6-5 shows the intersection performance results for the construction scenarios (Construction Stage 2A and Construction 2B and 2C) compared to the 2028 The Proposal scenario (Stage 1). Results are summarised in Table 6-6.

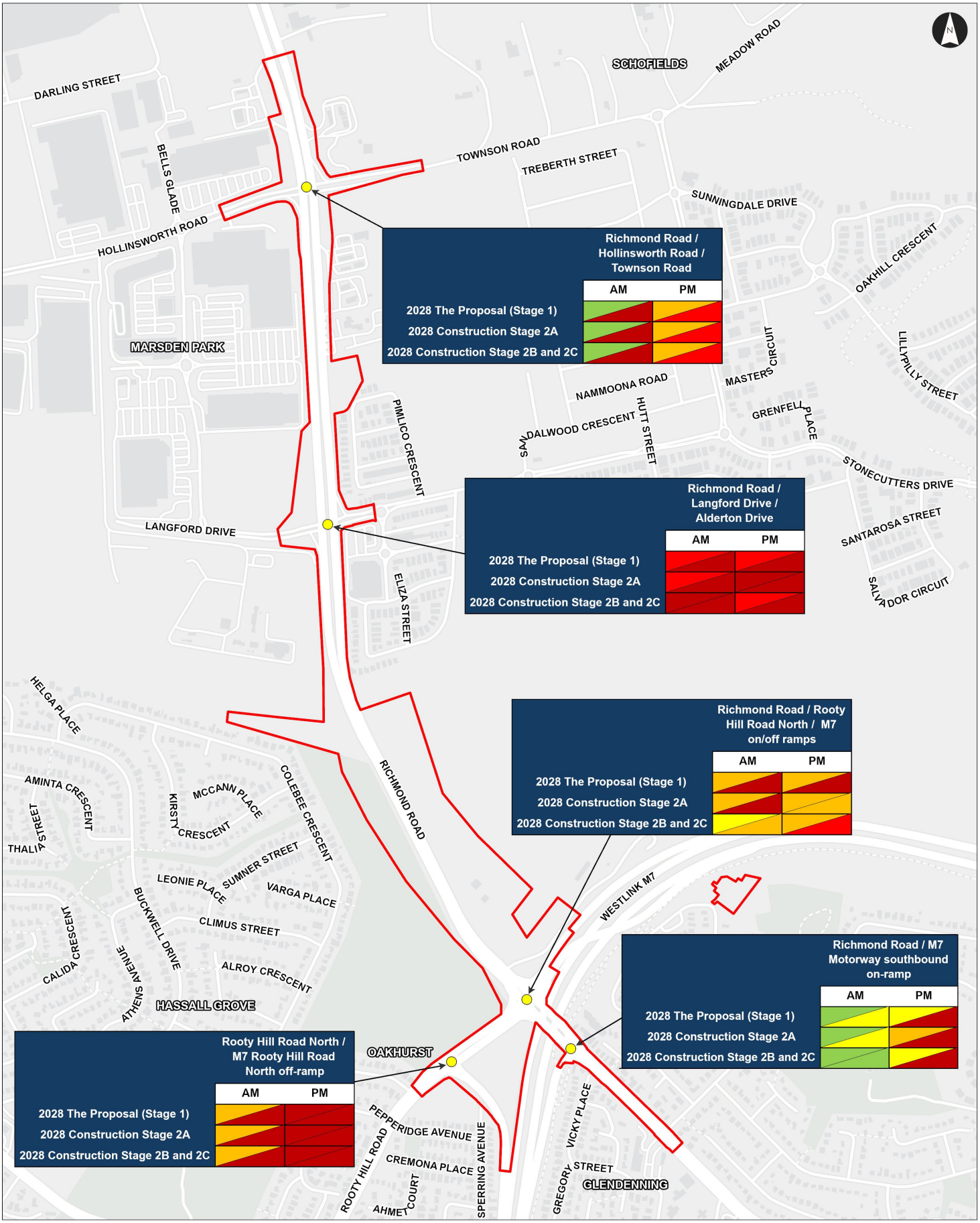


Figure 6-5: Construction intersection performance summary

Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

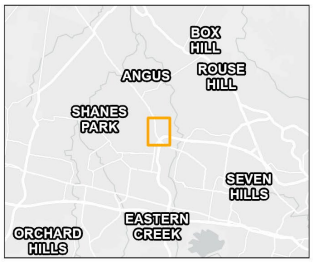
- REF construction boundary
- Intersection

LOS

A B C D E F — Hour 1 / Hour 2

Notes:
1. Map displayed in GDA2020 MGA Zone 56

Reference:
1. Light Gray Base provided by ESRI.



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Rev: 01 | Date: 2024-11-18

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Table 6-6 Construction intersection performance summary

Intersection	Impact level
Richmond Road / Hollinsworth Road / Townson Road	LOS remains comparable with the Proposal scenario in the AM and PM peaks, indicating that construction traffic has not worsened the performance.
Richmond Road / Langford Drive / Alderton Drive	LOS remains comparable with the Proposal scenario in the AM and PM peaks, indicating that construction traffic has not worsened the performance.
Richmond Road / Rooty Hill Road North / M7 Motorway on/off ramps	Construction Stage 2A: LOS remains comparable in the AM peak while improves to LOS D in the PM peak due to upstream congestion as a result of construction traffic. Construction Stage 2B and 2C: LOS improves from LOS F to LOS D in the AM peak and to LOS E in the PM peak due to the addition of auxiliary right turn lane.
Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp	LOS remains comparable with the Proposal scenario in the AM and PM peaks, indicating that construction traffic has not worsened the performance.
Richmond Road / M7 Motorway southbound on-ramp	Construction Stage 2A: LOS remains comparable with the Proposal scenario. Construction Stage 2B and 2C: LOS improves to LOS B in the AM peak. LOS remains the same in the PM peak.

Construction worker parking and impact on on-street parking

Parking for construction personnel would be provided at all ancillary facilities. It is not expected that surplus parking demand from construction activities would reduce the availability of surrounding public parking as there is currently limited or no on-street parking in the core study area. The overall impact on parking would be low.

Public transport network

The intention is for bus stops to remain in operation during construction. The bus stops may be relocated slightly (less than 50 metres), however final details would be confirmed during detailed design.

The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Hollinsworth Road / Townson Road would be maintained.

Active transport network

All pedestrian and cyclist facilities would be maintained during construction. A realigned path would be constructed on the western side of Richmond Road and opened to sensitive road users before decommissioning the existing path to maintain access along the length of the facility. Safety barriers would separate users from the construction zone during construction of the new path and the decommissioning of the old path to provide safe passage during the realignment works. At tie-in locations, any potential temporary disruptions (e.g. with final surfacing) would be managed to ensure users would be able to continue their journey. The overall impact on pedestrians and cyclists would be low.

Property access

During construction, Richmond Road would remain open in both directions at all times to ensure that through traffic would be largely unaffected. Access to properties and businesses would be maintained for the full construction duration with some detours and property alterations required through the construction phase. Property accesses that would be amended during construction include (refer section 3.6 for further information):

- modified access to Colbee Yard, private landowner, Sydney Water pump station and maintenance access for Blacktown City Council
- relocated access for the Blacktown Native Insitution from Richmond Road to Rooty Hill Road North.

Operation

Future traffic demand through the study area and to and from the major roads for the future years 2028 and 2038 were estimated for the AM peak and PM peak. These estimated traffic volumes were used to determine the operational impacts for the proposal. The modelled scenarios are outlined in section 6.1.1.

Network performance

The road network performance metrics used to compare the scenarios are described in section 6.1.1. Table 6-7 shows the existing conditions and the AM Peak and PM Peak road network performance of the 'Do-Minimum' scenario and The Proposal for future years 2028 and 2038.

Table 6-7 Road network performance

Network performance metric	Existing		2028 Do-Minimum		2028 The Proposal		2038 Do-Minimum		2038 The Proposal		2028 The Proposal compared to Do-Minimum		2038 The Proposal compared to Do-Minimum	
	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak
All vehicles														
Total demand (veh)	25,586	26,158	27,088	29,186	27,395	28,838	31,419	33,000	33,564	34,490	+307 (+1.1%)	-348 (-1.2%)	+2145 (+6.8%)	+1490 (+4.5%)
Vehicle kilometres travelled (VKT) (km)	108,818	112,425	111,249	116,852	113,122	117,650	108,261	112,516	122,028	127,162	+1873 (+1.7%)	+798 (+0.7%)	+13,767 (+12.7%)	+14,646 (+13.0%)
Vehicle hours travelled (VHT) (hr)	4055	3291	4542	4614	4298	4348	6410	7355	6239	6072	-244 (-5.4%)	-266 (-5.8%)	-171 (-2.7%)	-1283 (-17.4%)
Total number of stops (stops)	108,498	94,508	114,406	111,737	104,950	106,200	152,003	151,578	161,126	155,446	-9456 (-8.3%)	-5537 (-5.0%)	+9123 (+6%)	+3868 (+2.6%)
Averages per vehicle														
Average travel time in network (sec)	600	462	655	627	609	587	911	1,016	801	733	-46 (-7%)	-40 (-6.4%)	-110 (-12.1%)	-283 (-27.9%)
Average number of stops (stops)	4.46	3.68	4.59	4.22	4.13	3.98	6	5.8	5.7	5.2	-0.46 (-10%)	-0.24 (-5.7%)	-0.3 (-5%)	-0.6 (-10.3%)
Average speed (km/h)	26.84	34.16	24	25	26	27	17	15	20	21	+2 (+8.3%)	+2 (+8.0%)	+3 (+17.6%)	+6 (+40%)
Unreleased demand														
Unreleased demand (veh)	0	0	430	953	519	603	3270	3497	2904	1693	+89 (+20.7%)	-350 (-36.7%)	-366 (-11.2%)	-1,804 (-51.6%)
Proportion of total demand (%)	0%	0%	2%	3%	2%	2%	10%	11%	9%	5%				

The network performance results indicate that:

- VKT increases and VHT decreases in both peaks in the Proposal scenarios compared to Do-Minimum scenario, indicating that road users experience a reduction in congestion in the network.
- Average travel times and the average number of stops decrease, and average speeds increase in the Proposal scenarios in both AM and PM peaks indicating a reduction in congestion.
- In the AM peak, unreleased demand increases by 21 per cent in the 2028 Proposal scenario, when compared to the Do-Minimum scenario. Whilst the number of unreleased vehicles reduces at the M7 Motorway off-ramp as the proposal increases northbound capacity, the increase in northbound traffic volumes lead to increased unreleased vehicles further north outside the study area.
- In the PM peak, unreleased demand decreases by 37 per cent in the 2028 Proposal scenario, when compared to the Do-Minimum scenario. The number of unreleased vehicles reduces at the M7 Motorway off-ramp as the proposal increases northbound capacity.
- Unreleased demand decreases by 11 per cent in the AM peak and 52 per cent in the PM peak in the 2038 Proposal scenario when compared to the Do-Minimum scenario, as the Richmond Road upgrades increase network capacity.

Intersection performance

Figure 6-6 shows the intersection performance for the Do-Minimum scenario and The Proposal scenarios. A summary of the results is provided in Table 6-8.

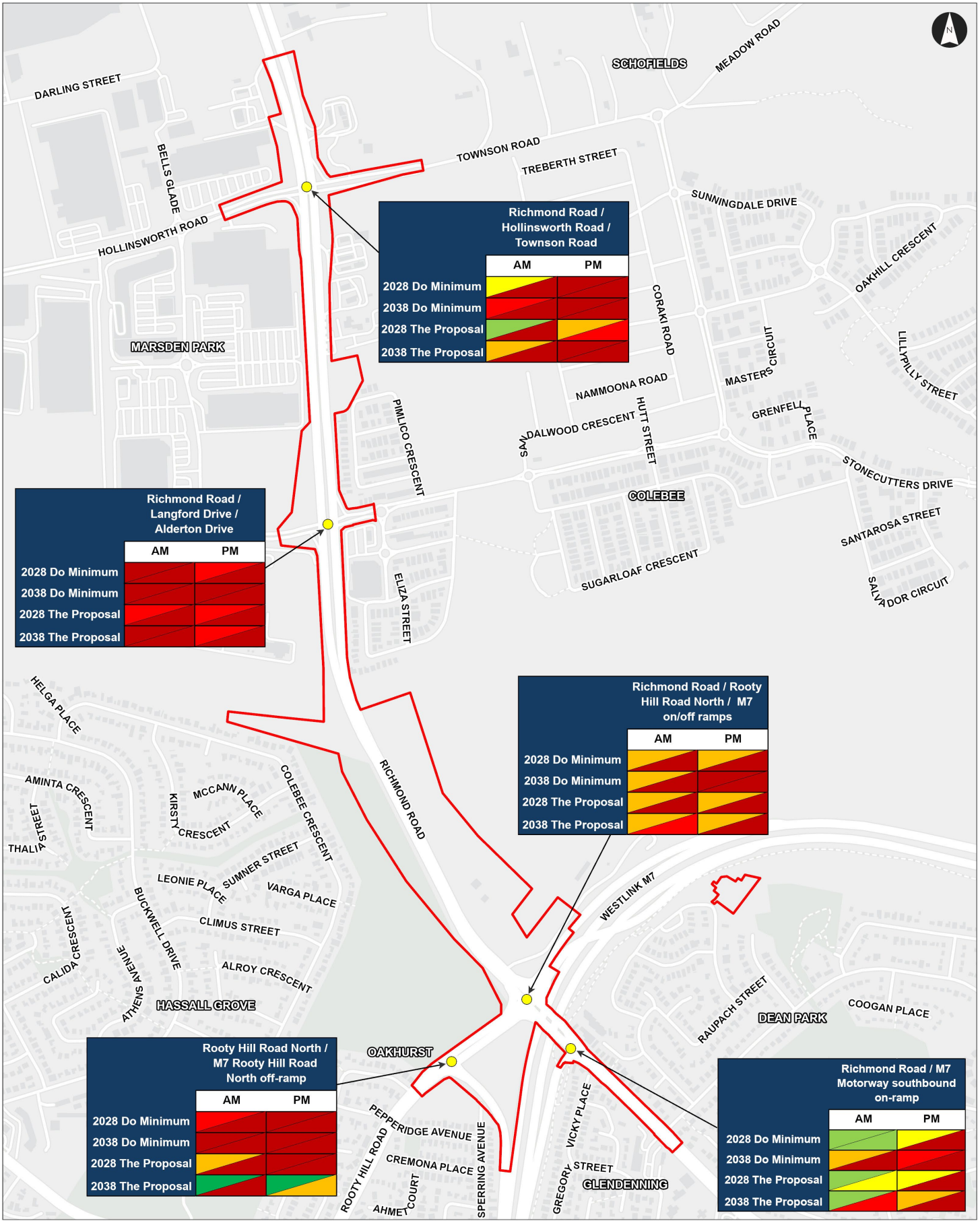

Figure 6-6: Operational intersection performance summary

Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

- REF construction boundary
- Intersection

LOS

A B C D E F — Hour 1 / Hour 2

Notes:
1. Map displayed in GDA2020 MGA Zone 56

Reference:
1. Light Gray Base provided by ESRI.

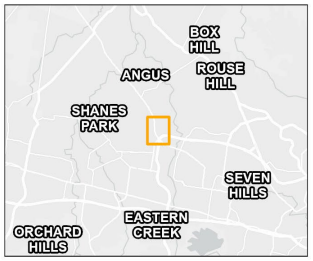

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Table 6-8 Intersection performance summary

Intersection	Impact level
Richmond Road / Hollinsworth Road / Townson Road	LOS remains comparable for all peaks with a reduction in queuing and delay with the proposal.
Richmond Road / Langford Drive / Alderton Drive	LOS remains comparable for all peaks with a reduction in queuing and delay with the proposal.
Richmond Road / Rooty Hill Road North / M7 Motorway on/off ramps	LOS remains comparable for all peaks with reductions in queuing and delay with the proposal, except for a slight improvement from LOS F to LOS E in the AM peak in 2038.
Rooty Hill Road North / M7 Motorway Rooty Hill Road North off-ramp	LOS remains comparable for all peaks with reductions in queuing and delay with the proposal, except for a significant improvement in the PM peak, where the LOS improves from F to D in 2038. This is due to the proposed M7 Motorway flyover, which alleviates some traffic on Rooty Hill Road, reducing queuing.
Richmond Road / M7 Motorway southbound on-ramp	LOS remains comparable for all peaks with reductions in queuing and delay with the proposal, except for a slight improvement from LOS F to LOS E in the AM peak in 2038.

Travel time

Under the 2028 Proposal scenario, travel times on Richmond Road decrease when compared to the Do Minimum scenario. The 2028 results indicate that:

- Under the Proposal scenario in the AM peak, travel times on Richmond Road northbound decrease by over two minutes when compared to the Do-Minimum scenario. This decrease is due to the additional northbound lane on Richmond Road.
- Under the Proposal scenario in the PM peak, travel times on Richmond Road northbound decrease by 24 seconds when compared to the Do-Minimum scenario. The additional northbound lane on Richmond Road reduces travel times.
- The travel time in the AM peak for Richmond Road southbound under the Proposal scenario decreases by almost two minutes when compared to the Do-Minimum scenario. Signal optimisations enabled by the proposal result in reduced travel time.
- The travel time during the PM peak for Richmond Road southbound under the Proposal scenario decreases by over one minute when compared to the Do-Minimum scenario. Signal optimisations enabled by the proposal result in reduced travel time.

Under the 2038 Proposal scenario, travel times on Richmond Road northbound increase and travel times on Richmond Road southbound decrease when compared to the Do-Minimum scenario. The 2038 results indicate that:

- Under the Proposal scenario in the AM peak, travel times on Richmond Road northbound increase by seven minutes when compared to the Do-Minimum scenario. The introduction of the flyover bridge and the Richmond Road / Rooty Hill Road North intersection reconfiguration in the Proposal scenario allows more vehicles to enter Richmond Road northbound leading to increased travel times along the route. Previously, a large number of vehicles were unable to enter Richmond Road northbound.
- Under the Proposal scenario in the PM peak, travel times on Richmond Road northbound increase by over one minute when compared to the Proposal scenario. As in the AM peak, the proposal allows more vehicles to enter Richmond Road northbound leading to increased travel times. Notwithstanding, the upgrades reduce travel time by one minute between Rooty Hill Road North and Hollinsworth Avenue / Townson Road when compared to Do-Minimum. Travel delays are the result of the merge-related congestion north of the proposal where the carriageway narrows back to two through lanes.
- Under the Proposal scenario in the AM peak, travel times on Richmond Road southbound decrease by 17 minutes when compared to the Do Minimum scenario. The widened Richmond Road carriageway increases capacity and reduces queuing and delay.

- Under the Proposal scenario in the PM peak, travel times on Richmond Road southbound decrease by over seven minutes when compared to the Do Minimum scenario. The widened Richmond Road carriageway increases capacity and reduces queuing and delay.

Public transport network

The seven bus stops within the construction boundary would not be impacted by the proposed work. The dedicated bus lanes at the intersection of Richmond Road with Langford Drive / Alderton Drive and Townson Road / Hollinsworth Road would be maintained.

Active transport network

The existing long crossings would be replaced with staged pedestrian crossings at the following locations:

- either side of the Richmond Road / Langford Drive / Alderton Drive intersection
- either side of the Richmond Road / Hollinsworth Road / Townson Road intersection.

The existing northern pedestrian crossing on Richmond Road at the intersection of Rooty Hill Road North / M7 Motorway on/off-ramps would be relocated around 160 metres south to the intersection to the Richmond Road / M7 Motorway southbound on-ramp intersection. The new staged crossings would be signalised and allow pedestrians to cross one carriageway before stopping in the median, and then crossing the second carriageway. Fencing would be provided in the median to ensure pedestrian safety.

Proposed changes to the existing pedestrian and cyclist facilities, either as footpaths or shared paths, on Richmond Road are as follows:

- The shared path on the western side and footpath on the eastern side of Richmond Road between Yarramundi Drive and the intersection with Rooty Hill Road North / M7 Motorway northbound on-ramp would be retained.
- A new four metre wide shared path on the western side of Richmond Road between Rooty Hill Road North / M7 Motorway southbound on-ramp and Langford Drive / Alderton Drive intersections. The new shared path would provide the same connectivity as the existing shared path. A small section of the existing footpath on the eastern side of Richmond Road to the south of the Langford Drive / Alderton Drive intersection would be maintained.

All pedestrians and cycling facilities on Richmond Road north of the Langford Drive / Alderton Drive intersection would be maintained as per the existing configuration.

6.1.4 Safeguards and management measures

Table 6-9 outlines the traffic and transport safeguard and management measures to be implemented for the proposal.

Table 6-9 Traffic and transport safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
TT1	Traffic and transport	A Traffic Management Plan (TMP) would be prepared and implemented as part of the CEMP. The TMP would be prepared in accordance with the Transport *Traffic Control at Work Sites Manual* (TfNSW, 2022c) and *QA Specification G10 Control of Traffic* (TfNSW, 2020a). The TMP would include: • confirmation of haulage routes • confirmation of workforce parking areas • 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	Contractor	Detailed design / Pre-construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• access to ancillary facilities including entry and exit locations and measures to prevent construction vehicles queuing on public roads • vehicle management / movement plan for ancillary facilities due to the proximity of these facilities to high speed, major movement corridors • a response plan for any construction road 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 • traffic assessments to support any works which may temporarily reduce capacity, change the intended schedule of works or any other interruptions to general operation • monitoring, review and amendment mechanisms. Road safety audits (RSA) of the TMP would be undertaken before construction.		
TT2	Traffic and transport	Preparation of a Traffic Guidance Scheme (TGS). The TGSs would be prepared by suitably qualified personnel for the construction area and progressively updated as the works progress.	Contractor	Pre-construction
TT3	Traffic and transport	A Road Occupancy License (ROL) would be obtained before road or lane closures.	Contractor	Pre-construction
TT4	Motorists and public transport	• Minimise road space occupied by the works in terms of time, width and length; road capacity would not be reduced unnecessarily, and sufficient capacity would be provided to accommodate expected traffic volumes. • Detailed site investigations would be undertaken to avoid any unforeseen problems that may increase traffic delays. • All work activities would be sufficiently planned to ensure road occupancies are not implemented at times of peak traffic volumes. • Road occupancies would be coordinated with transport operators regarding schedules and dimension loads. • The ability to stop work and clear travel lanes to allow traffic flows to return to normal free-flow conditions would be maintained. • Road users including public transport, local communities and the freight industry would be provided with timely, accurate, relevant and accessible information about changed traffic arrangements and delays resulting from construction activities. • Road occupancies would allow for and accommodate all road users ranging in size from oversized heavy vehicles, buses, pedestrians and cyclists. • Ensure that free flow traffic is not delayed in any direction at any single road occupancy for longer than five minutes.	Contractor	Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• Queues caused by road occupancies measured along a single lane in any direction should not exceed 250 metres in length. • Road occupancies involving the closure of any shoulder or auxiliary lane should always provide a minimum of one travel lane in each direction through period of occupancy. • Detour signage would be installed at appropriate locations to inform drivers of road closures. • Undertake daily travel time surveys through the project to monitor and verify delays caused by project works and ensure traffic delay criteria is satisfied. • Conduct a Road Safety Audit (RSA) after the implementation of any traffic switches, with the intention to address any identified issues and regularly monitor the implemented arrangements. This would involve consultation with all relevant stakeholders to identify issues.		
TT5	Pedestrians	• All footpaths for construction workers within the works areas would be clearly delineated, signed and fenced to prevent access to work areas and sufficiently separated from vehicular traffic. • Pedestrians would be segregated from live traffic by safety barriers where required. • Appropriate pedestrian detour signage would be provided to guide / direct pedestrians where detours are available.	Contractor	Construction
TT6	Cyclists	A road shoulder would be maintained for cyclists. If this is not possible during certain construction tasks, the speed limit would be reduced to maintain cyclist safety.	Contractor	Construction
TT7	Heavy vehicles	Heavy vehicle access, including for oversized vehicles, would be maintained at all times during construction.	Contractor	Construction
TT8	Traffic control	Development of temporary signposting schemes associated with the traffic staging arrangements. Traffic control devices may include safety barriers, pavement markings, portable variable message signs and temporary traffic signals.	Contractor	Construction
TT9	Construction access points	• Minimise the number of access points. • New construction access points would not adversely impact on any existing intersections, traffic facilities or traffic generation developments. • Security fences and gates at access points would be indented to enable vehicles to park clear of the adjacent travel lanes. • Access points would be constructed of a suitable all-weather surface that prevents debris from being tracked onto the adjacent travel lanes. • Access points would be clearly visible to approaching traffic and signposted accordingly. • Use of temporary traffic control would be considered to facilitate short-term major haulage operations and the movement of oversized vehicles where required.	Contractor	Construction

6.2 Hydrology, flooding and water quality

6.2.1 Methodology

This assessment is separated into matters of surface water, water quality and flooding, and groundwater.

Surface water, water quality and flooding

The methodology for the surface water assessment included:

- Desktop assessment of available documentation including surface water quality sampling records publicly available and the identification of relevant Water Quality Objectives (WQO).
- Assessment of construction water quality impacts.
- Preliminary hydrological water quality modelling using MUSIC (model for urban stormwater improvement conceptualisation) to size operational phase water quality management infrastructure to meet pollutant load reduction targets.
- Hydraulic modelling using the Two-dimensional Unsteady Flow (TUFLOW) software package to understand the existing flooding characteristics and the impact of the proposal on flood characteristics.
- Recommendation of mitigation measures.

Groundwater

The methodology for the groundwater assessment included:

- Desktop assessment of available documentation, including soil landscape investigations and mapping, geological and hydrogeological investigations and mapping (including historic borehole data).
- Opportunistic sampling of groundwater quality and level to establish baseline conditions.
- Assessment of potential impact of the proposal on groundwater recharge, groundwater quality and groundwater dependent ecosystems (GDEs) in line with the *Groundwater Assessment Guideline* (TfNSW, 2022d).
- Recommendation of mitigation measures for any expected groundwater impacts.

6.2.2 Existing environment

Surface water

The proposal crosses Bells Creek, which is a waterway within the Hawkesbury-Nepean catchment. The proposal lies within the South Creek sub-catchment which has been extensively modified and disturbed due to urbanisation and associated land clearance.

Bells Creek flows in a northerly direction, draining into Eastern Creek, South Creek and then eventually into the Hawkesbury River around 15 kilometres north of the proposal. The proposal crosses three tributaries of Bells Creek as shown in Figure 6-7 and described in Table 6-10. Photographs of Bells Creek at the location of the existing bridge are provided in Figure 6-8.

Table 6-10 Summary of existing watercourses crossed by the proposal

Name	Strahler order	Location	Catchment size (hectare)	Existing structure (s)
Bells Creek	Second	Figure 6-7	741	The pedestrian bridge is around 30 m long, 3.5 m wide and is supported by concrete abutments. The vehicle bridge is around 20 m long, 19 m wide and is supported by five 750 mm by 750 mm columns placed on 600 mm diameter piles located in the creek line.
Un-named Creek	First	Figure 6-7	110	Five box culverts 2400 mm wide by 1200 mm high underneath Richmond Road
Eastern Drain	First	Figure 6-7	43	Approximately 6 m wide grassed swale adjacent to Richmond Road, currently crossed by two driveways through 600 mm diameter pipes.

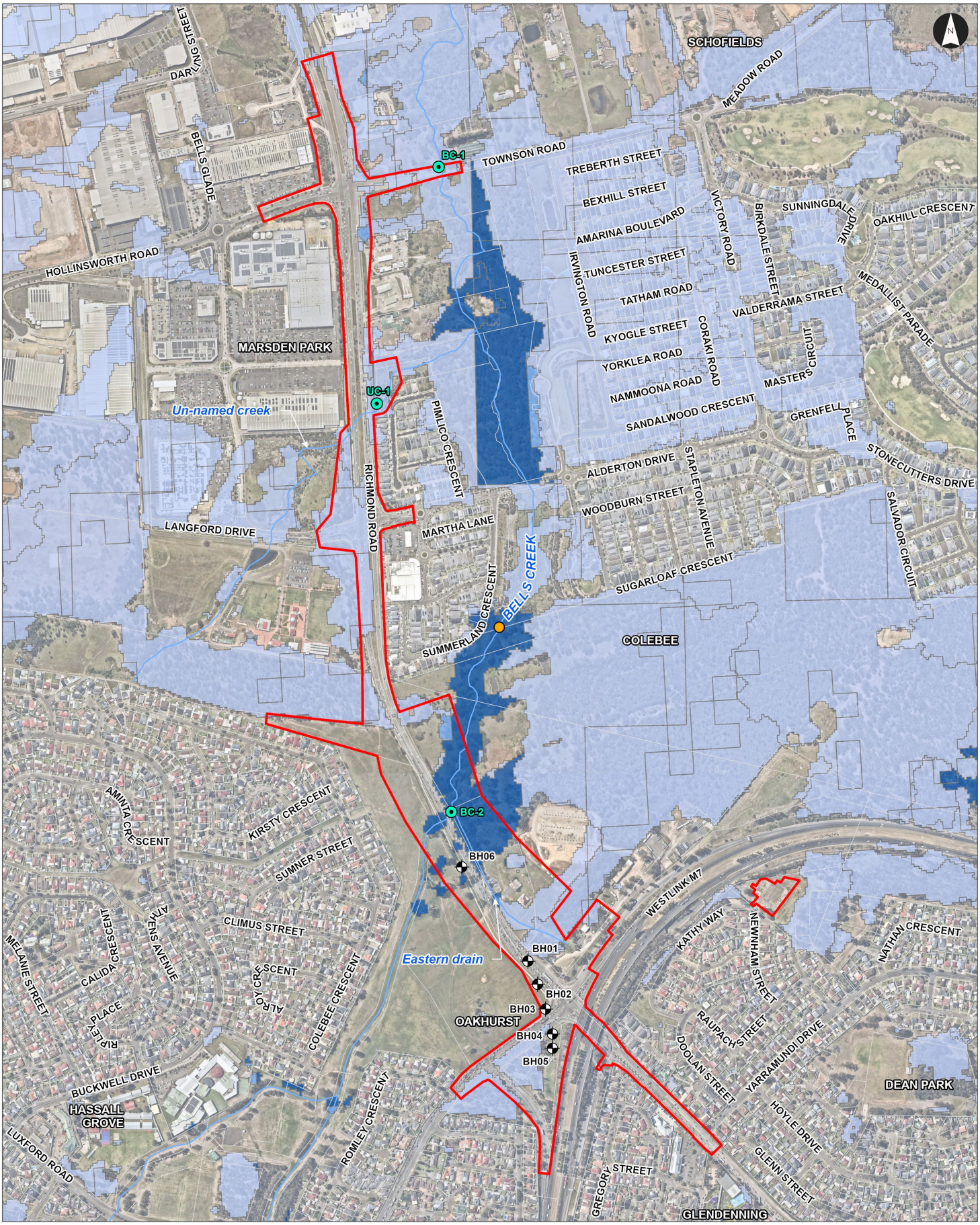


Figure 6-7: Surface and groundwater features

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-012
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-11

Legend

- Construction boundary
- Aquatic Sampling Site
- BCC Water quality Monitoring site: Bells Creek - south (upstream)
- Watercourse
- Cadastre

Groundwater Dependent Ecosystems

- High
- Medium
- Low

Existing Geotech Locations

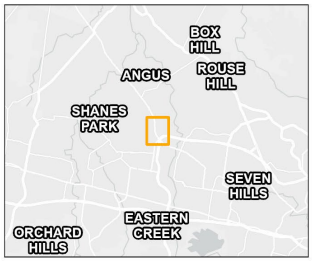
- Borehole

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Nearmap, June 2024)
2. Watercourse and Cadastre (NSW SS, 2023)
3. Groundwater Dependent Ecosystems (DCCEEW, 2022)

0 100 200 300 400 Metres

Scale at A3: 1:7,500



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(a) view of Bells Creek bridge (looking downstream, north-east)

(b) View of Bells Creek looking upstream of Bells Creek bridge

(c) Upstream view of Bells Creek

(d) Bells Creek looking downstream

Figure 6-8 Views of Bells Creek

Water quality

Blacktown City Council provides annual waterway health report cards which look at the state of waterways and the changes over time. The report cards provide an overall grade of health for the waterway based on two indicators: water quality and riparian health.

Bells Creek is monitored at two locations, Bells Creek (north) and Bells Creek (south). The southern monitoring point is located around 200 metres east of the proposal as shown in Figure 6-7. The northern monitoring point is located around three kilometres north-east of the proposal. Based on historical data from 2018 to 2023 (Blacktown City Council, 2024), overall Bells Creek has fair water quality and poor riparian health at the southern reach (closest to the proposal), and good water quality and poor riparian health at the northern end where it meets Eastern Creek.

The Bells Creek catchment has been reasonably disturbed by urban development and vegetation clearing, however the riparian corridor downstream of the proposal is reasonably intact. As such, the creek is identified to be representative of a slightly to moderately disturbed lowland river ecosystem in accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (the ANZECC 2000 guideline) (ANZECC, 2000). The ANZECC 2000 default trigger value (DTV) values for south-east Australian slightly disturbed lowland river ecosystems are summarised in Table 6-11.

An aquatic field survey was undertaken at three sites within the construction boundary, on the 31 January 2024, to assess the aquatic biodiversity which included water quality testing. Locations of the three sites are shown in Figure 6-7 as 'BC-1', 'BC-2' and 'UC-1'. Water quality measurements were taken at sites BC-1 and BC-2 and the results are summarised in Table 6-11. Site UC-1 did not have sufficient water to sample during the field survey.

Table 6-11 Water quality parameters measured during the field survey in January 2024

Reference	Ecosystem type	Temperature (°C)	Electrical conductivity (µS/cm)	Salinity (ppt)	pH	ORP (mV)	Dissolved oxygen (% saturation)	Turbidity (NTU)
ANZECC (2000) Guideline value	Lowland river	-	125-2200	-	6.5-8	-	85-110	6-50
Site BC-1	Lowland river	23.22	1298	0.65	7.4	151.35	127.3	1
Site BC-2	Lowland river	24.64	667	0.33	7.17	98.15	59.6	12.35

The pH and electrical conductivity were within the guideline range for the DTV for both sites. Dissolved Oxygen (DO) was above the guideline range for site BC-1 but was low for site BC-2 with a reading below the guideline range. Turbidity at site BC-1 was below the guideline range and within range at site BC-2.

Flood behaviour

A hydraulics and hydrology report has been prepared to inform the design of the proposal (Stantec, 2023). The report outlines the modelling undertaken to determine the existing flood characteristics of the area. The results of the modelling are shown in Figure 6-9 which indicate:

- Townson Road is currently inundated during the one per cent average exceedance probability (AEP).
- Bells Creek has a wide floodplain both upstream and downstream of the proposal.
- Richmond Road is inundated north of the intersection with Rooty Hill Road North during the one per cent AEP flood event.

Richmond Road is a nominated flood evacuation route, however, it is currently inundated during the one per cent AEP in the vicinity of Bells Creek as shown in Figure 6-9.

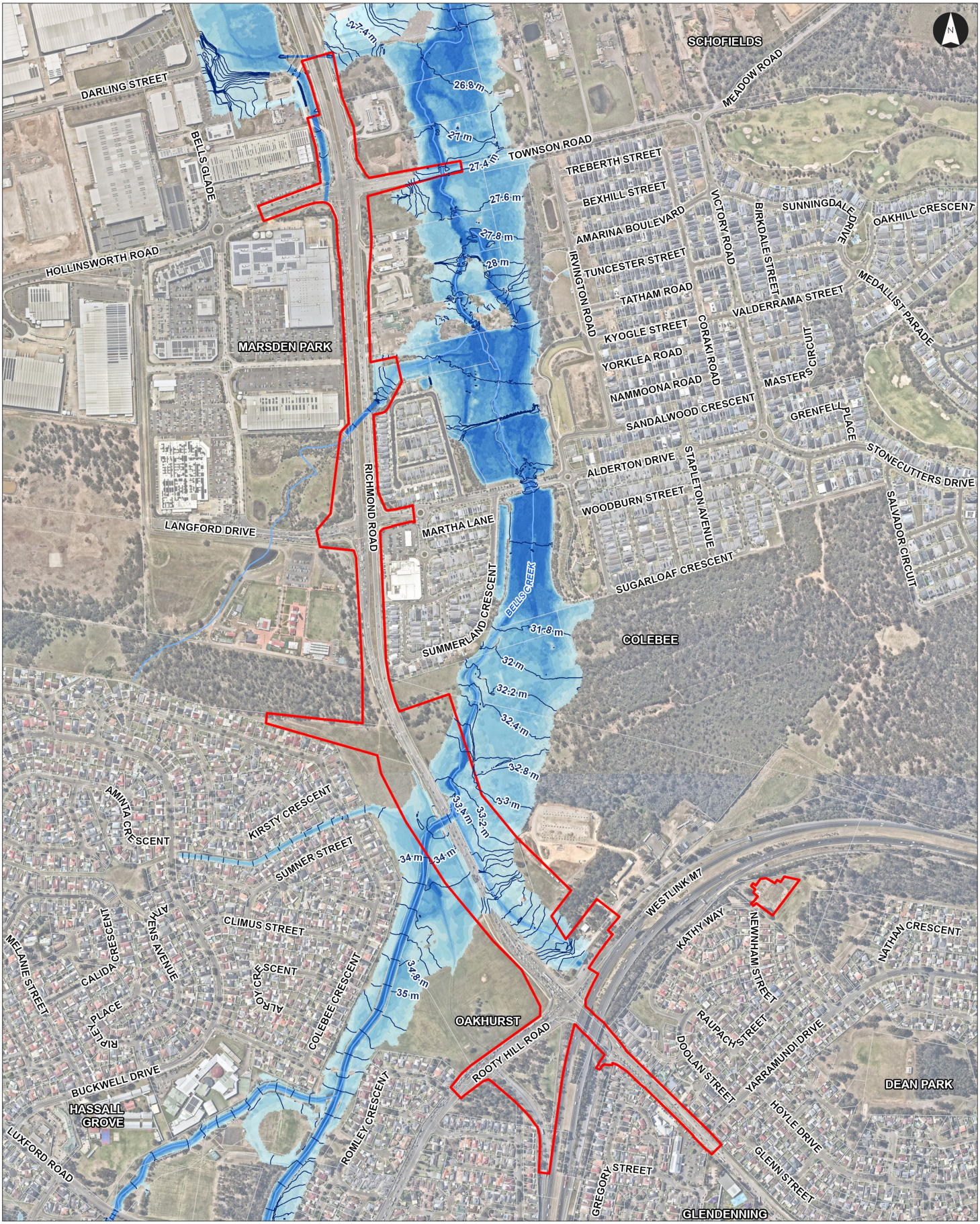


Figure 6-9: Existing 1% AEP flood depth and flood level

Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

- Construction boundary
- 0.2m Flood height contour
- Watercourse
- Cadastre

Flood depth (m)

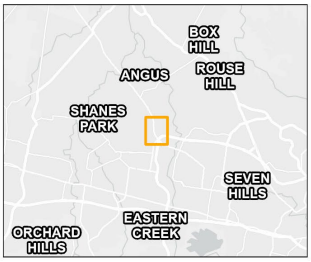
- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- > 1.50

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Nearmap, June 2024)
2. Watercourse and Cadastre (NSW SS, 2023)

0 100 200 300 400 Metres

Scale at A3: 1:7,500



Project Code: 305001173-EN-GS-011
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-14

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Groundwater

Hydrological landscape

The proposal is located in the Shale Plains hydrogeological landscape (HGL). A conceptual cross section of the HGL is shown in Figure 6-10.

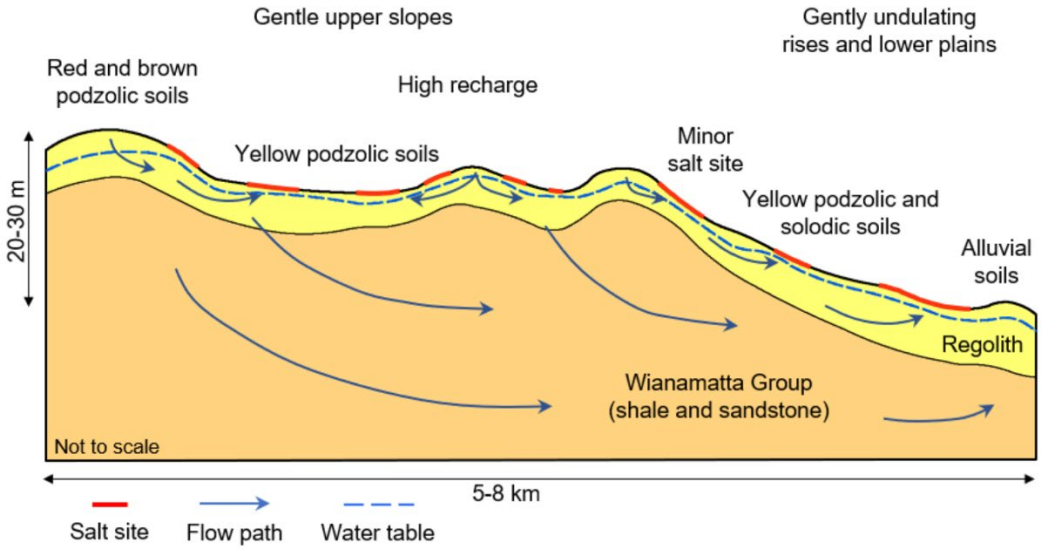


Figure 6-10 Conceptual cross-section of the Shale Plains hydrogeological landscape (DPIE, 2021a)

The aquifer is unconfined in the regolith (unconsolidated soil, alluvium, etc.) and has mostly lateral flow. The aquifer within the Wianamatta Group ranges from unconfined to semi-confined, and groundwater flows laterally and vertically through fractured and porous structures within the weathered geological unit. The hydraulic conductivity of the aquifer is moderate but highly variable, ranging from 0.01 -10 metres per day. The transmissivity of the aquifer ranges from less than 2-20 square metres per day, and depth to water table is intermediate, ranging from 2-6 metres below ground level (BGL) (State Government of NSW & DPE, 2023).

Groundwater depth

A search of the National Groundwater Information System (NGIS) was undertaken and identified that there are twenty-four available bores within 2000 metres of the proposal. Four of these bores have data of standing water level below the ground level. Groundwater wells with available standing water level data near the proposal are summarised in Table 6-12.

Table 6-12 Summary of existing bore details within 2000 metres of the proposal that have standing water level

NGIS Bore ID	NSW Bore ID	Bore type	Drill date	Status	Bore depth (m)	Standing water level (m)	Distance (m) / direction
10148655	GW203381	Monitoring	15/01/2015	Function	14.5	6.10	40 m / north
10119382	GW110684	Monitoring	26/08/2009	Unknown	4.3	2.80	1400 m / southwest
10123358	GW110683	Monitoring	26/08/2009	Unknown	3.8	2.80	1400 m / southwest
10119611	GW110685	Monitoring	26/08/2009	Unknown	3.8	2.80	1600 m / southwest

Groundwater information was collected as part of the geotechnical fieldwork (Stantec, 2024b). Two standpipes were installed at selected test locations to monitor changes to groundwater levels and to recover groundwater samples for chemical testing. Installed standpipes and findings are summarised in Table 6-13. The location of BH03 and BH06 are shown in Figure 6-7. The groundwater data logged from 13 March 2024 to 19 April 2024 is also summarised in Table 6-13.

Table 6-13 Summary of standpipe response zone and measurement

BH ID	Standpipe installation depth (mBGL)	Surface reduced level (m)	Response zone material	Screened interval depth (mBGL)	Groundwater measurements		Logged groundwater level (13/03/2024 to 19/04/2024)
					Depth (mBGL)	Measurement date	
BH03	20.34	39.53	Bedrock: Siltstone	8.34-20.34	2.60	29/02/24	2.21 m to 2.34 mBGL (RL 37.32 m to 37.19 m)
					2.27	13/03/24	
BH06	10.3	33.14	Weathered Materials and Bedrock: silty Clay and Siltstone	3.30-10.30	1.00	29/02/24	1.46 m to 1.51 mBGL (RL 31.68 m to 31.63 m)
					1.21	13/03/24	

Based on the information collected the highest groundwater level recorded at BH03 is at a relative level (RL) of 37.32 metres and at BH06 is at an RL of 31.68 metres. The groundwater data includes 6 April 2024, during which Richmond RAAF weather station recorded a daily rainfall of 134 millimetres, the highest daily rainfall recorded since the station commenced monitoring in 1993. It is therefore inferred that the groundwater levels collected include the effects of increased rainfall.

Groundwater quality

The Shale Plains HGL is identified to have a very high salinity hazard (State Government of NSW & DPE, 2023). Existing salinity is caused due to the mobilisation of salt loads within the soil. 'Cyclic salt sites' (areas with high salt loads) are located on the surface as shown in Figure 6-10. The salt sites are mobilised by rainfall, a rising groundwater table, and groundwater discharge. The salinity hazard is increased by urbanisation of the area, which can cause additional salt sites and runoff that increases groundwater recharge and discharge. Another contributing factor is a less permeable clay horizon of soil underlaying the alluvial layer, which can prevent water from permeating and diluting salinity into the groundwater table (DPIE, 2021a).

The finding of geotechnical investigations undertaken (Stantec, 2024b) suggest that the proposal site has a moderate level of salinity, with bedrock materials and the rock soil interface areas across the site generally expected to have slightly higher salinity levels. A total of 37 samples at a depth range from 0.5 metres to 5.5 metres BGL were collected for salinity testing. Thirty-five per cent of samples returned as non-saline, 24 per cent of samples returned as slightly saline, 35 per cent of samples returned as moderately saline, and five per cent of samples returned as very saline. No direct correlation between material properties or origin and the salinity is evident, however, the samples that indicated higher salinity level were generally obtained from greater depths.

Two of the groundwater samples collected during the geotechnical investigations were also chemically tested. The result of the testing is shown in Table 6-14.

Table 6-14 Groundwater test sample results

Parameter	Limit of reporting	Unit	BH03	BH06
Chloride	1	mg/L	13000	8400
Conductivity (at 25 °C)	10	µS/cm	34000	22000
pH (at 25 °C)	0.1	pH Units	7.5	6.7
Resistivity	0.01	ohm.m	0.29	0.46
Sulphate (as SO4)	2	mg/L	2100	1800

The groundwater is classified as "moderate aggressivity" for concrete structures and "severe' for steel structures.

Groundwater dependent ecosystem

Cumberland Shale Plains Woodland is mapped as a high potential ground dependent ecosystem (GDE) at the northern and southern extremities of the study area. An area of Cumberland Shale Plains Woodland within the central portion of the construction boundary is mapped as a moderate potential GDE as shown in Figure 6-7. GDEs are discussed in further detail in the biodiversity assessment prepared for the proposal (refer section 6.8).

6.2.3 Potential impacts

Construction

Surface water

The proposal includes earthworks adjacent and within the banks of Bells Creek, which have the potential to impact on water quality within the creek. Potential erosion and destabilisation of disturbed areas presents a risk to water quality as sediment and other mobilised pollutants have the potential to enter the creek. Pollutants could enter the waterway due to the following:

- Disturbance of land located on existing steep slopes/batters such as existing cuttings located along Richmond Road in proximity to the waterway. If not appropriately managed the increased water velocities on these slopes/batters could result in an increased risk of erosion occurring and entering the waterway.
- Embankments for the new bridge at Bells Creek, which if not stabilised appropriately, could result in erosion and sedimentation impacts to the creek.
- Disturbance of flood liable land which in the event of a flood would result in any earthworks being inundated and therefore resulting in material entering the waterway.
- Increased velocities due to Eastern Drain realignment and drainage structures causing erosion of watercourse banks and outlet locations.

These construction activities have the potential to temporarily expose soils, increasing the risk of erosion. If sediment laden run-off from stockpiles enters Bells Creek and associated tributaries, this may result in increased turbidity and enhanced sedimentation. Increased sediments and pollutants in waterways can result in increased turbidity, decreased light levels for submerged aquatic vegetation, and smothering of benthic organisms. Impacts to the aquatic environment are considered in section 6.8.

The requirement for construction sediment basins to manage potential impact of erosion and sediment release is discussed in section 0. However, even with sediment basins and other controls, the discharge of treated (by sediment basin) water can decrease water quality downstream of the discharge location. This impact is dependent on the quality and flow of discharge water, as well as the quality and flow of waters in the receiving waterway. The location and potential quality / quantity of discharge from sediment is uncertain, however associated impacts are expected to be temporary and minor following the adoption of safeguards recommended in section 6.2.4.

Construction of the proposal would involve temporary storage of hydrocarbons (i.e. fuel, oil and grease). Accidental spills of stored hydrocarbons could directly pollute nearby surface water by increasing the concentration of hydrocarbons of the receiving waterway. There is also potential for accidental spills of hydraulic oil and fuels from malfunctioning equipment or vehicles. In the instance of a spill occurring, the impact would be minor and localised as the quantity of hydraulic oil and fuels would be kept to a minimum and would be stored in a suitably bunded and covered area.

Groundwater

Construction of the proposal would not require permanent excavation or dewatering of groundwater below the assumed groundwater level of 1.46 metres below ground level, however temporary interference with the groundwater could occur during some construction activities, such as the treatment of foundations beneath fill embankments or pile driving. This dewatering would be undertaken if geotechnical assessment determines that soil beneath proposed fill embankment needs to be excavated and treated to support the proposed embankments. This dewatering would be temporary and informed by additional long-term groundwater information collected prior to construction.

The dewatering during construction of the proposal could result in localised drawdown of the groundwater table which has an indirect impact on GDEs and potential impact to the groundwater quality downstream of the proposal. Indirect impact to GDEs would occur from changes in groundwater flowrates and availability of groundwater in the ecosystem. The reduction in groundwater level and volume downstream can also impact water quality due to increasing relative concentration of salinity and other existing pollutants in the groundwater.

The extent of dewatering is likely to be minor and temporary, and it is expected that construction of the proposal is unlikely to include the extraction of more than three mega litres per year or lower the groundwater table by more than two metres. This is considered a minor impact that would not result in significant changes to the level or flow of groundwater. There remains some uncertainty associated with the potential groundwater impacts, as groundwater levels and quality were determined through limited sampling data of two boreholes, and the extent of treatment required for foundations is still to be determined during detailed design.

Operation

Surface water flows

The proposal would result in an increase in the impervious surface within the road corridor due to the widened road pavement and new bridge structures during ongoing operation of the road. The proposal also includes an upgrade to the existing drainage design within the proposal area, which has been designed and modelled to accommodate and manage this increase in flows. The drainage design would allow for water to flow off the road surfaces in order to maintain road safety, as well as ensure the stormwater system can adequately discharge surface run off from the site.

In addition, the construction areas that are outside of the road pavement areas would be stabilised and revegetated as part of the construction process, therefore impacts to surface water flows adjacent to the road are not expected to have ongoing surface water impacts to surrounding water catchments.

It is not expected that there would be any ongoing operational impacts to the water flows through Bells Creek or its tributaries as a result of the proposal. The proposed drainage system provides drainage from all parts of the infrastructure which would maintain existing surface water flow regime to Bells Creek. The design of the new bridge would be the same level as existing bridge ensuring existing flows are maintained. The bridge design also provides erosion and scour protection measures.

The detailed design of the drainage system for the overall proposal would ensure that surface water flows to the surrounding landscape including Bells Creek and associated streams are not substantially altered, and appropriate scour protection is included for any outlets.

Surface water quality

The operation of the proposal would include the increase in impervious areas as the widening of the road and associated new bridge structures requires the extension of pavement and bitumen surfaces. The increase in impervious area increases the generation of pollutants built up on the pavement surface such as total suspended solids (TSS), total phosphorus (TP) and total nitrogen (TN) during rainfall events. The proposal would result in an additional 1.35 hectares of impervious area, which is a 57 per cent increase to the impervious area in the road catchment. However, the additional 1.35 hectares is considered a small area relative to the wider 741 hectares of the Bells Creek catchment.

One existing gross pollutant trap (GPT) is proposed to be removed, and two additional GPTs are proposed to reduce the pollutant loading of stormwater prior to discharging at Bells Creek. The locations of the GPTs are shown in Figure 6-11.

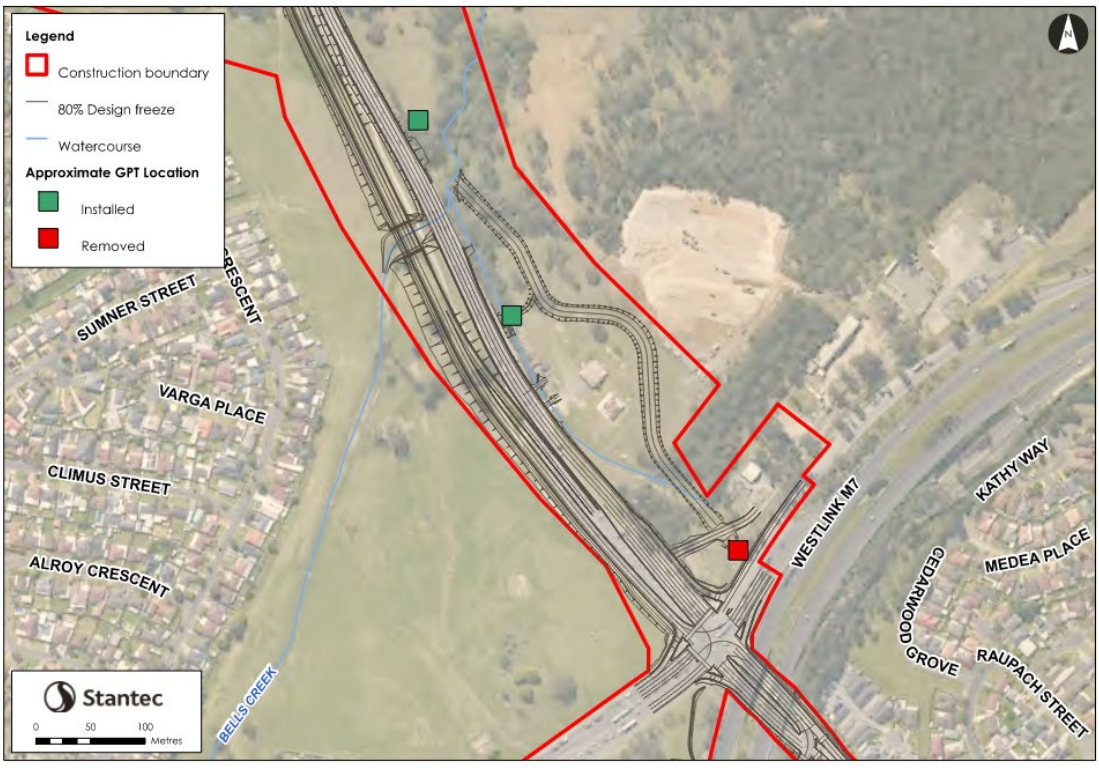


Figure 6-11 Water quality location references

The operation of the proposal has been modelled in MUSIC software to assess potential impact of increased impervious areas and the size of water sensitive urban design (WSUD) elements to remove pollutants from operational stormwater runoff. The modelling was undertaken in accordance with the *Water sensitive urban design (WSUD) developer handbook – MUSIC modelling and design guide 2020* (Blacktown City Council, 2020) and using hydrological data including rainfall and evaporation endorsed by Blacktown City Council.

The pollutant reduction percentage results of the MUSIC model assessment are compared to Transport's reduction targets *Water Sensitive Urban Design Guideline* (TfNSW, 2023g) in Table 6-15. The reduction targets are presented as a percentage of the annual average load. The pollutant reduction results consider the treatment train use of GPTs only.

Table 6-15 Pollutant reduction (Stantec, 2024e)

Pollutant	North of Bells Creek	South of Bells Creek	Total	Reduction target (TfNSW, 2023g)
Total Suspended Solids (%)	59.5	59.7	59.6	85
Total Phosphorus (%)	9.2	9.4	9.4	65
Total Nitrogen (%)	0	0	0	45
Gross Pollutants (%)	98	98	98	98

Water quality treatment such as the use of operational water quality basins to meet water quality targets are not considered feasible due to several site constraints including limited space, low lying topography, safety concerns during maintenance, and capital and ongoing cost considerations.

Although reduction targets are not met, the proposal would result in a minor increase of pollutant loads compared to the existing scenario. As shown in Table 6-16, the estimated pollutant loads of TSS and gross pollutants are lower for the proposal scenario but there is a minor increase of loads for phosphorus and nitrogen. The increased phosphorous and nitrogen loads would have a relatively negligible impact to the long-term water quality of Bells Creek given the size of the wider catchment.

Table 6-16 Comparison of pollutant loading for the existing and the proposal scenario

Pollutant	Existing scenario	Proposal scenario	Difference
Total Suspended Solids (kg/yr)	6610	3920	2690 decrease
Total Phosphorus (kg/yr)	11.4	14.7	3.3 increase
Total Nitrogen (kg/yr)	48	66.1	18.1 increase
Gross Pollutants (kg/yr)	582	14.8	567.2 decrease

Flooding

The operation of the proposal includes a new bridge over Bells Creek, additional culvert and drainage structures, and a realigned open flooding channel (referred to as 'Eastern Drain' in the REF). These changes would likely impact the existing flood behaviour in proximity to the proposal.

The realigned open flooding channel would be located north-east of the intersection of Rooty Hill Road North / Richmond Road / M7 Motorway on/off-ramps, and runs in a northerly direction for around 450 metres before discharging into Bells Creek. The channel would be vegetated and would be around 450 metres long, with a 10 metre base width and 2:1 slopes, and 2.5 metres wide. The depth of the channel would be approximately 1.2 metres. The final design of this channel would be developed during detailed design, however the proposed open flooding channel aims to capture water from the surrounding catchment during large flood events, providing a flow path into Bells Creek and directing flows away from Richmond Road.

An afflux map was generated to compare the difference between the existing scenario and proposed scenario for the one per cent annual exceedance probability (AEP) flood event. The afflux map is shown in Figure 6-12 and indicates that:

- Flood levels would decrease upstream of the Bells Creek bridge crossing.
- The area of land flood affected during the event (i.e. extent of flooding), as shown in the 'was wet now dry' layer in Figure 6-12, would be reduced upstream of the bridge crossing and on Richmond Road.
- Extent of flooding has reduced within the vicinity of Sydney Water Pumping Station site and the locality east of Richmond Road.
- A new area is inundated within the proposed open flooding channel located in 717 Richmond Road Colebee. However, the overall extent of flooding is reduced across the property. There was a slight increase in afflux within this private property at the downstream end. The property is zoned for RU4 Primary Production Small Lots. The increase is in the range between 20 millimetres and 50 millimetres. The increase is acceptable as per the proposed flooding performance criteria for the proposal (refer section 3.2.1).

Flood storages are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. Design features of the proposal such as provision of the larger open flooding channel creates more flood storage area. Overall, there would be no major loss of flood storage area as part of the proposal.

Realignment of the Eastern Drain (to become the open flooding channel) and increased velocity in the drainage channel has the potential to destabilise over time and result in bank erosion which can contribute to long term changes in sediment pollution of downstream waterways and changes to stream flow. The existing watercourse is already modified by previous development and is piped under driveway drainage structures, so it is likely that a proposed open flooding channel would improve the riparian corridor outcomes by providing increased bank width. However, destabilisation of banks can still occur over time, and is at highest risk of occurring early following construction if vegetation is not planted and soil stabilised. The potential impact of bank destabilisation and erosion is considered to be low in the long-term, following the implementation of mitigation measures listed in section 6.2.4.

Overall, the proposal is unlikely to have a significant impact on flood behaviour downstream, and it would improve the overall flood immunity of Richmond Road.

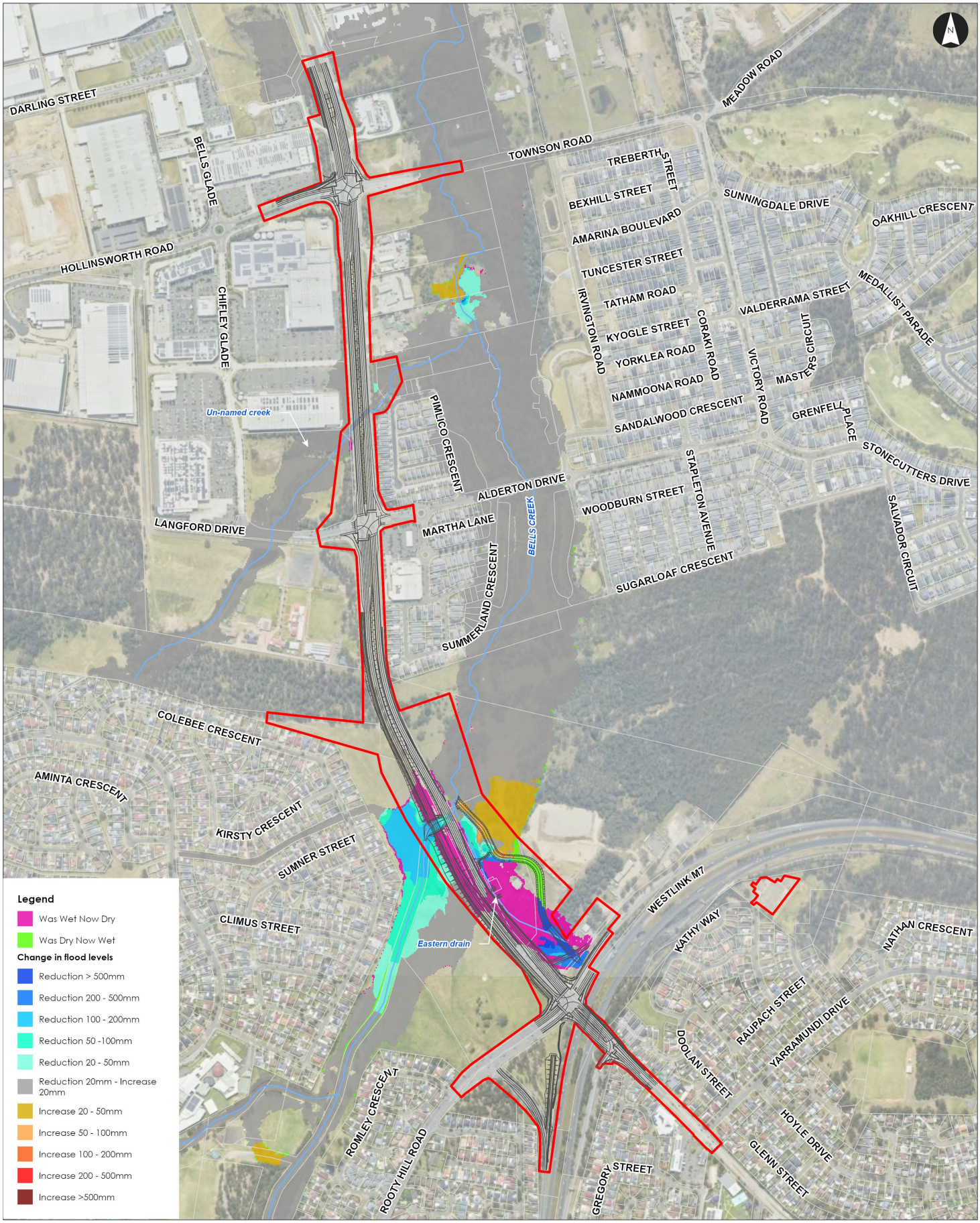


Figure 6-12: Proposed 1% AEP afflux

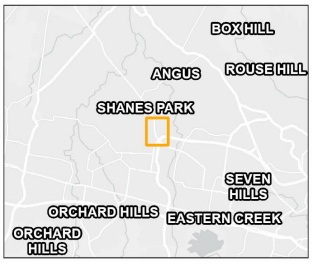
Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

- Construction boundary
- 80% Design freeze
- Watercourse
- Cadastre

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, 2024)
2. Watercourse and Cadastre (NSW SS, 2024)



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Scale at A3: 1:7,500

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Groundwater

The operation of the proposal includes an open flooding channel which diverts the existing Eastern Drain first order watercourse. The existing watercourse is heavily modified and already diverted along the existing road verge. However, the proposed realignment has potential to impact groundwater recharge in the long term by redistributing overland flows.

The redistribution of overland flows can affect groundwater recharge in the long term by increasing local recharge in some areas and decreasing recharge in others. The increase / decrease of recharge can subsequently result in localised changes to groundwater levels which may have potential impacts associated with a rise the groundwater level (i.e. mobilising salt stores in previously unsaturated soil strata layers) or a lowering of groundwater levels (which may reduce availability of groundwater for any GDEs). The redistribution of flows as a result of the proposal is expected to have minor impact on groundwater recharge, given the isolated location of this potential and since the length of the diversion is relatively minor and flow is maintained toward the existing discharge location at Bells Creek. The biodiversity assessment prepared for this proposal also identified that potential impact to GDE is expected to be minor (refer section 6.8).

6.2.4 Safeguards and management measures

Table 6-17 outlines the hydrology, flooding and water quality safeguards and management measures to be implemented by the proposal.

Table 6-17 Hydrology, flooding and water quality safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing

H1	Erosion and sedimentation	A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP during construction. The SWMP would include (but not limited to):
		• objectives and targets for soil and water quality management
		• approvals, licence requirements and relevant legislation
		• overview of the existing environment and potential impacts of construction works
		• identification of high-risk activities (such as the bridge construction around Bells Creek) and sensitive areas and the need for an Environmental Work Method Statement (EWMS)
		• environmental control measures in relation to:
		  ○ erosion and sedimentation including the preparation and updating of Erosion and Sediment Control Plans (ESCPs) throughout construction
		  ○ stockpile management
		  ○ spoil and fill management
		  ○ surface water quality
		  ○ refuelling of vehicles and equipment and accidental spills
		  ○ storage or hydrocarbons
		  ○ wet weather events
		  ○ groundwater dewatering and management of groundwater in-flow during construction
		• a surface water monitoring program including regular monitoring of Bells Creek within the mixing zone (100 m downstream) as well as an upstream reference point for each discharge point
		• auditing and reporting requirements
			Contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• site inductions and training for construction personnel. The SWMP would be prepared in accordance with the following specifications and guidelines: • Managing Urban Stormwater: Soils and Construction (Landcom, 2004) • Transport's Soil and Water Management Specification (G38) • Transport Erosion and Sedimentation procedure.		
H2	Erosion and sedimentation	A primary site-specific ESCP and progressive ESCPs would be prepared and implemented as part of the SWMP.	Contractor	Pre-construction
H3	Erosion and sediment control	A construction erosion and sedimentation assessment would be undertaken to determine specific location, sizing and effectiveness of erosion and sediment control measures during construction. This assessment would also consider construction flooding impacts as the staging plans are refined as the detailed design progresses.	Transport	Detailed design
H4	Water quality	Consult with Blacktown City Council about operational pollution reduction targets.	Transport	Detailed design
H5	Water quality	A water quality assessment would be undertaken prior to construction to determine the discharge criteria for the local waterways. Undertake water quality monitoring during construction of the proposal. The discharge rate of sediment basins (if required) is to be adjusted to ensure that turbidity within the mixing zone does not exceed discharge criteria.	Contractor	During construction
H6	Water resources	Detailed design of the open flooding channel is to consider the following: • A vegetation management plan to both stabilise banks and manage the groundwater table. • Geotechnical investigations to collect geotechnical information including soil type and groundwater levels along the proposed realignment. • Low flow channel requirements, a naturalised channel design, and scour protection.	Transport	Detailed design
H7	Groundwater resources and quality	Monitor the volume of groundwater that is dewatered during construction to ensure extraction does not exceed more than three mega litres a year. Test the quality of groundwater prior to discharge.	Contractor	Construction

6.3 Soils and contamination

6.3.1 Methodology

The scope of this assessment is separated into matters of soils and contamination.

Soils

The methodology for the soils assessment included:

- Review of background information including soils landscapes, salinity and results from the field investigations of soil conditions.
- Consideration of the likely impacts of construction activities on soils.
- Review of the preliminary erosion and sedimentation assessment prepared on the concept design of the proposal (SEEC, 2024).
- An outline of mitigation measures to mitigate impacts.

Contamination

A Preliminary Site Investigation (PSI) was undertaken for the proposal (provided as Appendix D). The methodology for the PSI included:

- A desktop review of information for the site and surrounds including review of historical aerial photographs, search of the contaminated land records, registers and POEO Act licences.
- A site walkover of the proposed road upgrade and ancillary sites to identify potential sources of contamination.
- Limited soil sampling for preliminary waste classification purposes.
- Development of a Conceptual Site Model (CSM) to provide an assessment of the fate and transport of contaminants of potential concern (CoPC).
- An outline of mitigation measures to mitigate impacts.

6.3.2 Existing environment

Topography

The terrain within the construction boundary varies, with elevations ranging from approximately 30 to 40 metres Australian Height Datum (AHD). The topography generally consists of long, gently undulating low hills with slopes typically less than 15 per cent although occasionally steeper over short distances. The proposal crosses the Bells Creek floodplain where the topography is near level.

Soils

Soil landscape

Soil landscape mapping by the NSW Government (accessed via eSpade online portal) shows the proposal lies predominately on the Blacktown Soil Landscape, with a small area intersecting the South Creek Soil Landscape (refer Figure 6-13). Site observations by SEEC (2024) during a site inspection confirmed the accuracy of the soil landscape mapping.

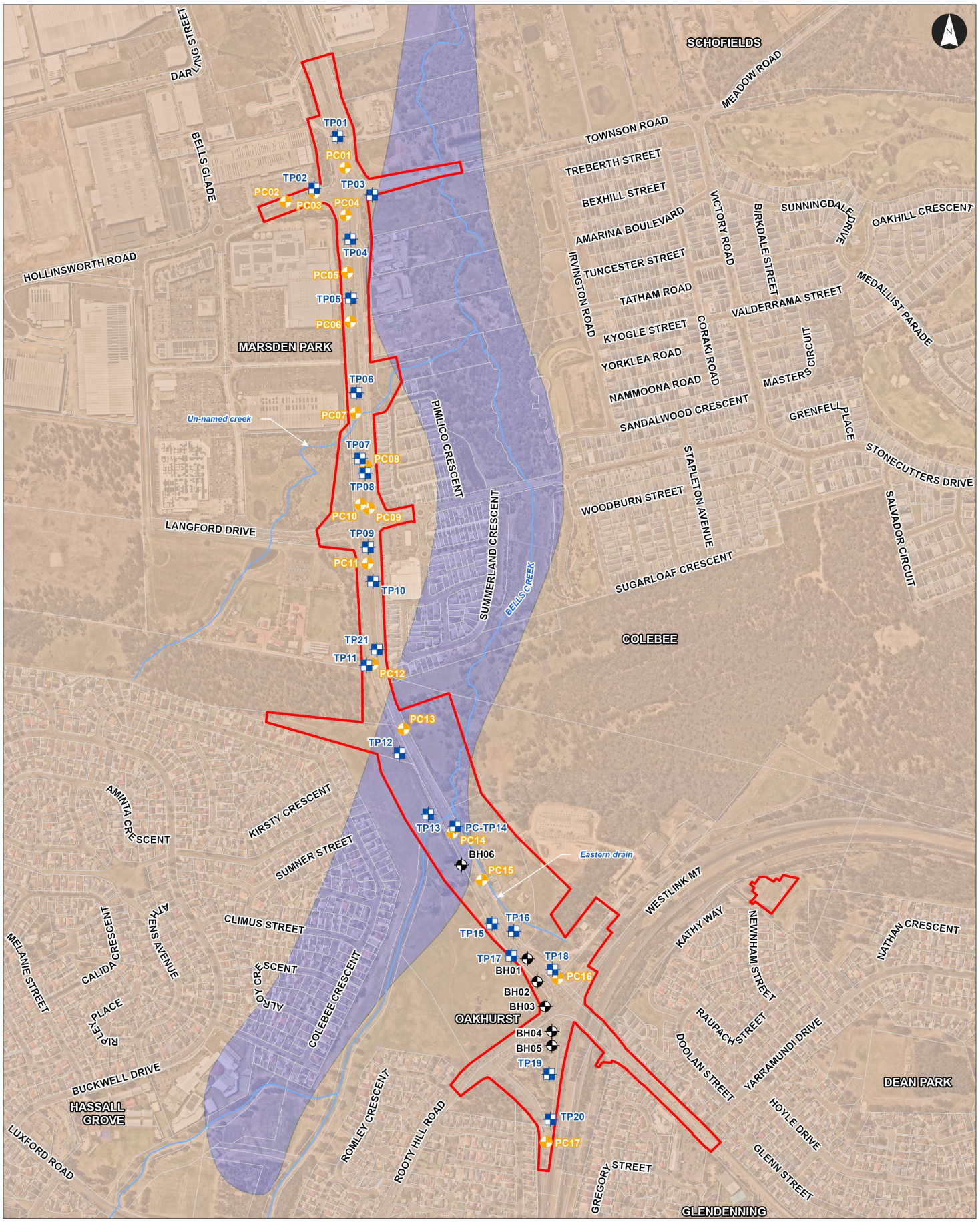

Figure 6-13: Soil landscapes

Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

- Construction boundary
- Watercourse
- Cadastre

Soil landscapes

- Blacktown
- South Creek

Existing Geotech Locations

- Test Pit
- Borehole
- Pavement Core

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Nearmap, June 2024)
2. Watercourse and Cadastre (NSW SS, 2023)
3. Soil landscapes (NSW SS, Feb 2007)

0 100 200 300 400 Metres

Scale at A3: 1:7,500

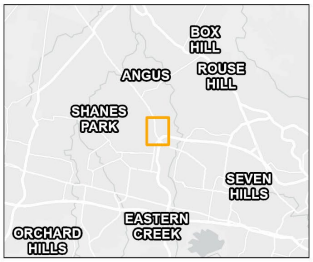

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Table 6-18 contains a summary of key features and potential constraints that might influence erosion and sediment control during construction (SEEC, 2024).

Table 6-18 Soil landscape details (from NSW Government, 2024 and Landcom, 2004)

Soil landscape name	Approximate extent	Soil landscape description	Key landscape and soil constraints for erosion and sediment control
Blacktown	85%	• Broad rounded crests and ridges with gently inclined slopes and undulating rises on Wianamatta Group shales. Local relief to 30 m and slopes usually >5%. • Red and brown duplex soils on crests and mid-slopes, grading to yellow duplex soils on lower slopes and around drainage lines.	• Localised impermeable highly plastic subsoil. • Moderately reactive soils. • Low wet strength soils. • Low plant-available water holding capacity. • Low permeability soils. • Low fertility subsoils. • Localised dispersive (sodic) subsoils. • Highly acidic topsoils with aluminium toxicity potential. • Localised salinity.
South Creek	15%	• Alluvial deposits associated with major creek lines. Slopes generally less than 5%. • Soils primarily consist of Quaternary alluvium derived from Wianamatta Group sediments. • Deep sandy, sandy clay and clay soils were deposited by the present South Creek drainage network.	• Flooding hazard. • Seasonal waterlogging of soils. • Localised salinity. • Localised high-water tables. • Localised sodicity (dispersive soils).

Salinity

The salinity potential in Western Sydney Map (DIPNR, 2003) shows the soils along the alignment have a moderate salinity potential, except for low-lying footslopes around Bells Creek and its tributaries where the salinity potential is high.

Areas classified as moderate risk for salinity are unlikely to show significant expressions of salinity (e.g. vegetation decline, excessive erosion, salt damage to built structures). However, excessive groundwater recharge in areas of moderate risk can cause or exacerbate surface expressions of salinity in high-risk areas. In areas classified as high risk for salinity, activities that modify the movement or relative height of groundwater could cause or exacerbate surface expressions of salinity.

Acid sulfate soils

Acid sulfate soil (ASS) mapping (Atlas of Australian Acid Sulfate Soils) shows the risk of ASS across the construction boundary has been mapped as an extremely low risk, however, the mapping has been identified as low confidence and is described as a provisional classification inferred from national and state soils, hydrography and landscape coverage.

To confirm the current and potential acid content and sulfuric acid generating potential of the material in the construction boundary, soil samples were collected and tested during the geotechnical investigations for the proposal (Stantec, 2024). Twenty-two soil samples were collected from a selection of the boreholes (BH01, BH02, BH04, BH05), test pits (TP07, TP09, TP10, TP12, TP19, TP21) and pavement cores (PC01, PC02, PC03, PC04, PC06, PC08, PC08, PC12, PC13, PC14x2, PC15). The locations of all geotechnical investigations are provided in Figure 6-13.

Based on testing results the following was noted:

- Soils at TP08, TP10, TP12, TP19 and PC12 are indicative of potential ASS based on net acidity values in exceedance of screening criteria and peroxide oxidisable sulfur (S_{POS}) results exceeding the adopted definition of sulfidic soils.
- Soils at BH02, TP21 and PC08 are indicative of potential or actual ASS based on net acidity values in exceedance of screening criteria, but S_{POS} results less than the adopted definition of sulfidic soils.
- Soils at BH01, BH04, PC14 (x2 samples) contain detectable sulfur but are not indicative of potential or actual ASS, or sulfidic soils.
- Soils at BH05, BH06, TP07, PC01, PC02, PC03, PC04, PC05, PC13 and PC15 are not indicative of potential or actual ASS, or sulfidic soils.

Further testing of soils is being undertaken during the detailed design to allow for clearer delineation of ASS extents in relation to the proposed ground disturbance footprint and to determine whether an ASS management plan is necessary.

Contamination

Aerial imagery from 1949 indicates the area appeared to be predominantly bushland and isolated residential dwellings with a main thoroughfare through the centre of the area. From the 1970's and onwards, commercial structures began to appear immediately surrounding the proposal, particularly to the north-east. Various dam structures were also being constructed adjacent to the construction boundary to the west. Major commercial and industrial development occurred in the area surrounding the northern portion of the proposal around 2016, with large structures being constructed to the west of Richmond Road, and residential dwellings constructed to the south-east and south-west. Residential development was further expanded to the east from 2020.

Based on review of the historical site and surrounding land uses, a search of the relevant contamination registers / records and the site walkover inspection, areas of environmental concern (AEC) that may be encountered within the construction boundary are outlined in Table 6-19. The locations of the AECs are provided in Figure 6-14, noting the approximate extents for AEC 6 and 7 are not indicated on the figure due to limitation of the current investigation and scattered nature of the identified AECs. Further detail is provided in the PSI located in Appendix D.

Table 6-19 Areas of environmental concern

AEC	Hazard ranking	Description	Contaminants of potential concern*
AEC 1: Waste fuel/oil containers	Low	• Waste fuel/oil drums located within the open farming sheds and within the Transport Colebee storage yard. • Evidence of a spill/staining of hydraulic oil was observed at the site.	TRH, BTEX, PAH, metals
AEC 2: Former truck repairs workshop	Medium	• A former truck repair workshop indicated to have been formerly located onsite as depicted within 1991 Business Directory records. • Two 40L rusted metal waste drums were observed within this area.	TRH, BTEX, PAH, metals
AEC 3: Asbestos waste	Medium – High	• Small stockpiles of asbestos containing material (ACM) impacted waste located within areas north of the dwelling located adjacent to the Transport Colebee storage yard and within land south of Summerland Crescent, Colebee.	ACM
AEC 4: Uncontrolled fill	Medium - High	• Uncontrolled fill located within ground surface of the Transport Colebee storage yard and ancillary sites. • Uncontrolled fill is also expected to be located across other areas of the site boundary footprint.	TRH, BTEX, PAH, PCB, VOCs, SVOCs OCP/OPPs, phenols, metals, asbestos, PFAS.
AEC 5: Fly tipping and stockpiling	Medium - High	• Fly tipping was observed throughout the vegetated area to the north of the Transport Colebee storage yard and sporadically throughout the site extents (primarily within road reserves).	TRH, BTEX, PAH, PCB, metals, asbestos,

AEC	Hazard ranking	Description	Contaminants of potential concern*
AEC 6: Hazardous building materials contained within former and existing site structures	Medium	• Where previous structures onsite have been demolished, improper demolition activities may have occurred. Residual and latent waste for poor demolition, including hazardous building materials, may be present resulting from these activities. • Existing structures onsite including structures within the Transport Colebee storage yard may contain hazardous building materials.	TRH, BTEX, PAH, PCB, metals, asbestos.
AEC 7: Multiple petrol service stations**	Low	• Elevated risk of potential groundwater contamination and migration associated with adjacent service stations (the closest one identified to be bordering the northeast corner of the site), where there has been known bulk storage of petroleum products on-site.	TRH; BTEX; PAH; Phenols; Lead; VOC; SVOC.

**Notes to table: PAH: polycyclic aromatic hydrocarbons; TRH: total recoverable hydrocarbons; BTEX: benzene, toluene, ethylbenzene, xylene; OCP: organochlorine pesticides; OPP: organophosphorus pesticides; PFAS: Per- and Polyfluorinated Substances; E.coli: Escherichia coli; PCB: polychlorinated biphenyls; VOC: Volatile organic compounds SVOC: Semi-volatile organic compounds*
***Located offsite*

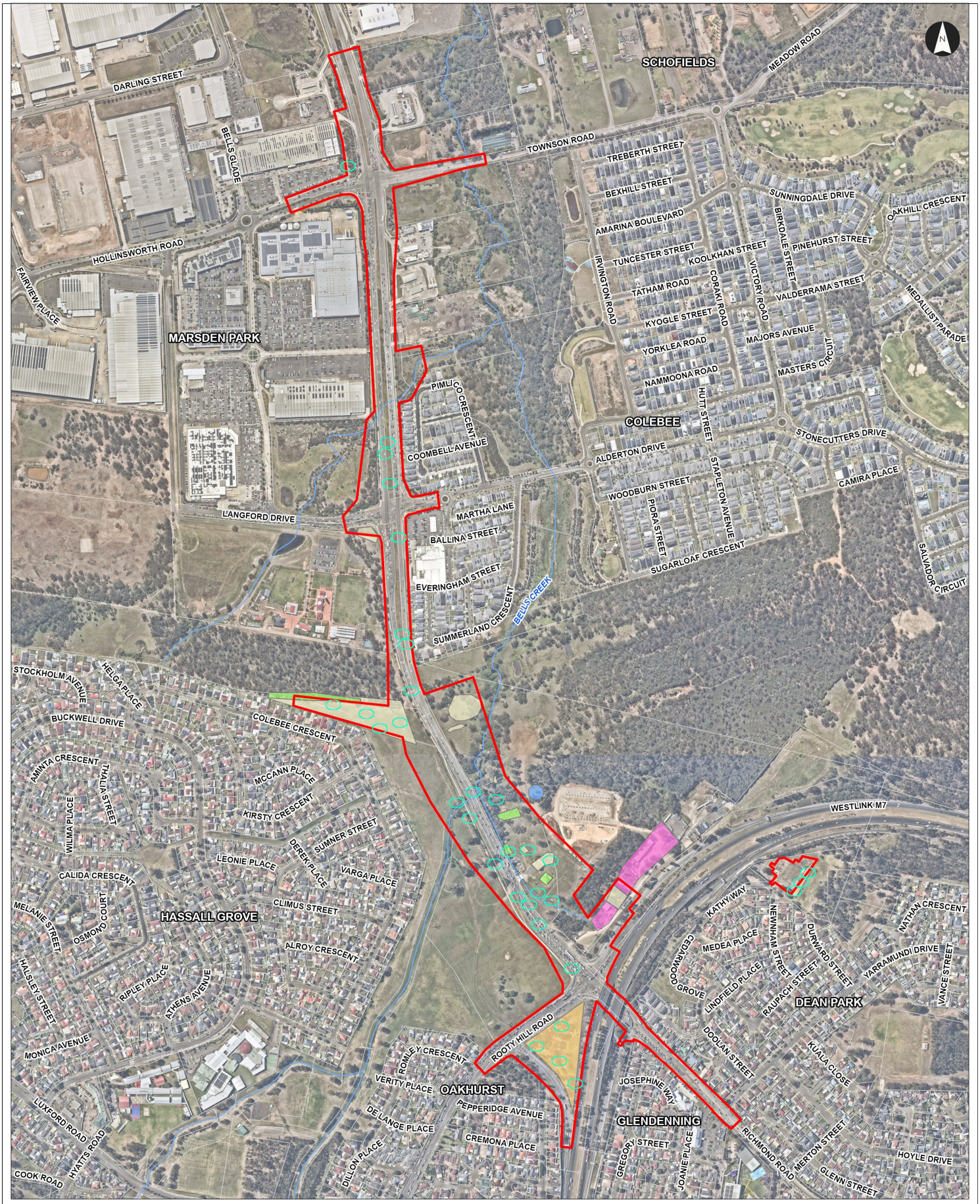

Figure 6-14: PSI Areas of environmental concern

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-023
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Legend

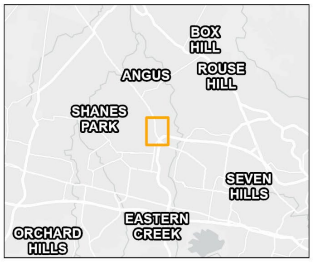
- REF construction boundary
- Contamination test locations
- Watercourse
- Cadastre

Areas of Environmental Concern (AEC)

- AEC 1: Waste fuel/oil containers
- AEC 2: Former truck repairs workshop
- AEC 3: Asbestos waste
- AEC 4: Uncontrolled fill
- AEC 5: Fly tipping and stockpiling

Notes:
1. *Map displayed in GDA2020 MGA Zone 56*
2. *AEC6 and AEC7 were not indicated due to limitation of the current investigation and scattered nature of the identified AECs.*

References:
1. *Aerial imagery (Nearmap, June 2024)*
2. *Watercourse and Cadastre (NSW SS, 2023)*



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Scale at A3: 1:7,500

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Soil waste classification

Two soil samples were collected during the geotechnical investigation for the proposal (Stantec, 2024b). Samples were collected to assess the potential presence of contaminants and to provide a limited preliminary indication of waste classification of underlying surface soils within the construction boundary. Two samples were collected from surface soil (0.0-0.2 metres BGL) in test pits TP19 and TP20 (refer Figure 6-13 for locations).

The laboratory results of the soils samples collected and analysed were compared against the specific contaminant concentrations (SCC) values the *Waste Classification Guidelines, Part 1: Classifying Waste* (EPA, 2014). All soil results were detected below the adopted assessment criteria and asbestos was not detected in either sample analysed. Based on the laboratory results of two surface soil samples analysed, a preliminary waste classification of General Solid Waste (GSW) (non-putrescible) was determined. Further contamination testing is being undertaken as part of the detailed design at the locations shown in Figure 6-14.

6.3.3 Potential impacts

Construction

Soils

Erosion and sedimentation

Construction of the proposal would include temporary exposure, storage and transport of soils, which may risk erosion of the exposed soils to weather conditions and result in sedimentation of the stormwater system and Bells Creek and its tributaries. The following construction activities have the potential to result in soil erosion and sediment transport:

- Establishment of the ancillary facilities.
- Removal of vegetation (clearing and grubbing) and associated disturbance and removal (and storage) of topsoil.
- Earthworks and transport of soils/materials associated with the following key activities:
    - excavation for the open flooding channel on the eastern side of Richmond Road
    - construction of embankments for the flyover bridge
    - construction of the abutment/retaining wall located at the northern end of the flyover bridge within the median of Richmond Road
    - earthworks along Richmond Road to create the required alignment for the proposed design. This would include widening of the road corridor by up to 30 metres in the southern portion of the proposal and widening by around 10 metres into the median in the northern portion.
    - construction and/or modification of five culverts as detailed in section 3.2.3
    - road widening and bridge construction works in the vicinity of Bells Creek
    - importing and storage of construction materials.
- Temporary stockpiling of materials including topsoils.
- Landscaping and rehabilitation of disturbed areas.

The activities listed above have the potential to mobilise site soils or imported granular material during weather events, such as rainfall or winds, from increased soil exposure, leading to erosion and sedimentation. This has the potential to increase sediment loads entering nearby waterways including Bells Creek, Un-named Creek and Eastern Drain. If sediment is deposited in creeks or drainage structures (e.g. culverts), this may reduce the available flow area and may lead to flooding in the vicinity of the creek or structure. Impacts on hydrology and flooding are discussed in section 6.2. The impacts of sedimentation on the aquatic environment are discussed in section 6.8.

A preliminary erosion and sedimentation assessment (SEEC, 2024) was undertaken for the proposal in accordance with the Blue Book (Landcom, 2004) and relevant guidelines. The assessment determined that the southern section of the proposal has inherently high risk (for erosion and sedimentation control) due to:

- crossing Bells Creek and its associated floodplain
- the potential for discharges into Bells Creek, which eventually drains to the Hawkesbury River

- complexity of constructing the proposal including multiple traffic switches to maintain live traffic during construction.

The construction works near Bells Creek for the new northbound carriageway and new bridge structure are within an area that is relatively flat, with sensitive downstream areas including Bells Creek, Eastern Creek, South Creek and ultimately the Hawkesbury River. Given the area of potential soil exposure, the risk of erosion and sedimentation impacts around Bells Creek would be greater than the northern section of the proposal where earthworks are predominately limited to the median.

With the implementation of appropriate erosion and sediment management measures, the residual potential impact of erosion of exposed soils is expected to be temporary and minor in nature.

Salinity

The areas in the vicinity of Bells Creek are mapped as having a high risk of salinity. Construction could result in excavation or erosion of potentially saline soils. This could cause saline surface water runoff to waterways and have a negative impact water quality and aquatic ecosystems. Saline soils can cause a decline in soil structure and plant growth.

Construction of the proposal has the potential to increase salinity where the groundwater table is impacted by construction work. As the extent of dewatering during construction is likely to be minor and temporary (refer section 6.2), the proposal is unlikely to contribute to increased salinity. With the implementation of appropriate salinity management measures the impacts would be appropriately managed.

Acid sulfate soils

Based on the preliminary testing results there is potential for acid sulfate soils to be disturbed across the construction boundary. Construction activities with the potential to disturb ASS include:

- excavation of ASS and stockpiling of untreated materials
- piling activities associated with the new flyover bridge
- dewatering activities which would lower the groundwater table.

If ASS are disturbed runoff from excavated soils can be acidic and leach iron, aluminium and other heavy metals. Without mitigation measures, the heavy metals and acids can leach into soil and groundwater, or impacted runoff can enter waterways and have negative impacts on water quality and aquatic ecosystems. With the implementation of appropriate ASS management measures the impacts would be appropriately managed.

Contamination

Any contamination in the soils may pose a risk to human and ecological receptors both on and offsite if contaminated material is exposed during construction activities. Several areas of environmental concern (AEC) were identified within the construction boundary and may be disturbed by construction activities. Construction activities with the potential to disturb contaminated materials include topsoil stripping, earthworks for the new road alignment, open flooding channel and utility and drainage work, and surface disturbance for the establishment and operation of ancillary facilities.

Identified receptors for the potential site contamination include:

- ecological receptors dependent on-site soils in potentially impacted areas and ecological receptors downstream of the proposed works
- current site users and workers disturbing potentially impacted materials
- future site users and workers disturbing potentially impacted materials.

The PSI identified there is a low to moderate likelihood of complete exposure pathway to human and ecological receptors in the event that contaminated material is present and interacted with during construction. The risks posed by the AEC would be further evaluated during detailed design which would include targeted sampling, and identification of management measures and/or remediation if required. The proposed targeted sampling locations are shown in Figure 6-14.

There is the potential to encounter previously unknown contamination during construction excavation activities. Precautions and measures would be prepared and implemented as part of the CEMP.

New sources of contamination

There is potential that the use of plant/machinery and operation of the ancillary facilities during construction could result in unexpected chemical and/or fuel leaks and spills resulting in localised contamination of soils. These impacts would generally be temporary and are considered to be minimal with the implementation of safeguards and management measures outlined in Table 6-20.

Operation

Soils

Embankment and batter slopes of the new flyover bridge and road have been designed with appropriate slope ratios and vegetation or revetment cover in accordance with relevant standards to avoid erosion during the operation of the proposal. The new drainage culverts have been designed with consideration for erosive velocities and appropriate scour protection would be provided.

As the proposal would be designed in accordance with current standards, erosion of soils during its operation are considered unlikely and negligible.

Contamination

During operation of the proposal, there is potential for contaminated run-off from the road which may arise from vehicles using the road corridor (fuel leak, tyre wear), an accidental spill or traffic accident. To mitigate this risk, the proposal design includes spill containment devices in sensitive areas, which would be further refined during detailed design.

6.3.4 Safeguards and management measures

Table 6-20 outlines the soil and contamination safeguards and management measures to be implemented by the proposal.

Table 6-20 Soil and contamination safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing

SC1	Erosion and sedimentation	A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP during construction.
		The SWMP would include (but not limited to):
		• objectives and targets for soil and water quality management
		• approvals, licence requirements and relevant legislation
		• overview of the existing environment and potential impacts of construction works
		• identification of high-risk activities (such as the bridge construction around Bells Creek) and sensitive areas and the need for an Environmental Work Method Statement (EWMS)
		• environmental control measures in relation to:
		  ○ erosion and sedimentation including the preparation and updating of Erosion and Sediment Control Plans (ESCPs) throughout construction
		  ○ stockpile management
		  ○ spoil and fill management
		  ○ surface water quality
		  ○ refuelling of vehicles and equipment and accidental spills
		  ○ storage or hydrocarbons
		  ○ wet weather events
			Contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		○ groundwater dewatering and management of groundwater in-flow during construction • a surface water monitoring program including regular monitoring of Bells Creek within the mixing zone (100 m downstream) as well as an upstream reference point for each discharge point • auditing and reporting requirements • site inductions and training for construction personnel. The SWMP would be prepared in accordance with the following specifications and guidelines: • Managing Urban Stormwater: Soils and Construction (Landcom, 2004) • Transport's Soil and Water Management Specification (G38) • Transport Erosion and Sedimentation procedure.		
SC2	Erosion and sediment control	A primary site-specific ESCP and progressive ESCPs would be prepared and implemented as part of the SWMP.	Contractor	Pre-construction
SC3	Erosion and sediment control	A construction erosion and sedimentation assessment would be undertaken to determine specific location, sizing and effectiveness of erosion and sediment control measures during construction. This assessment would also consider construction flooding impacts as the staging plans are refined as the detailed design progresses.	Transport	Detailed design
SC4	Contaminated lands	Undertake additional contamination testing and assessment at locations identified in Figure 6-14 that would be disturbed by the proposal (in consideration of the identified AEC) to confirm the presence of contamination. If contamination is present and exceeds the adopted site criteria, a Remedial Action Plan (RAP) would be developed in line with the relevant guidelines to ensure appropriate management and mitigation measures are in place.	Transport	Detailed design
SC5	Contaminated lands	Unexpected Finds Protocol would be prepared and included within the CEMP to manage unexpected occurrences of contaminated materials.	Contractor	Pre-construction
SC6	ASS	Undertake further testing of soils during detailed design to allow for clearer delineation of ASS extents in relation to the proposed ground disturbance footprint. This testing would: • include screening of soils with the pHField / pHOxidation methodology • target areas of proposed cut or dewatering • determine whether an ASS Management Plan is necessary, in accordance with published guidance including ASSMAC (1998), National ASS Guidelines (Sullivan et al, 2018) and *Guidelines for the Management of Acid Sulfate Materials* (RTA, 2005).	Transport	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
SC7	Accidental spill	A site-specific emergency spill plan would be developed and include spill-management measures in accordance with the Transport *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport EPA officers).	Contractor	Construction

6.4 Aboriginal cultural heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) was prepared by Kelleher Nightingale Consulting Pty Ltd (KNC, 2024) to assess the potential Aboriginal heritage impacts during construction and operation the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix E.

This section has also been informed by the Connecting with Country process currently being undertaken for the proposal and the statement of heritage impact (SOHI) prepared by Artefact (Artefact, 2024).

The history of the Aboriginal heritage associated with the proposal overlaps significantly with the history of the non-Aboriginal heritage (refer section 6.5). Although the following sections assess Aboriginal cultural heritage and archaeology much of the background information discusses the history of Aboriginal people following occupation.

6.4.1 Methodology

Aboriginal cultural heritage assessment

The ACHAR was prepared in accordance with Stage 3 of the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS, 2011), the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a). The ACHAR included:

- Desktop review of the environmental context and previous archaeological investigations within and in the vicinity of the study area. The study area for the Aboriginal cultural heritage assessment is shown in Figure 6-15.
- Stakeholder consultation as outlined in section 5.3.
- Archaeological field surveys of the study area carried out by archaeologists from KNC and representatives from Deerubbin Local Aboriginal Land Council (DLALC) on 19 June 2020 and 21 August 2023. The surveys focused on identifying Aboriginal objects and determining the spatial extent of any associated subsurface deposits with archaeological potential.
- Archaeological test excavation program carried out between 7 August and 11 August 2023 by archaeologists from KNC and representatives of the registered Aboriginal stakeholder groups in accordance with relevant guidelines. The test excavation program aimed to determine the intactness, extent and significance of any subsurface archaeological deposits within the tested areas.
- A significance assessment for the Aboriginal archaeological sites identified within the study area.
- Assessment of the potential impacts on Aboriginal cultural heritage, and identification of mitigation measures.

Connecting with Country

The Connecting with Country process is guided by an understanding and acknowledgment of a suite of documents that outline good practice approaches and principles frameworks, and site-specific structure and master planning specific for the study area. The key documents reviewed include:

- *Vision for Country Blacktown Native Institute for DSMG* (COLA, 2024)
- *Dharug Nura: The Blacktown Native Institution Conservation Management Plan* (CMP) (GML, 2023)
- *Connecting with Country – Good practice guidance on how to respond to Country in the planning, design and delivery of the built environment projects in NSW* (Government Architect NSW, 2023).

Knowledge, cultural values, and stories about Richmond Road and north-west Sydney are being gathered and incorporated into the design of the proposal, with the aim of sharing knowledge and strengthening local identity and culture. This process is Aboriginal community led and endorsed, and follows the *Connecting with Country Framework* (Government Architect NSW, 2023). The key items being considered are:

- Research and analysis of Aboriginal history and stories of the Marsden Park and Colebee area.
- Engagement of local Aboriginal communities through meetings and workshops (refer section 5.3).
- Development of Aboriginal design principles to inform the design of the proposal (refer section 2.3.3).
- Identification of opportunities and constraints to incorporate Aboriginal design principles into the design.

6.4.2 Existing environment

Landscape context

The study area is located in the north-west of the Cumberland Plain, a gently undulating and generally low-lying physiographic region of the Sydney Basin. The Sydney Basin is a large geological feature stretching from Batemans Bay in the south to Newcastle in the north and Lithgow in the west. The formation of the basin began between 250 to 300 million years ago when river deltas gradually replaced the ocean that had extended as far west as Lithgow.

The topography of the study area is characterised by flat, crest, open depression and slope landforms that form the floodplain of Bells Creek and adjacent slopes. Bells Creek is the main watercourse within and in the vicinity of the study area and flows generally north for approximately five kilometres where it joins Eastern Creek. Archaeologically, areas adjacent to major watercourses are known focal points for past Aboriginal land use activity as they are likely to have provided a stable source of water and other resources.

The distribution of native vegetation within the study area has been affected by historic and contemporary land use practices. Prior to 1788, a mixture of native vegetation communities would have extended across the entire region with distribution determined by a combination of factors including soil, terrain and climate. The variety of native vegetation and sources of permanent water would have made the region an attractive locale for past Aboriginal people due to the subsistence and material resources available. Aboriginal land use practices shaped the environment and would have influenced the distribution and numbers of plants and animals within the region. However, extensive modifications to the landscape that are visible today are almost entirely the result of the land use practices during the past 200 years.

Aboriginal history

The study area and surrounding region are known to have been important to, and extensively used by Aboriginal people. Bells Creek and its tributaries were used by Aboriginal people living in the region prior to the British invasion. Before the British invasion in the late eighteenth century, Aboriginal people inhabited the area, living in groups of extended families tied to specific regions. These groups were interconnected through marriage and gathered for activities like subsistence gathering, initiations, funerals, and ritual combat. Aboriginal customary law and practices included responsibilities for land, kinship structures, marriage and childcare rules, and dispute resolution procedures, though these varied across Australia.

Following the colonisation of NSW by British settlers in 1788, the Aboriginal people of Sydney and the surrounding areas experienced dispossession from their traditional country and the appropriation and misuse of their land by the colonists. Natural resources were destroyed or made unavailable to Aboriginal people and land was converted in pastoral estates for grazing and crop growth, among other uses (Colebee and Nurragingy, 2011). Response to the occupation varied between groups, individuals and over time due to proximity to the occupied areas, personal association and external factors, such as periods of drought. Some groups became synonymous with the conflict between the British and Aboriginal people through the late eighteenth and early nineteenth centuries while others, such as Colebee and Nurragingy, sought to coexist with the British.

As British occupation expanded, Lachlan Macquarie and subsequent governors sought to increase their control over the Aboriginal groups in the region. The British attempted to superimpose a social hierarchy onto Aboriginal groups living in the region by conferred social status onto preferred individuals, such as Nurragingy, through the allocation of breastplates, European titles such as king or chief, and other gifts. Aboriginal people, including Nurragingy and Colebee, were enticed to adopt European social practices through the allocation of land for occupancy and cultivation. The land grants do not appear to have been allocated based on the traditional lands of the individual, as attested by the grant to Colebee and may have further eroded existing social structures with the Aboriginal groups in the region.

The British also sought to change the social practices of Aboriginal people in the region through the establishment in 1814 of the Native Institution in Parramatta, in which Aboriginal children were taught European domestic and religious practices to

'render their habits more domesticated and industrious' (Campbell, 1819). Children aged between four and seven years old, were admitted to the institute and were unable to leave or be removed until the age of 14 for females and 16 for males. During this time, the children were taught European domestic, social and religious practices, and several marriages were arranged between former students of the institution and, in some instances, between former students and colonists.

Aboriginal culture endures to this day across the Cumberland Plain and has influenced many aspects of contemporary Australian culture including in the names of animals, plants and localities. The long struggle for recognition, self-determination and acknowledgement forms part of the Aboriginal cultural heritage story and lived experience of contemporary Aboriginal people. Members of the contemporary Aboriginal community continue to experience connection with the area through cultural and family associations.

Further information is provided in Appendix E and Appendix F.

Historic land use

British occupation of the region began in the late eighteenth century with the establishment of settlements at Richmond and Windsor to exploit agricultural potential of the alluvial plains adjacent to the Hawkesbury River. An unformed track linking the settlements at Richmond and Parramatta developed during this period and was established as a road during the early nineteenth century. The road was the main overland transport route between the settlements and would become the present-day Richmond Road.

The land adjacent to the road was divided into allotments during the early nineteenth century. The allotments were generally larger on the western side of the road, where 1350 acres was granted to Richard Fitzgerald in 1819 that encompassed most of the north-western portion of the study area. Over 8000 acres were reserved by Governor King as a stock run between Eastern Creek and Ropes Creek that forms the south-western portion of the study area.

The allotments adjacent to the eastern side of the road were generally smaller rectangular blocks of between 30 and 60 acres that straddled Bells Creek and extended from the road to the north-south oriented Plumpton Ridge. An allotment in this area of 30 acres was granted to Colebee and Nurragingy in 1816 and 'was the first such grant to be issued to Aboriginal people in Australia's history' (SHR 01877). The Colebee and Nurragingy Land Grant is located immediately north-east of the proposal. Further information on the Colebee and Nurragingy Land Grant is provided below.

A settlement developed around the Colebee and Nurragingy Land Grant and by 1821 thirteen residents were living in the area, which became known as Black Town (GML, 2004). In 1823, the Native Institution was moved from Parramatta to land adjoining the Colebee and Nurragingy Land Grant where it operated until 1829. Further information on the Blacktown Native Institution site is provided below.

In the 1840s, a plan of the region indicated the tree clearance was generally limited to areas adjacent to major watercourses and showed cleared areas around the Blacktown Native Institution, the Colebee and Nurragingy Land Grant, and on the eastern side of Richmond Road around an intersection in the vicinity of the present-day Townson Road.

A large portion of the study area was covered in bushland in the 1940s and cleared paddocks, ploughed fields and some rural structures were largely confined to the western side of Richmond Road. By 1978, the bushland had been largely replaced by cleared paddocks, ploughed fields and rural structures. Inline dams had been constructed along drainage lines and within Bells Creek. Residential redevelopment of rural properties in the present-day suburbs of Hassall Grove and Dean Park commenced during the 1970s and were completed in the 1980s.

Over the last 30 years, the M7 Motorway was constructed through the southern portion of the study area, residential and commercial redevelopment occurred to the north-west of the study area, Bells Creek was channelised on the western side of Richmond Road, a pipeline was installed along the boundary between Hassall Grove and Marsden Park, and Richmond Road was upgraded. Large portions of previously rural properties and farmland in the southern portion of the study area have been cleared and some revegetated with native trees.

Blacktown Native Institution

The proposal lies on the unceded Traditional Lands of the Dharug peoples. At the intersection of Rooty Hill Road North and Richmond Road is the Blacktown Native Institution which is an item listed on the State Heritage Register (SHR No. 01866) and the *Blacktown Local Environment Plan 2015* (Item A121). The study area overlaps the curtilage of the former the Blacktown Native Institution site.

The Native Institution was established in Parramatta in 1814 by Governor Macquarie and missionary William Shelley, for the education of Aboriginal children. The establishment of the Native Institution exerted greater control over Aboriginal people and focused on changing the way in which Aboriginal people lived by promoting Christianity, British social practices, and European farming techniques.

The land granted to Colebee and Nurragingy in 1816 led to the establishment of a significant Aboriginal community on the eastern side of Richmond Road. In 1823, the Native Institution in Parramatta was relocated to land adjoining the Colebee and Nurragingy Land Grant. The proximity to the grant and the community it had formed is likely a contributing factor to establish the Blacktown Native Institution in this location.

On 1 January 1823 the Blacktown Native Institution commenced operation as the children were transferred from Parramatta to Blacktown (Blacktown Native Institution, 2011). From 1823 onwards, historical records indicate that a number of Aboriginal people were present in the area and were camping along Bells Creek in order to remain near their children who were in the Institution. Records suggest that 17 Aboriginal and five Māori children were housed at the Blacktown Institution in 1827. The Māori children were taken from the Parramatta school at Rev Marsden's persuasion (GML, 2023). It has been suggested that the school had significant difficulties maintaining 'enrolments', with children frequently removed by their parents or leaving (GML, 2018).

Several modern Dharug community members state a belief that burials of Aboriginal children occurred in unmarked graves within and surrounding the Blacktown Native Institution. There is no formal record of these burials, and no evidence of any unmarked graves has been identified to date. It has been suggested that if burials did occur, these would be most likely to be located along Bells Creek, on landforms north of Bells Creek, within the Colebee and Nurragingy Land Grant, or near the former Blacktown Native Institution buildings.

The Blacktown Native Institution remained operative until 1829. In 1833 the former Blacktown Native Institution site was advertised for sale and was purchased at auction by William Bell who renamed the property 'Epping Lodge.' William Bell died in 1843 and the property was inherited by his daughter Maria, who made improvements to the property and died in 1876.

In 1877 Epping Lodge was purchased by Sydney Burdekin, who named it Lloydhurst (Blacktown Native Institution, 2011) and expanded and altered the site. Burdekin was a prominent colonial politician and Lord Mayor of Sydney and became a member of the Aboriginal Protection Board in 1887. In 1899 Sydney Burdekin died, and the former Blacktown Native Institution site was purchased by Robert Smith, and then by Harry Woolnough in 1910 (Blacktown Native Institution, 2011).

In 1914 the Blacktown Native Institution land was subdivided into five blocks and purchased by the Wardrop family in 1920 and was used as a dairy farm until 1985 (Blacktown Native Institution, 2011). The Native Institution building was destroyed in a fire in 1924 and a fibro house was built on its ruins (Blacktown Native Institution, 2011). In 1985 the fibro house was demolished and the land was purchased by Landcom. It was intended that the land would be incorporated into a housing development, however it has remained vacant since (Blacktown Native Institution, 2011).

The Blacktown Native Institution was listed on the State Heritage Register on 18 November 2011. The land containing the former Blacktown Native Institution was returned to Aboriginal people in 2018 and is currently being managed by the Dharug Strategic Management Group (DSMG) on behalf of the Aboriginal community.

The Blacktown Native Institution land has remained undeveloped, although planning is underway for the development of this site into a culturally significant area for the Aboriginal community. The site has been involved in a series of interpretive art programs by the Blacktown Native Institution Project in conjunction with the Museum of Contemporary Art (Blacktown Native Institution, 2011).

Further information is provided in Appendix E and Appendix F.

Statement of significance

The former Blacktown Native Institution was listed on the SHR on 18 November 2011 (SHI No. 01866). The SHR curtilage of the former Blacktown Native Institution encompasses the entire lot (formerly Portion 123 of the Parish of Rooty Hill, County of Cumberland) and includes the remains of the structures and a reserve containing a garden and a stockyard. The overall heritage curtilage of the site includes the portion of land owned by DSMG as well as land owned by Transport and zoned as road corridor (SP2) for the future widening of Richmond Road. The SHR listing of the Blacktown Native Institution provides the following statement of significance:

> *The Blacktown Native Institution is a site of State significance because of its combination of historical, social and archaeological values. The Blacktown Native Institution played a key role in the history of colonial assimilation policies and race relations. The site is notable for the range of associations it possesses with prominent colonial figures including: Governor Macquarie, Governor Brisbane, Samuel Marsden, William Walker and Sydney Burdekin.*
>
> *The Blacktown Native Institution site is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural engagement in Australia. For Aboriginal people in particular, it represents a key historical site symbolising dispossession and child removal. The site is also important to the Sydney*

Māori community as an early tangible link with colonial history of trans-Tasman cultural relations and with the history of children removed by missionaries.

The Blacktown Native Institution is a rare site reflecting early 19th century missionary activity. The site has the potential to reveal evidence that may not be available from other sources, about the lives of the children who lived at the school and the customs and management of the earliest Aboriginal school in the colony. The site also has the potential to contain archaeological evidence relating to later phases of land use, including the period the property was owned by Sydney Burdekin. In addition, the site may contain evidence of Aboriginal camps which may provide information about how Aboriginal people, accustomed to a traditional way of life, responded to the changes prompted by colonisation.

As one of the earliest examples of colonial governments seeking to institutionalise First Nations peoples and their culture, the site also has multiple cultural and artistic overlays that have sought to address and heal historical and ongoing trauma associated with dispossession and assimilation.

Colebee and Nurragingy Land Grant

With the escalating tensions between Aboriginal and non-Aboriginal people, Governor Macquarie ordered 'punitive expeditions' throughout the Cumberland Plain in 1816. These 'expeditions' were sometimes accompanied by Aboriginal guides. Colebee and Nurragingy were two Aboriginal guides who accompanied the military parties to locate camps and groups of Aboriginal people.

For their part in the early punitive expeditions, Colebee and Nurragingy amongst other rewards were granted a 30 acre parcel of land on the eastern side of Richmond Road, which was selected by Nurragingy himself as it was in his country (Colebee and Nurragingy Land Grant, 2011). This became the first grant to Aboriginal people in Australian history and was registered in 1819 in Colebee's name (Colebee and Nurragingy Land Grant, 2011). The grant included an Iron Bark Range, which featured a ridgeline campsite and silcrete source. Nurragingy grew various crops and practiced animal husbandry and was praised by Macquarie for his success in European agricultural practices (Colebee and Nurragingy Land Grant, 2011).

Governor Macquarie provided Nurragingy with cattle and arranged for a house to be built for him by Sylvanus Williams (GML, 2012). Refer section 6.5 for more information on this house. An Aboriginal community grew on the land, as many families camped on the land to be near their children within the Blacktown Native Institution on the opposite side of Richmond Road (Colebee and Nurragingy Land Grant, 2011). Structures built on the grant included a bark and log hut with a chimney, sheds, animal enclosures, fencing, gardens, and vegetable patches and crops (Colebee and Nurragingy Land Grant, 2011). Colebee did not live on the land for more than a few years, however Nurragingy lived at and worked the land until his death in 1833.

Following Nurragingy's death, the land grant was claimed by Colebee's younger sister Maria Lock. Maria was a Boorooberongal Dharug woman who was born at Richmond on the Hawkesbury River c. 1805 (Parry, 2005). Maria was admitted to the Parramatta Native Institution and in 1824 married Robert Lock in the first official marriage between an Aboriginal woman and European man (Parry, 2005). Following Robert's death in 1854 and Maria's in 1878 the 30 acre grant was divided between their children. In the early 1900s following Federation of Australia, the Lock family were one of very few Aboriginal families who had the right to vote, as they were landowners.

By the 1950s much of the original Colebee and Nurragingy grant was regranted as Crown land and sold (Colebee and Nurragingy Land Grant, 2011). The northern part of the Colebee Nurragingy land grant has been incorporated into recent residential development, however the southern half of the grant is undeveloped.

Further information is provided in Appendix E and Appendix F.

Statement of significance

The SHR curtilage of the Colebee and Nurragingy Land Grant (SHR No. 01877) encompasses the land granted to Colebee and Nurragingy by Lachlan Macquarie. Historical sources document the presence of several structures within the land grant that are associated with Colebee and Nurragingy including a hut, fencing, gardens, sheds, and animal enclosures. The SHR listing of the Colebee and Nurragingy Land Grant provides the following statement of significance:

The Colebee/Nurragingy Land Grant is a site of state heritage significance because of its combination of historical, social and cultural values. The site was the first land grant ever given to Aboriginal people in Australia. The land grant is associated with two significant Aboriginal figures from the early colonial period-Nurragingy and Colebee-to whom the land was jointly granted in 1816. The location of the land grant is significant because it was an Aboriginal choice, being on land belonging to Nurragingy's clan. The land grant is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural

engagement in Australia. For Aboriginal people, in particular, it represents a key historical site symbolising Aboriginal resilience and enduring links to the land (Godden, Mackay, Logan, 2010).

Archaeological context

Numerous archaeological investigations have been undertaken in the region over several decades that have revealed physical traces of a range of Aboriginal land use activities which have survived in the form of Aboriginal archaeological sites. The spatial distribution and density of these sites provide insight into the adaptation of Aboriginal people to an everchanging landscape and may also reflect social changes.

The Aboriginal archaeological sites identified in the vicinity of the study area predominantly contain stone artefacts in either surface and/or subsurface contexts of varying density and integrity. Stone quarry sites have also been documented that are associated with the outcropping of silcrete from St Marys Formation geology on and in the vicinity of Plumpton Ridge.

Soil landscape, vegetation and land use practices have been identified as factors influencing the preservation of Aboriginal archaeological sites in the region. Previous archaeological investigations have shown that the distribution of Aboriginal archaeological sites in the region has been highly influenced by the reliability and permanence of fresh water sources such as Bells Creek and South Creek, in addition to certain underlying geology.

The Blacktown Native Institution and the Colebee and Nurragingy Land Grant are areas of state significance due to their association with historical events and people. Archaeologically, the sites have the potential to provide archaeological information on the people who inhabited them during this time. However, their inhabitants are unlikely to have made contemporary stone artefacts or Aboriginal objects of types that predated the British invasion. Archaeological investigations within these areas have identified Aboriginal archaeological sites containing stone artefacts with similar spatial distributions and densities to sites in the region, indicating that these sites likely predated the Blacktown Native Institution and the Colebee and Nurragingy Land Grant.

The current study area overlaps with two existing Aboriginal Heritage Impact Permits (AHIP) as shown in Figure 6-15. Details are as follows:

- Lot 41 DP1100854 has been previously assessed for Aboriginal cultural heritage values and is covered by AHIP 5224. The AHIP relates to the Richmond Road Colebee fence installation and Transport is the applicant. The AHIP was issued on 8 January 2024 and expires on 8 January 2027.
- Lot 101 DP110952 has been previously assessed for Aboriginal cultural heritage values and is covered by AHIP 5276. The AHIP relates to a warehouse facility in Colebee and Transport is the applicant. The AHIP was issued on 22 May 2024 and expires on 22 May 2034.

Archaeological field survey

The survey focused on identifying Aboriginal objects and determining the spatial extent of any associated subsurface deposits with archaeological potential. The field survey:

- Identified one previously unrecorded surface artefact within study area (Richmond Road Bells Creek AFT 1). Richmond Road Bells Creek AFT 1 was located within the curtilage of the former Blacktown Native Institution. The artefact was not indicative of objects associated with the use of the property during operation of the Blacktown Native Institution and was assessed as being deposited at the site prior to the construction of the institution.
- Inspected the locations of the five Aboriginal archaeological sites (MPIP 12, Richmond Road 1, Richmond Road Bells Creek AFT 2, Rooty Hill Road North Plumpton, and Western Sydney PAD 3) previously identified within the study area. The survey:
    - determined Richmond Road 1 and Rooty Hill Road North Plumpton had been impacted by previous works and no longer exist.
    - identified a silcrete flake at Richmond Road Bells Creek AFT 2 on a small ground surface exposure within an unsealed track at the western edge of a cleared paddock.
    - confirmed MPIP 12 and Western Sydney PAD 3 to be within the study area.

The field survey was unable to provide sufficient information on the nature and extent of subsurface archaeological deposits within the eastern portion of Western Sydney PAD 3 and at Richmond Road Bells Creek AFT 2 due to low surface visibility, limited or absent surface artefacts and suspected disturbance from land use practices. An archaeological test excavation was undertaken to acquire additional information on the nature and extent of subsurface archaeological deposits within these areas.

Archaeological test excavations

Archaeological test excavations were undertaken within the eastern portion of Western Sydney PAD 3 and at Richmond Road Bells Creek AFT 2. The excavation was undertaken by archaeologists from KNC and representatives of the registered Aboriginal stakeholder groups in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b). A total of 33 test squares were excavated across the two sites and an additional test square was excavated adjacent to a modified drainage channel in the southeastern portion of the study area to verify the nature of the subsurface deposit and the impact of disturbance in this area.

The test excavation confirmed the presence of subsurface Aboriginal objects within the eastern portion of Western Sydney PAD 3 and at Richmond Road Bells Creek AFT 2. No subsurface Aboriginal objects were recovered from the area adjacent to a modified drainage channel.

Aboriginal archaeological sites within the study area

A review of background information, Aboriginal community consultation and archaeological assessment, including archaeological survey and test excavation, identified six Aboriginal archaeological sites containing Aboriginal objects within the study area as detailed in Table 6-21. The site locations are shown in Figure 6-15.

Table 6-21 Aboriginal archaeological sites identified within the study area

Site name	AHIMS number	Site feature/s	Status
MPIP 12	45-5-3741	Surface artefact scatter	Valid
Richmond Road 1	45-5-2651	Surface artefact scatter	Destroyed
Richmond Road Bells Creek AFT 1	45-5-5471	Surface artefact scatter and associated subsurface deposit	Valid
Richmond Road Bells Creek AFT 2	45-5-5826	Surface artefact scatter and associated subsurface deposit	Valid
Western Sydney PAD 3	45-5-3322	Surface artefact scatter and associated subsurface deposit	Valid
Rooty Hill Road North Plumpton	45-5-0252	Surface artefact scatter	Destroyed

A further five Aboriginal archaeological sites were identified within 100 metres of the study area (refer Appendix E for further information). The majority of the identified Aboriginal archaeological sites were recorded during previous archaeological investigations for residential, commercial or industrial redevelopment and infrastructure projects that have resulted in the subsequent destruction of two sites (Richmond Road 1 and Rooty Hill Road North Plumpton) previously identified within the study area.

One Aboriginal archaeological site (Richmond Road Bells Creek AFT 1) was identified within the portion of the study area that overlaps the SHR registered curtilage of the Blacktown Native Institution item during the archaeological assessment; however, the site was assessed as predating the establishment of the Blacktown Native Institution and is not related to the historical, associative and social significance of the property.

Figure 6-15 Archaeological sites within and in the vicinity of the study area

Statements of significance

The assessment of significance is a key step in the process of impact assessment for a proposed activity. This is because the significance or value of an object, site or place will be reflected in recommendations for the conservation, management or mitigation. The significance assessment for the Aboriginal archaeological sites identified within the study area has focused on the social/cultural, historic, scientific and aesthetic significance of Aboriginal heritage values as identified in the *Australia ICOMOS Burra Charter* (Australia ICOMOS, 2013).

Consultation with the Aboriginal community undertaken for the proposed upgrade as part of the PACHCI process has identified that the study area has cultural heritage value (social value) to the local Aboriginal community. Regarding the Aboriginal archaeological sites identified within the study area, no specific cultural/social, historic, aesthetic values expressed by these sites were identified in the ACHAR.

The study area contains four existing Aboriginal archaeological sites as defined under the *National Parks and Wildlife Act 1974*. Based on the values assessment provided in Appendix E, the statements of significance in Table 6-22 were determined for the sites.

Table 6-22 Statements of significance for Aboriginal archaeological sites within the study area

Aboriginal archaeological site	Significance	Description
MPIP 12	Low	• Low-density surface artefact scatter in a disturbed context. • The artefacts are typical of the region in terms of type and raw material. • It is unlikely that further archaeological investigation of the site could contribute additional information to our understanding of Aboriginal landscape use in the region.
Richmond Road Bells Creek AFT 1	Moderate	• Surface artefact scatter and associated subsurface deposit. • The artefacts are typical of the region in terms of type and raw material. • The site is located within the SHR listed curtilage of the former the Blacktown Native Institution (SHR No. 01866). The Aboriginal objects present within the site are likely to predate the establishment of the Blacktown Native Institution and therefore be unconnected to the historical, associative and social significance of the property; however, further archaeological investigation of the site could contribute additional information to our understanding of Aboriginal landscape use within this property. • Richmond Road Bells Creek AFT 1 is part of the same landform as Richmond Road Bells Creek AFT 2 (artificially separated by the road) and is part of the larger archaeological complex associated with Bells Creek.
Richmond Road Bells Creek AFT 2	Moderate	• Low-density surface artefact scatter and associated subsurface archaeological deposit. • The artefacts are typical of the region in terms of type and raw material; however, few sites have been excavated in the vicinity of Bells Creek upstream of the sites associated with the reduction of silcrete at Plumpton Ridge and further archaeological investigation of the site could contribute additional information to our understanding of Aboriginal landscape use in the region. • Richmond Road Bells Creek AFT 2 is part of the same landform as Richmond Road Bells Creek AFT 1 (artificially separated by the road) and is part of the larger archaeological complex associated with Bells Creek.
Western Sydney PAD 3	Western portion- moderate Eastern portion - low	• Low-density surface artefact scatter and associated subsurface archaeological deposit. • The artefacts are typical of the region in terms of type and raw material; however, few sites have been excavated in the vicinity of Bells Creek upstream of the sites associated with the reduction of silcrete at Plumpton Ridge and further archaeological investigation of the site could contribute additional information to our understanding of Aboriginal landscape use in the region.

Aboriginal archaeological site	Significance	Description
		• The location of this site on the ridge associated with silcrete cobbles and artefacts displays a scientifically valuable location for comparing the quarrying of silcrete cobbles on ridgelines as opposed to the more numerous silcrete quarries along creek lines.

Cultural heritage

ACHAR

The study area has substantial cultural value for the local Aboriginal community. The identified cultural values are both specific to the Blacktown Native Institution and a wider feeling of attachment and responsibility for the land. The Blacktown Native Institution and Colebee and Nurragingy's land grant retain significance due to their association with historical events and people.

Cultural values become tangible when tied to identified Aboriginal objects found at archaeological sites; however, the presence of Aboriginal objects is not required for a location to have value for the Aboriginal community. Aboriginal sites may also have social, spiritual or landscape values which are not tangible.

Some of the Aboriginal cultural heritage values expressed by stakeholders for the study area and wider region during preparation of the ACHAR include (further information in relation to specific stakeholder consultation is provided in section 5.3.1):

- ancestral association with the land, including connection and descendance from the original traditional owners
- responsibility to look after the land, including the heritage sites, plants and animals, creeks, rivers and the land itself
- artefact sites and landscape features
- culturally modified trees
- connectivity of sites throughout the landscape
- creek lines, particularly landscape features and waterways, such as Bells Creek
- indigenous plants and animals
- general concern for burials, as their locations are not always known and they can be found anywhere.

Vison for Country

The *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024) is a visioning document that seeks to investigate design actions that can articulate a sense of place, offering shared belonging and connection, a place of healing and learning, supporting environmental relationships and custodianship. The report provides a timeline of the site's history, guiding frameworks, the communities visions as well as key design directions that will help guide the design of the site in a Country positive manner. The aspirations of the Dharug community and the vision for the Blacktown Native Institution site, as noted in the Vision for Country report, are:

> *"A place cared for and loved by Dharug community – shared with the broader communities to foster friendship and understanding, for truth telling and acknowledgement.*
>
> *A place of deep healing that offers connection with the land, the stories and spirits of ancestors embedded within this place.*
>
> *A place for singing, dancing, cultural expression and connection, a continuation of cultural practice that breaths life, spirit and healing into the land and people.*
>
> *A place of protection, of nurturing, of cultural education. A place for children to sing, dance and be with family, strong and proud in their identity.*
>
> *A place of remembering, healing, connecting, truth telling and belonging".*

The aspirations of the traditional knowledge-holders and Elders of the DSMG and the local Dharug community include the ultimate layout of the site including design of the edge condition. The proposed design for the Blacktown Native Institution site includes:

- a series of nodes that are connected by walking trails, situated within varying ecological areas, providing opportunities for training and education
- new accessible entrance on Rooty Hill Road North with signage
- development of cultural assets on site including a cultural centre and permanent dance circle
- enhancement of biodiversity of the site and beyond with open Dharug eucalyptus woodland forests with grassy understorey
- turfed and/or closed forest berm in the south-east corner to provide a noise and visual barrier to the site.

Connecting with Country

As part of the ongoing proposal development, a Connecting with Country assessment is being prepared. This includes reviewing existing historical significance as well as consulting with and talking to the Aboriginal community, particularly the representatives of DSMG, to understand the cultural significance of the area to the Aboriginal community, the knowledge and stories they have to share about the area and its people and the plans that they have for the site into the future. This report is still being prepared, however early key themes have been identified to date as part of the Connecting with Country design process (further detailed information is provided in section 5.3):

- Place for cultural, place for ceremony
- Dharug identity
- An interconnected blue and green network
- Process and protocols.

This process is ongoing and will help to inform the ongoing design of the proposal and how it can consider and incorporate Aboriginal values and connections with Country in this location. Consultation with DSMG will continue throughout this process.

Conservation Management Plan

The *Dharug Nura: The Blacktown Native Institution Conservation Management Plan* (CMP) (GML, 2023) has been developed to support the continuing conservation of the Blacktown Native Institution site heritage significance and to assist the DSMG in the care, control and management of the place on behalf of the community. The CMP provides the following summary of social values:

> *The BNI as both a living entity and living memorial represents a place and being which holds entangled social and spiritual values that nourish and connect Dharug Traditional Custodians to Nura through a reciprocal relationship. These values are enduring, evolving and emerging, and presentation of a social values statement can only reflect the current feelings and associations, which are likely to change, concurrently with the Dharug community's connection with the BNI.*
>
> *The returning of the land to Dharug ownership in 2018 represents a seminal moment in the story of the place and meaning for the Dharug community today. It celebrates and supports activism, truth telling, healing, resilience and learning to belong together with Dharug Nura.*
>
> *Dharug self-determination has been celebrated through a series of creative Dharug-led programs, events and activities. These have supported the community in connecting, caring and belonging with Dharug Nura and the regeneration of cultural practices, knowledges, and language. Together, they have helped to create a safe and nourishing environment that facilitates healing of painful individual and collective historical lived experiences and memories.*

The following policies from the CMP, which are relevant to the study area and proposal, have been assessed in Appendix F):

- Leadership – statutory context
- Caring for Nura, Culture and Community – Future use and activities
- Caring for Nura, Culture and Community – New development.

Consultation

Consultation with Aboriginal people has been undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the requirements of Clause 60 of the National Parks and Wildlife Regulation 2019. Consultation has also been undertaken and will continue with the DSMG as part of the ongoing design development and the Connecting with Country design process. Further detail is provided in section 5.3.

6.4.3 Potential impacts

Construction

Aboriginal archaeological sites within the study area

The identified Aboriginal archaeological sites have been considered in relation to the proposed works. Impacts on Aboriginal heritage could not be completely avoided due to the proposal involving an upgrade of an existing road, within a limited area. In total, four Aboriginal archaeological sites would be at least partially impacted by the proposal.

Aboriginal archaeological site MPIP 12 is a surface artefact scatter and would be directly impacted by the construction work associated with the road widening causing a total loss of value. MPIP 12 is considered to display low archaeological value and significance as outlined in Table 6-22. The site is located within the disturbed contexts and is unlikely to retain intact subsurface archaeological deposits.

A portion of the Aboriginal archaeological sites Richmond Road Bells Creek AFT 1 and Western Sydney PAD 3 would be directly impacted by construction work associated with the road widening on the western side of Richmond Road causing a partial loss of value. A portion of Richmond Road Bells Creek AFT2 would be directly impacted by the open flooding channel on the eastern side of Richmond Road causing a partial loss of value. These three sites are surface artefact scatters with associated sub-surface deposits and are considered to display moderate significance based on the scientific value of the information they contain as outlined in Table 6-22. The identified ancillary facilities would be located in areas with no archaeological potential.

Recovery of this information through archaeological salvage excavation would mitigate the impact of the proposal and offer an opportunity to better understand the activities which were undertaken at these sites and the effect of land use disturbance and natural processes on subsurface archaeological deposits in the vicinity of Bells Creek and associated ridges. The loss of intrinsic Aboriginal cultural value of impacted sites cannot be offset or mitigated; however, the salvaged information would assist in a better understanding of and future management of archaeological sites in the region.

The remaining areas within the study area are not expected to impact upon any known Aboriginal heritage items or areas where potential items may be present.

A summary of the proposed impacts to sites identified within the study area are detailed in Table 6-23, and identified in Figure 6-16.

Table 6-23 Proposed impacts to Aboriginal archaeological sites

Site name	AHIMS number	Significance	Type / degree of harm	Consequence of harm
MPIP 12	45-5-3741	Low	Direct / total	Total loss of value
Richmond Road Bells Creek AFT 1	45-5-5471	Moderate	Direct / partial	Partial loss of value
Richmond Road Bells Creek AFT 2	45-5-5826	Moderate	Direct / partial	Partial loss of value
Western Sydney PAD 3	45-5-3322	Moderate	Direct / partial	Partial loss of value

An Aboriginal heritage impact permit (AHIP) would be required prior to the commencement of pre-construction and construction activities associated with the proposal that would affect the sites identified in Table 6-23. The AHIP application would cover the entirety of the study area to accommodate the proposal, and any changes during detailed design. The actual impact areas would be less, and final impact areas would be outlined in the Aboriginal Heritage Management Plan (AHMP). The ACHAR will accompany an application for the AHIP for the proposal.

As the current study area overlaps areas that has been previously assessed for Aboriginal cultural heritage values and are covered by an AHIP 5224 and AHIP 5276, any works related to the proposal within the existing AHIP areas would be required to comply with the existing AHIP conditions.

Figure 6-16 Archaeological sites - proposed impact area

Blacktown Native Institution

The study area overlaps the curtilage of the former the Blacktown Native Institution site. The SHR listing and the CMP (GML, 2023) identify that the Blacktown Native Institution site is significant because of its unique combination of historical, social, and archaeological values. The cultural value of this place is well understood and articulated in existing documentation as outlined above.

The proposal would require the relocation of the existing access of the Blacktown Native Institution site from Richmond Road to Rooty Hill Road North. There is an opportunity to locate the Blacktown Native Institution access where it would assist in achieving positive social impacts by facilitating access for future development of the site, while protecting culturally significant places and meeting road safety requirements. Final design of the access to the Blacktown Native Institution site would be developed in consultation with DSMG and Blacktown City Council.

Except for the change to access, direct physical impacts on the Blacktown Native Institution site owned by the DSMG are not expected. In-direct impacts to the Blacktown Native Institution site owned by the DSMG as a result of the proposal would include visual impacts, as well as potential impacts to amenity and noise as a result of the construction and ongoing operation of the proposal. These impacts have been considered in the relevant chapters (visual impacts in section 6.9 and noise impacts in section 6.7). Transport will consult with the DSMG to identify opportunities for co-design at the Blacktown Native Institution site with the aim to reflect the identified cultural and spiritual values and the significance of the Blacktown Native Institution site. These opportunities would be identified through the Connecting with Country process and may include design enhancements on structures, landscaping and other mitigation measures.

The historical, associative and social significance relevant to Aboriginal cultural heritage and is further outlined in section 6.5 and section 6.10.

During the archaeological assessment one Aboriginal archaeological site (Richmond Road Bells Creek AFT 1) was identified within the portion of the study area that overlaps the SHR registered curtilage of the Blacktown Native Institution item; however, the site was assessed as predating the establishment of the Blacktown Native Institution and is not related to the historical, associative and social significance of the property.

Colebee and Nurragingy Land Grant

The SHR listing identifies that the Colebee and Nurragingy Land Grant site is significant because of its combination of historical, social and cultural values. The northern part of the Colebee and Nurragingy Land Grant has been incorporated into recent residential development; however the southern half of the grant is undeveloped.

There would be no direct impacts to the Colebee and Nurragingy Land Grant site as a result of the proposal either during construction or operation.

Operation

Operation of the proposal would not impact Aboriginal heritage as ground disturbance and excavation would be restricted to the construction phase. Should maintenance and/or repairs of infrastructure require excavation, potential environmental impacts would be considered as relevant.

6.4.4 Safeguards and management measures

Table 6-24 lists the Aboriginal heritage safeguards and management measures that would be implemented by the proposal.

Table 6-24 Aboriginal heritage safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
AH1	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) would be prepared in accordance with the PACHCI (RMS, 2011) and the *Unexpected Heritage Items Procedure* (TfNSW, 2024b) and implemented as part of the CEMP. It would provide specific drafting guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP would be prepared in consultation with all relevant Aboriginal groups.	Contractor	Pre-construction
AH2	Unexpected finds	The *Unexpected Heritage Items Procedure* (TfNSW, 2024b) would be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work would only re-commence once the requirements of that Procedure have been satisfied.		
AH3	AHIP	An application for an Aboriginal Heritage Impact Permit (AHIP) would be made under section 90A of the *National Parks and Wildlife Act 1974* for the land and associated objects within the boundaries of the study area, excluding the area within the boundary of AHIP 5224 and AHIP 5276. The AHIP would also be sought for the specified Aboriginal sites and Aboriginal objects contained within the following sites: • MPIP 12 (AHIMS # 45-5-3741) • Richmond Road Bells Creek AFT 1 (AHIMS # 45-5-5471) • Richmond Road Bells Creek AFT 2 (AHIMS # 45-5826) • Western Sydney PAD 3 (AHIMS # 45-5-3322).	Contractor	Detailed design
AH4	Existing AHIPs	Any works related to the current proposal undertaken within the boundary of AHIP 5224 and AHIP 5276 would be required to comply with the existing permit conditions.	Transport	All phases
AH5	Salvage excavation	The AHIP would include provision for impact mitigation through archaeological salvage excavation. Salvage excavation would be required at sites Richmond Road Bells Creek AFT 1 (AHIMS 45-5-5471), Richmond Road Bells Creek AFT 2 (AHIMS 45-5-5826) and Western Sydney PAD 3 (AHIMS 45-5-3322). Salvage excavation would be completed prior to any activities (including pre-construction activities) which may harm Aboriginal objects at these locations. Salvage excavation activities would be undertaken in accordance with the methodology provided in Appendix E.	Contractor	Pre-construction
AH6	Site protection	The boundary of the AHIP area adjacent to the non-impacted portion of sites Richmond Road Bells Creek AFT 2 (AHIMS 45-5-5826) and Western Sydney PAD 3 (AHIMS 45-5-3322) would be demarcated with protective fencing and listed in the CEMP. These areas would be identified as 'no-go zones' on the CEMP maps and workers inducted as to appropriate protection measures and requirements to comply with conditions in the adjacent AHIP.	Contractor	Construction
AH7	Collected / salvaged Aboriginal objects	The short-term management of collected Aboriginal objects is as follows: • Any Aboriginal objects that are removed from the land by actions authorised by an AHIP, must be moved as soon as practicable to the temporary storage location (see below) pending any agreement reached about the long-term management of the Aboriginal objects. • The temporary storage location would be Kelleher Nightingale Consulting Pty Ltd, Suite 505-507, 155 King Street, Sydney NSW 2000.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• Any Aboriginal objects stored at the temporary storage location must not be further harmed, except in accordance with the conditions of the AHIP. The long-term management of collected Aboriginal objects is as follows: • Recovered objects would be managed in accordance with Requirement 26 "Stone artefact deposition and storage" in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b).		
AH8	Blacktown Native Institution property access	The location and design of a permanent access to the Blacktown Native Institution would be subject to further assessment and is to be developed in consultation with the DSMG and Blacktown City Council with reference to their future plans for this site.	Transport	Detailed design
AH9	Aboriginal culture	Consultation would continue with DSMG throughout detailed design and construction. DSMG input would be sought on: • the location and design of the interim and potential permanent driveway relocation • the opportunity to include cultural interpretations or design into the proposed road infrastructure (i.e. the flyover bridge or abutments) • the opportunity for culturally sensitive and locally indigenous plantings within the road corridor • the opportunity for the proposal to support the proposed development of the Blacktown Native Institution site in accordance with the *Vision for Country* (COLA, 2024) • the ongoing development of the Connecting with Country assessment.	Transport	Detailed design
A10	Māori community	Consultation with the Sydney Māori community would be undertaken as part of the REF exhibition and continue throughout detailed design as appropriate.	Transport	Detailed design

6.5 Non-Aboriginal heritage

A Statement of Heritage Impact (SoHI) has been prepared by Artefact Heritage and Environment Pty Ltd (Artefact, 2024) to assess the potential non-Aboriginal heritage impacts during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix F.

The history of the non-Aboriginal heritage overlaps significantly with the history of the Aboriginal heritage (refer section 6.4). Although the following sections assess State and locally listed heritage items and historical archaeology, much of the background information discusses the linkage between these items and the past and ongoing association with Aboriginal people.

6.5.1 Methodology

Preparation of the SoHI included the following tasks:

- Background research to understand the existing environment with respect to heritage values. The study area for the assessment is shown in Figure 6-18.
- Searches of relevant statutory and non-statutory heritage registers to identify heritage listed items within and surrounding the study area:
    - National Heritage List (NHL)
    - State Heritage Register (SHR)
    - Section 170 Heritage and Conservation Registers
    - *Blacktown Local Environmental Plan 2015* (Blacktown LEP)
    - Register of the National Estate (RNE)
    - National Trust of Australia (NSW) register.
- Physical inspections of the study area were undertaken on 18 August 2023 and 8 February 2024. The aim of the site inspections was to inspect the area of proposed impacts, inform a preliminary assessment of archaeological potential, and to identify environmental heritage items within and adjacent to the study area that may be affected by the proposal.
- Assessment of historical archaeological potential within the study area (refer below for further information on methodology).
- Determination of the level of heritage significance of each identified environmental heritage item and archaeological resource and assessment of the potential impacts as a result of the proposal (refer below for further information on methodology).
- Determination of the heritage approval pathways and make recommendations for mitigation and ongoing management of non-Aboriginal heritage.

The archaeological potential

The archaeological potential of the study area is presented in terms of the likelihood of the presence of archaeological resources, considering the land use history and previous impacts at the site. This evaluation is presented using the grades of archaeological potential outlined in Table 6-25.

Table 6-25 Grading of archaeological potential

Grading	Rationale
Nil	No evidence of historical development or use, or where previous impacts would have removed all archaeological potential
Low	Research indicates little historical development, or where there have been substantial previous impacts, disturbance and truncation in locations where some archaeological remains such as deep subsurface features may survive
Moderate	Analysis demonstrates known historical development and some previous impacts, but it is likely that archaeological remains survive with some localised truncation and disturbance

Grading	Rationale
High	Evidence of multiple phases of historical development and structures with minimal or localised twentieth century development impacts, and it is likely the archaeological resource would be largely intact

Significance assessment

Determining the significance of heritage items or a potential archaeological resource is undertaken by utilising a system of assessment centered on the *Burra Charter* (Australia ICOMOS, 2013). The principles of the charter are relevant to the assessment, conservation and management of sites and relics. The assessment of heritage significance is outlined through legislation in the *Heritage Act 1977* and implemented through the *Assessing Heritage Significance: Guidelines for assessing places and objects against the Heritage Council of NSW criteria* (DPE, 2023), the *Archaeological Assessment Guidelines* (DUAP, 1996b) and the document *Assessing Significance for Historical Archaeological Sites and 'Relics'* (DoP, 2009).

If an environmental heritage item meets one of the seven heritage criteria and retains the integrity of its key attributes, it can be considered to have heritage significance (refer Table 6-26). The significance of an item or potential archaeological resource can then be assessed to determine whether it meets the threshold for significance or not, and if so, whether it is of local or State significance. If a potential archaeological resource does not reach the local or state significance threshold, then it is not classified as a relic under the *Heritage Act 1977* and does not require management.

Table 6-26 NSW heritage assessment criteria

Criteria	Description
A – Historical Significance	An item is important in the course or pattern of the local area's cultural or natural history.
B – Associative Significance	An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history.
C – Aesthetic or Technical Significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.
D – Social Significance	An item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons.
E – Research Potential	An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history.
F – Rarity	An item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history.
G - Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area).

Heritage impact assessment

The impact of the proposed works on heritage values within the study area and/or place has been undertaken. The heritage impact assessment also addresses how the heritage value of the site/place can be conserved or maintained, or preferably enhanced by the proposed works.

To consistently identify the impact of the proposed works, the terminology used in Table 6-27 and Table 6-28 has been referenced in the assessment. The terminology and definitions are based on those contained in guidelines produced by Heritage NSW in the *Material Threshold Policy* (DPC, 2020).

Table 6-27 Terminology for assessing the magnitude of heritage impact.

Criteria	Description
Total loss of significance	Major adverse impacts to the extent where the place would no longer meet the criteria for listing on the SHR.
Adverse impact	Major (that is, more than minor or moderate) adverse impacts to State heritage significance.
	Moderate adverse impacts to State heritage significance.
	Minor adverse impacts to State heritage significance.
Little to no impact*	An alteration to State heritage significance that is so minor that it is considered negligible. * Little to no impact (as opposed to no impact) acknowledges that any change will result in some level of impact/alteration to State heritage significance.
Positive impact	Alterations that enhance the ability to demonstrate the State heritage significance of an SHR listed place.

Table 6-28 Terminology for heritage impact types

Impact	Definition
Physical	Impacts resulting from works located within the curtilage boundaries of the heritage item.
Potential physical	Impacts resulting from increased noise, vibrations and construction works located outside the curtilage boundaries of the heritage item.
Visual	Impact to views, vistas and setting of the heritage item resulting from proposed works outside the curtilage boundaries of the heritage item.

6.5.2 Existing environment

Listed heritage items

The search of relevant registers (as outlined in section 6.5.1) was undertaken on 19 July 2024 and 20 September 2024 to determine heritage items within and surrounding the study area. The results are outlined in Table 6-29 and the locations of these listings are shown in Figure 6-17.

The study area encroaches on the heritage curtilage of the Blacktown Native Institution and sits adjacent to the Colebee and Nurragingy Land Grant, which are listed on multiple heritage registers. These items are further described in the following sections.

Table 6-29 Heritage items in and adjacent to the study area

Item	Address	Significance	Listing	Relationship to study area
Blacktown Native Institution	Richmond Road, Oakhurst	State	SHR No. 01866 Blacktown LEP No. A121 RNE Place ID. 159505 Transport s170 ID (unavailable)	Within (partially)
Colebee and Nurragingy Land Grant	Richmond Road, Colebee	State	SHR No. 01877 Blacktown LEP No. A120 RNE Place ID. 18986 Transport s170 ID (#4311607)	Adjacent to

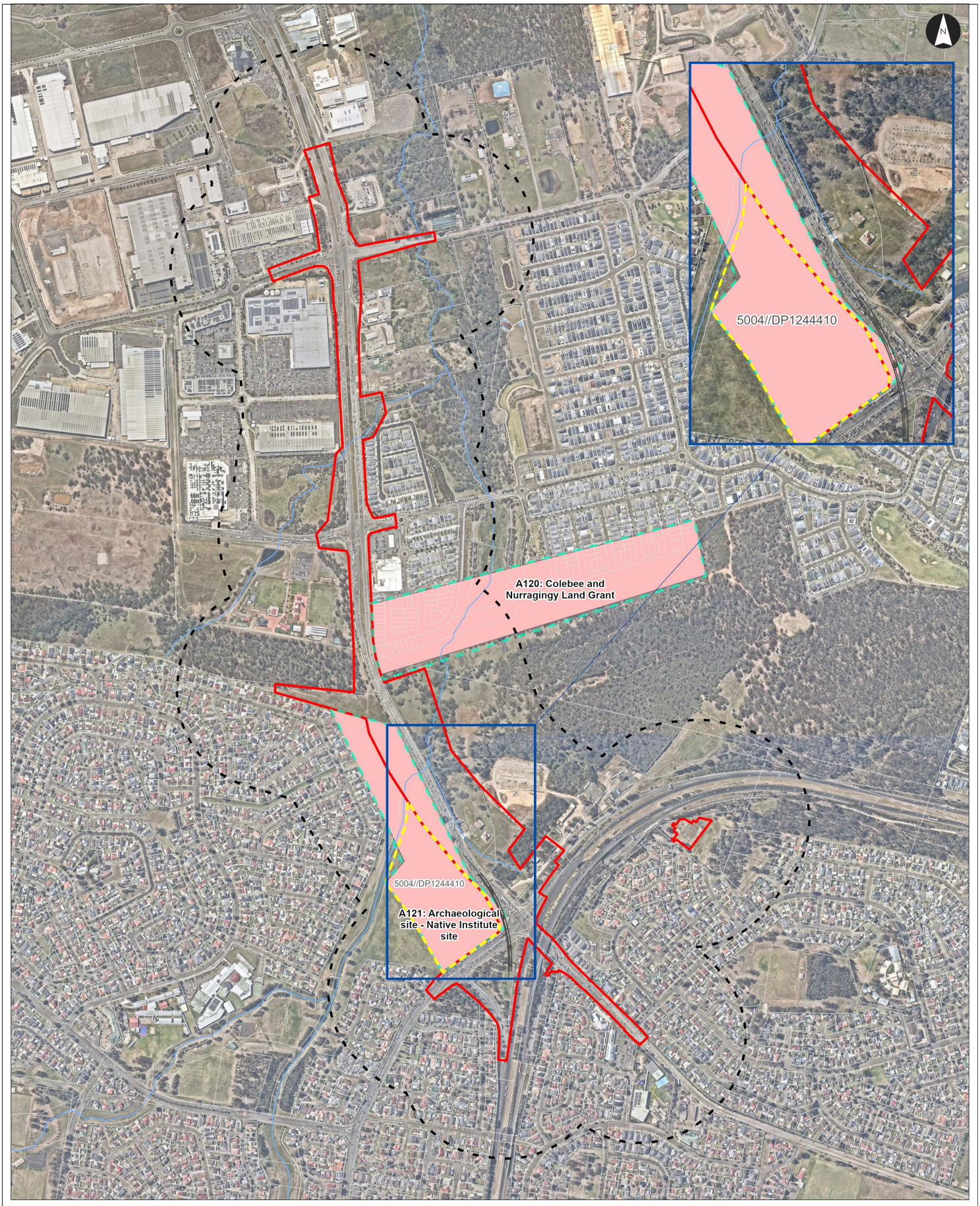


Figure 6-17: Heritage items in or adjacent to the study area

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-024
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

- REF construction boundary / SOHI study area
- 250 m Buffer
- Bridge
- Watercourse
- Cadastre
- Lot 5004 / DP1244410

LEP Items

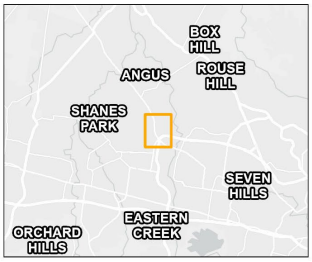
- Item - Archaeological

SHR Items

- Archaeological - Terrestrial

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (NearMap, June 2024)
2. Watercourse and Cadastre (NSW SS, 2023)
3. LEP Item (NSW DCCEEW, 2024)
4. SHR Item (NSW DCCEEW, 2024)



0 100 200 300 Metres
Scale at A3: 1:9,000

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Site inspection findings

The results from the site inspection have been broken up into geographic areas known as inspection units (IU). The results of the site inspection are summarised in Table 6-30 and the locations of the inspection units are shown in Figure 6-18.

Table 6-30 Summary of field inspection results

Inspection unit ID	Description/results	Images
IU1	IU1 is dominated by the road corridor, which consists of dual carriageways along Richmond Road and Hollinsworth Road, and a multilane single carriageway along Townson Road. The typical environment within IU1 is shown in the adjacent image. No evidence of environmental heritage items or potential archaeological resources were identified during inspection of IU1.	
IU2	The typical environment within IU2 consisted of the dual carriageway of Richmond Road and surrounding infrastructure, including footpaths and utilities services. The ground surfaces have been heavily disturbed through this area during construction of the roadway and utilities (refer adjacent image). No evidence of environmental heritage items or potential archaeological resources were identified during inspection of IU2.	
IU3	The typical environment with IU3 is characterised by the dual carriageway of Richmond Road and surrounding infrastructure, including footpaths and utilities (refer adjacent image). No evidence of environmental heritage items or potential archaeological resources were identified during inspection of IU3.	
IU4	The inspection noted cleared paddocks with overgrown vegetation fronting residential development further west. The lots inspected contain no structures and no indication of previous development. Bells Creek flows through Lot 1 DP1043661. It was noted that the creek is well vegetated with rushes and other water plants. There is a slight incline to the north along the length of the lots inspected, getting steeper towards Lot 1 DP792478.	

Inspection unit ID	Description/results	Images
	No evidence of potential environmental heritage items, former structures, or areas of archaeological potential were identified within IU4.	
IU5	IU5 was typically characterised by overgrown grassed paddocks with sparse tree coverage. There is a residence, and associated sheds situated within Lot 49 DP1104950. Ground disturbance in this area was generally from construction and agricultural activities, including ploughing and water management. IU5 also includes a portion of the 'Colbee Yard', a Transport operated materials laydown site at the corner of Richmond Road and Rooty Hill Road. Inspection in this area also included views to the Blacktown Native Institution site from the surrounding landscape, to understand potential visual impact of the proposed works. No items of environmental heritage significance or historical archaeological potential were identified within IU6.	
IU6	Only a portion of IU6 was subject to physical inspection. Pedestrian survey was undertaken along Rooty Hill Road North and Richmond Road, around the edge of the Blacktown Native Institution site (refer adjacent image). Assessment of this area was based largely on historical research and a review of historical aerial imagery. No areas of potential environmental heritage or historical archaeological potential were identified within IU6.	
IU7	IU7 was not subject to physical inspection, as the inspection unit is characterised entirely by road corridor, away from identified heritage items. Assessment of this area was based on historical research and a review of historical aerial imagery. No areas of potential environmental heritage or historical archaeological potential were identified within IU7.	
IU8	IU8 consists of a proposed construction laydown area situated within Lot 41 DP1187574. This area was not inspected due to access restrictions. Aerial imagery demonstrates that IU8 consists of an existing construction hardstand, likely concrete, which is overgrown with grass in some places. No areas of environmental heritage or historical archaeological potential have been identified within IU8 based on the review of aerial imagery and historical research.	

Figure 6-18: Location of heritage study area and inspection units

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-025
Drawn By: RA, Checked By: SM
Rev: 01 | Date: 2024-11-14

Legend

- REF construction boundary / SOHI study area
- Watercourse
- 250 m Buffer
- Cadastre

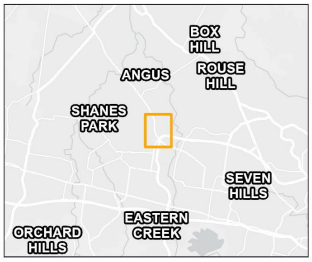
Inspection units

- IU1
- IU2
- IU3
- IU4
- IU5
- IU6
- IU7
- IU8

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (NearMap, June 2024)
2. Watercourse and Cadastre (NSW SS, 2023)

0 100 200 300 Metres
Scale at A3: 1:9,000



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Historical background

Aboriginal history

Many Aboriginal people, like other Indigenous or First Nations people around the world, have been living on Country for 'time immemorial' – that they have always been here, and their origins lie in the creation of the land and animals.

Before colonisation, Aboriginal people in the resource-rich Sydney region lived in extended family groups of about 30 to 50 people. These groups had specific territories that granted them social and economic rights and obligations. There were around 30 clans, each named after a place or resource, like the Cabro (Gabra) gal people of modern-day Cabramatta. Clan groups moved within a well-defined area according to seasonal changes and resource availability. There were also forms of more sedentary agriculture and aquaculture, and villages.

In resource-rich areas, neighbouring groups often shared boundaries and had reciprocal rights. With appropriate permission and protocols, people could travel and hunt on each other's lands. Special occasions, such as feasts, hunts, trading, and ceremonies, would see people traveling long distances, even from outside the Sydney region.

With several rivers and estuarine coastal areas, the Sydney region sustained a large population compared to more arid inland areas. People living inland across the Cumberland Plain focused on hunting small animals, gathering plants and catching freshwater fish and eels. The Sydney region was a landscape rich with the imprints of activity, art and culture such as rock engravings and paintings, scarred and carved trees, ceremonial rock and mound structures, cooking ovens, villages of bark huts, stone tool quarries, grinding grooves and tool-making sites, burial and other shell middens, and other artefacts.

The first encounters between the British colonists and the Sydney people were initially based in curiosity, with both sides attempting to comprehend each other. However, misunderstandings or transgressions of Aboriginal law and protocol soon escalated into violence and retribution.

As the Cumberland Plain became more settled in the 1800s, Aboriginal people tried to stay near their traditional lands. Some lived in the growing city of Sydney, while others lived on the outskirts in places like La Perouse and Salt Pan Creek. From the 1880s, some moved to or were forced onto reserves, such as Sackville in the north-west.

Government policies of removing Aboriginal children from their parents in order to assimilate them into white society effectively began in 1814. William Shelley proposed a plan for the education of Aboriginal people to Governor Macquarie, who established the 'Black Native Institution of NSW' at Parramatta (Parramatta Native Institution). Children were either selected, coerced, or sent by their families (until they realised visitation was only once a year). Macquarie even ordered that any children captured or orphaned during his 1816 military campaign were to be brought to the school. When Governor Macquarie returned to England in 1821 the school suffered from lack of patronage and was moved to what became known as 'the Black's Town' (present day Blacktown) in 1823.

Further information on Aboriginal history is provided in section 6.4.

Early land grants

The first European activity in the area was exploratory; however, this was shortly followed by settlement. The first land grants in the Blacktown region were located at Prospect Hill.

The establishment of roads towards Windsor and the greater Cumberland region allowed settlers to access newly allocated land. Many of these roads, including Richmond Road, were originally a series of tracks providing routes for horse drawn carts, foot traffic and cattle. Richmond Road linked the early settlements of Richmond and Blacktown. In 1816, William Cox was hired by Governor Macquarie to improve the colonial road system, including Richmond Road. By 1822 Richmond Road had been sealed with a macadam surface. These improvements further encouraged settlement of the region and several significant land grants were made.

The study area falls within the Parishes of Rooty Hill (west and south of Richmond Road) and Gidley (east and north of Richmond Road). The earliest land grants were made by Governor Macquarie from c.1816 and varied in size. Within these parishes land was granted to:

- Anthony Vitrio, 35 acres
- Colebee and Nurragingy, 35 acres
- Sylvanus Williams, 30 acres
- Robert Cartwright, 500 acres
- W. Barret, 30 acres

- Joseph McLoughlin 60 acres.

Antonio Vitrio and Sylvanus Williams were both ex-convicts who received land from Governor Macquarie (GML, 2012). Colebee and Nurragingy, two Aboriginal men, received their grant in 1816 and were the first Aboriginal people in Australia to be granted land of their choice (Colebee and Nurragingy Land Grant, 2011). Following the selection of this land grant by Nurragingy, Macquarie gave the opposite grant to Joseph McLoughlin – a police constable who knew Colebee and Nurragingy well. The adjacent grant was given to Reverend Robert Cartwright, a churchman with interest in the education of Aboriginal people and the Parramatta Native Institution (GML, 2012).

A summary of the Colebee and Nurragingy Land Grant and the Sylvanus Williams Land Grant are provided below. Further information on all the land grants and their locations are provided in Appendix F.

Colebee and Nurragingy Land Grant

Colebee and Nurragingy, two Aboriginal men, received their grant in 1816 and were the first Aboriginal people in Australia to be granted land of their choice (Colebee and Nurragingy Land Grant, 2011). Further information on the Colebee and Nurragingy is provided in section 6.4.

Sylvanus Williams Land Grant

Sylvanus Williams, a former convict turned handyman, was granted his 30 acres in 1819. Williams likely to have been selected for the grant for his ability to assist in constructing the growing Blacktown settlement. Shortly after receiving his grant, Williams was commissioned to build a log and bark roof dwelling for Nurragingy. The location of the hut is unknown, although the Windsor District map of 1842 (refer Figure 6-19) shows a small structure which may represent this hut. The location of the structure may not be accurately represented, and it is unclear whether this structure depicted in the plan is the hut constructed by Williams. There is no documentary evidence of Williams constructing other structures within his grant.

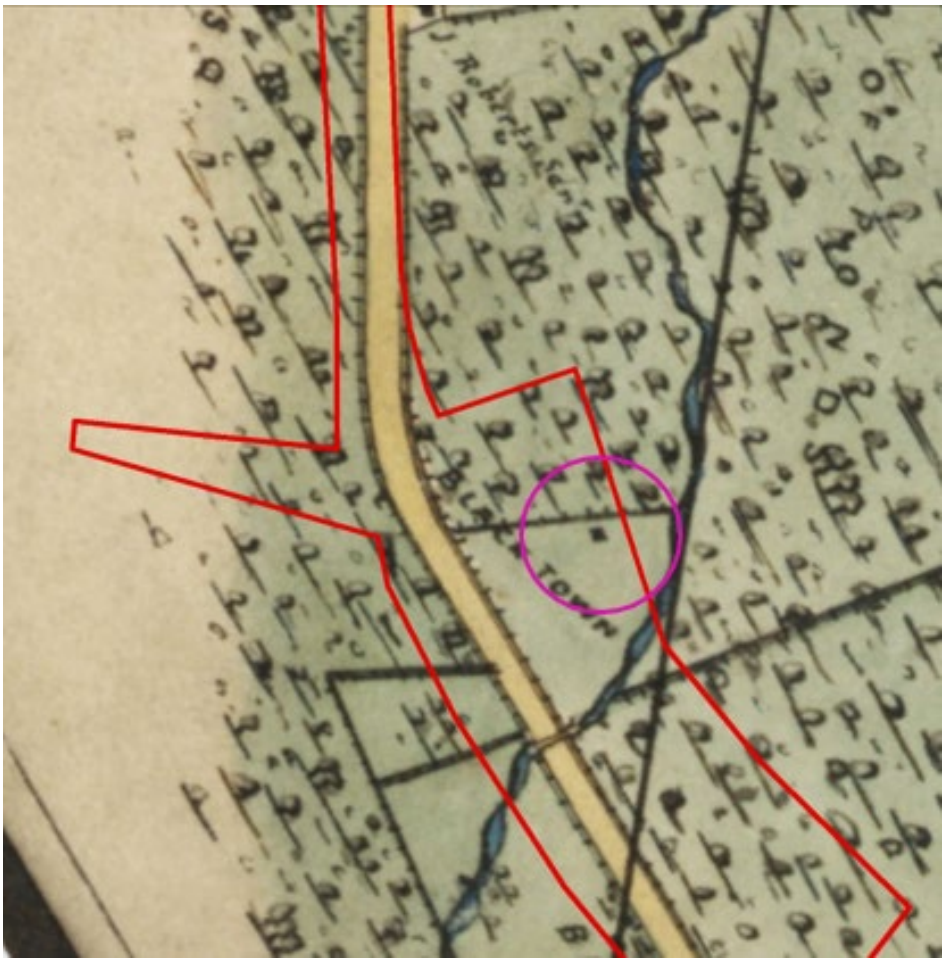

Figure 6-19 Portion of Windsor District Plan 1842 showing possible location of Nurragingy's Hut (pink) (Source: State Library NSW Z/M4 811.1122/1842/1 with Artefact markup)

Blacktown Native Institution

The proposal lies on the unceded Traditional Lands of the Dharug peoples. At the intersection of Rooty Hill Road North and Richmond Road is the Blacktown Native Institution which is an item listed on the State Heritage Register (SHR No. 01866) and the Blacktown Local Environment Plan 2015 (Item A121). The study area overlaps the curtilage of the former the Blacktown Native Institution site.

The Native Institution was established in Parramatta in 1814 by Governor Macquarie and missionary William Shelley, for the education of Aboriginal children. The establishment of the Native Institution exerted greater control over Aboriginal people and focused on changing the way in which Aboriginal people lived by promoting Christianity, British social practices, and European farming techniques.

The land granted to Colebee and Nurragingy in 1816 led to the establishment of a significant Aboriginal community on the eastern side of Richmond Road. In 1823, the Native Institution in Parramatta was relocated to land adjoining the Colebee and Nurragingy Land Grant. The proximity to the grant and the community it had formed is likely a contributing factor to establish the Blacktown Native Institution in this location.

On 1 January 1823 the Blacktown Native Institution commenced operation as the children were transferred from Parramatta to Blacktown (Blacktown Native Institution, 2011). From 1823 onwards, historical records indicate that a number of Aboriginal people were present in the area and were camping along Bells Creek in order to remain near their children who were in the Institution. Records suggest that 17 Aboriginal and five Māori children were housed at the Blacktown Institution in 1827. The Māori children were taken from the Parramatta school at Rev Marsden's persuasion (GML, 2023). It has been suggested that the school had significant difficulties maintaining 'enrolments', with children frequently removed by their parents or leaving (GML, 2018).

Several modern Dharug community members state a belief that burials of Aboriginal children occurred in unmarked graves within and surrounding the Blacktown Native Institution. There is no formal record of these burials, and no evidence of any unmarked graves has been identified to date. It has been suggested that if burials did occur, these would be most likely to be located along Bells Creek, on landforms north of Bells Creek, within the Colebee and Nurragingy Land Grant, or near the former Blacktown Native Institution buildings.

The Blacktown Native Institution remained operative until 1829. In 1833 the former Blacktown Native Institution site was advertised for sale and was purchased at auction by William Bell who renamed the property 'Epping Lodge.' William Bell died in 1843 and the property was inherited by his daughter Maria, who made improvements to the property and died in 1876.

In 1877 Epping Lodge was purchased by Sydney Burdekin, who named it Lloydhurst (Blacktown Native Institution, 2011) and expanded and altered the site. Burdekin was a prominent colonial politician and Lord Mayor of Sydney and became a member of the Aboriginal Protection Board in 1887. In 1899 Sydney Burdekin died, and the former Blacktown Native Institution site was purchased by Robert Smith, and then by Harry Woolnough in 1910 (Blacktown Native Institution, 2011).

In 1914 the Blacktown Native Institution land was subdivided into five blocks and purchased by the Wardrop family in 1920 and was used as a dairy farm until 1985 (Blacktown Native Institution, 2011). The Native Institution building was destroyed in a fire in 1924 and a fibro house was built on its ruins (Blacktown Native Institution, 2011). In 1985 the fibro house was demolished and the land was purchased by Landcom. It was intended that the land would be incorporated into a housing development, however it has remained vacant since (Blacktown Native Institution, 2011).

The Blacktown Native Institution was listed on the State Heritage Register on 18 November 2011. The land containing the former Blacktown Native Institution was returned to Aboriginal people in 2018 and is currently being managed by the Dharug Strategic Management Group (DSMG) on behalf of the Aboriginal community.

Further information is provided in Appendix E and Appendix F.

Recent history

Richmond Road and the surrounding region has been subject to considerable modification since the mid-2000s with the development of the M7 Motorway and upgrades of surrounding roads, the previous upgrades of Richmond Road and extensive residential and semi-industrial/commercial development as part of the NWGA development, including the opening of the Marsden Park homemaker centre.

Historical archaeological assessment

Archaeology is the study of human activities by recovering and analysing material remains. Based on background research and review of aerial imagery four phases of historical land use have been established for the study area as follows:

- Phase 1: Informal land use and establishment of Richmond Road (1788-1816)
- Phase 2: Formal land grants and 19th Century residences (1816-1899)
- Phase 3: Market gardening and semi-rural use (1899-1980)
- Phase 4: Suburbanisation (1980-present).

A discussion of each phase, along with a summary of the likely archaeological remains and archaeological potential associated with each phase are provided in Table 6-31. The complete archaeological assessment is outlined within Appendix F. Results of the archaeological assessment have identified nil to low potential for historical archaeological remains.

Table 6-31 Land use phasing, archaeological remains and archaeological potential of the study area

Phase	Discussion	Archaeological remains	Archaeological potential
Phase 1: Informal land use and establishment of Richmond Road (1788-1816)	• The land may have been informally used prior to the issuance of official land grants. • Richmond Road was initially established as a dirt track to Richmond, Windsor and the other settlements in the Hawkesbury. No formal survey or land clearance for the road occurred at this time. • Minor land clearance may have occurred either side of this informal roadway to allow for movement of carriages and livestock. • Minimal land clearance is likely to have occurred surrounding Richmond Road.	Tree boles, land clearance, early informal road surfaces.	Nil
Phase 2: Formal land grants and 19th Century residences (1816-1899)	• The settlement of Blacktown was established. • Richmond Road was formalised in 1816 by William Cox and later sealed in the 1820s with a Macadam surface. • Formal land grants were dedicated, including the Colebee and Nurragingy Grant, the Cartwright Grant, and the Williams Grant. • Sylvanus Williams constructed a timber hut for Nurragingy, either on this own grant or on land granted to Colebee and Nurragingy . • The Blacktown Native Institution was established in 1823 and a double storey residence was constructed on the land. • The Blacktown Native Institution land was purchased by William Bell in the 1830s and renamed 'Epping Lodge'. It was later inherited by his daughter, who made improvements to the property. • The Blacktown Native Institution land was purchased by Sydney Burdekin in the 1870s and renamed 'Lloydhurst'. The Blacktown Native Institution had ceased operations by this time.	Ephemeral evidence of nineteenth century development, including fences, timber structures, and occupation deposits associated with post-contact Aboriginal camps. Aboriginal burials associated with the use of the Blacktown Native Institution.	Low
Phase 3: Market gardening and semi-rural use (1899-1980)	• 'Lloydhurst' was traded after the death of Sydney Burdekin in 1899 and continued to operate in an agricultural capacity. • The Blacktown Native Institution buildings burned down in the early 1900s and were replaced with a fibro house. • Portions of the Colebee and Nurragingy Grant (now owned by Nurragingy's descendants, The Lock family)	Farm structures, rubbish pits, postholes.	Low

Phase	Discussion	Archaeological remains	Archaeological potential
	were resumed by the Aboriginal Protection Board. The land was used as an Aboriginal Mission. • Additional agricultural use of the land surrounding Richmond Road increased, supported by the construction of sheds and other infrastructure. • Upgrades undertaken to Richmond Road, including modern sealing. • Residential development within the surrounding lands, including on the eastern part of the former Colebee and Nurragingy Grant.		
Phase 4: Suburbanisation (1980-present)	• Richmond Road was converted to a two-lane dual carriageway in 2005 and widened to four lanes in 2011. These changes were due to the construction of the M7 Motorway and expected development of Marsden Park. • Further land clearance and disturbance occurred within the Blacktown Native Institution and the remainder of the Colebee and Nurragingy Grant. Areas remain undeveloped. • Modern light infrastructure and bulk commercial retailing centres have been established along Richmond Road at Marsden Park, leading to further road, traffic and infrastructure upgrades.	Modern infrastructure	Nil

Significance assessment

Blacktown Native Institution

The Blacktown Native Institution has heritage significance at varying levels for its historic, associative, aesthetic, social and rarity values. The SHR listing for the Blacktown Native Institution site provides the following statement of significance:

> *The Blacktown Native Institution is a site of State significance because of its combination of historical, social and archaeological values. The Blacktown Native Institution played a key role in the history of colonial assimilation policies and race relations. The site is notable for the range of associations it possesses with prominent colonial figures including Governor Macquarie, Governor Brisbane, Samuel Marsden, William Walker and Sydney Burdekin.*
>
> *The Blacktown Native Institution site is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural engagement in Australia. For Aboriginal people in particular, it represents a key historical site symbolising dispossession and child removal. The site is also important to the Sydney Māori community as an early tangible link with colonial history of trans-Tasman cultural relations and with the history of children removed by missionaries.*
>
> *The Blacktown Native Institution is a rare site reflecting early 19th century missionary activity. The site has the potential to reveal evidence, that may not be available from other sources, about the lives of the children who lived at the school and the customs and management of the earliest Aboriginal school in the colony. The site also has the potential to contain archaeological evidence relating to later phases of land use, including the period the property was owned by Sydney Burdekin. In addition, the site may contain evidence of Aboriginal camps which may provide information about how Aboriginal people, accustomed to a traditional way of life, responded to the changes prompted by colonisation.*

The assessment of heritage significance of the Blacktown Native Institution against each NSW heritage assessment criterion is provided in Appendix F.

Colebee and Nurragingy Land Grant

The Colebee and Nurragingy Land Grant has heritage significance for its historic, social and cultural values. The SHR listing for the Colebee and Nurragingy Land Grant provides the following statement of significance:

> *The Colebee/Nurragingy Land Grant is a site of state heritage significance because of its combination of historical, social and cultural values. The site was the first land grant ever given to Aboriginal people in Australia. The land grant is associated with two significant Aboriginal figures from the early colonial period-Nurragingy and Colebee- to whom the land was jointly granted in 1816. The location of the land grant is significant because it was an Aboriginal choice, being on land belonging to Nurragingy's clan. The land grant is valued by the contemporary Aboriginal community and the wider Australian community as a landmark in the history of cross-cultural engagement in Australia. For Aboriginal people, in particular, it represents a key historical site symbolising Aboriginal resilience and enduring links to the land (Godden, Mackay, Logan, 2010).*

Cultural heritage significance of the study area

Portion of study area within the Blacktown Native Institution

A portion of the study area overlaps with the SHR listed curtilages of the Blacktown Native Institution. The SHR listing and the CMP (GML, 2023) identify that the Blacktown Native Institution site is significant because of its unique combination of historical, social, and archaeological values. The cultural value of this place is well understood and articulated in existing reports.

This assessment has identified that the portion of the study area which overlaps with the Blacktown Native Institution curtilage is along the outer edge of the historical property boundary, away from the central areas of activity. It is also noted that the portion of the curtilage which overlaps the study area is within the existing road corridor, and has been previously heavily disturbed as a result of road upgrades and utility and drainage installations over time.

It is concluded that the portion of the study area overlapping with the Blacktown Native Institution would continue to meet the threshold for state significance for social, associative and historical values. The currently documented social and historical values would not be impacted by the proposed works. (Note: it is acknowledged that much of the social values of this area may not have been documented for review and therefore have not been considered as part of this significance assessment. Transport is working with DSMG to understand any culturally sensitive areas or knowledge that are currently undocumented that may be impacted by the proposal).

This portion of the Blacktown Native Institution also contains Aboriginal archaeological values, as expressed in the ACHAR report (refer section 6.4 and Appendix E). It is understood that Aboriginal archaeological remains would be impacted by the proposed works, however, intangible social and historical significance would continue to be expressed within this portion of the Blacktown Native Institution. Aboriginal archaeological values within the broader Blacktown Native Institution would also remain intact.

Although the portion of the Blacktown Native Institution within the study area has low potential to retain historical archaeological remains, if these archaeological remains were identified, they would be expected to meet the threshold for State significance.

Further information on the Aboriginal cultural values of the Blacktown Native Institution and the broader region is provided in section 6.4.2.

Portion of study area outside the Blacktown Native Institution

The assessment has shown that the portion of the study area outside the Blacktown Native Institution site contains no further listed heritage items and is unlikely to contain previous unidentified heritage values.

Archaeological significance of the study area

The value of archaeological sources primarily lies in their research potential or the ability to provide additional information about site/item that is not contained in historical records. The significance assessment of the study area's potential archaeological remains has been carried out by using the criteria as outlined in the *Assessing Significance for Historical Archaeological Sites and 'Relics'* (DoP, 2009). Descriptions of the heritage criteria are provided in Table 6-26.

The following significance assessment examines the proposal corridor holistically, including discussion of listed and non-listed portions of the study area concurrently. The assessment of significance presented in Table 6-32 addresses Phases 2 and 3 only, as Phases 1 and 4 have been determined to have nil archaeological potential. The phases assessed are:

- Phase 2: Formal land grants and 19th Century residences (1816-1899)
- Phase 3: Market gardening and semi-rural use (1899-1980).

Table 6-32 Assessment of significance for Phase 2 and Phase 3

Group	NSW Heritage criteria	Assessment (refer Appendix F for full assessment)
Archaeological research potential	E – Research Potential	Archaeological remains of road establishment and modifications within Phases 2 and 3 are unlikely to be substantially intact, and therefore they are unlikely to contribute to our understanding of early European occupation in the Blacktown region. These archaeological remains would be unlikely to reach the threshold for significance under this criterion. It is unlikely that archaeological remains associated with Phases 2 and 3 use of the Blacktown Native Institution site will be present. Archaeological remains from Phase 2 and 3 occupations of the Blacktown Native Institution would be unlikely to reach the threshold for significance under this criterion. There remains low potential for unmarked historical Aboriginal burials to be encountered in the portion of the study area along Bells Creek adjacent to Richmond Road. There is low likelihood of identifying these burials, although if human remains that could be conclusively tied to Phase 2 and 3 occupation were identified they would be of great significance to the local Aboriginal community. Historical Aboriginal burials relating to Phase 2 and 3 occupation, if identified, would meet the threshold for State significance. There is some potential for the identification of a timber structure within land granted to Sylvanus Williams, immediately south of the Colebee and Nurragingy Grant. Depending on the extent and integrity of the remains, the hut site would have potential to provide information on the history of the development of the area and the occupiers and their lifestyle. The potential timber structure would likely reach the threshold for local significance under this criterion. If evidence of post-contact Aboriginal encampments was identified outside the Blacktown Native Institution, this would reach the threshold of State significance for their probable association with the surrounding Blacktown Native Institution and Colebee and Nurragingy Grant.
Association with individuals, events or groups of historical importance	A – Historical Significance B – Associative Significance D – Social Significance	The portion of the study area that overlaps the Blacktown Native Institution is unlikely to reach the threshold for listing under this criterion. There is low potential for the identification of a timber hut on the eastern side of Richmond Road that may be associated with Nurragingy and/or Sylvanus Williams. Further detailed research is required to investigate this association. If found to be associated with Nurragingy, the remains of the timber hut would be likely to meet the threshold for State significance under this criterion.
Aesthetic or technical significance	C – Aesthetic or Technical Significance	The material remains of Phase 2 and Phase 3 within the study area and outside the Blacktown Native Institution site are unlikely to present aesthetic or technical significance. The study area is in a portion of the Blacktown Native Institution site with no historical archaeological potential. The study area is unlikely to reach the threshold for listing under this criterion.
Ability to demonstrate the past through archaeological remains	A – Historical Significance C – Aesthetic or Technical Significance F – Rarity G - Representativeness	Archaeological remains associated with Phase 2 and Phase 3 are likely to be dispersed, degraded, and not substantially intact. As such, the remains have low potential to contribute to the archaeological record and expand our understanding of early European land use of the Blacktown region. No remains of the Blacktown Native Institution site are anticipated within the study area. The study area is unlikely to reach the threshold for listing under this criterion.

Summary of significance

It is acknowledged that the study area sits partially within the curtilage of the Blacktown Native Institution, a highly significant historical and cultural site. The State significant values held in this place, demonstrated through physical remains and ongoing physical and spiritual connections to land are acknowledged.

The portion of the Blacktown Native Institution heritage curtilage site within the study area has limited potential to demonstrate these State significant values, either through standing structures or archaeological remains. If identified within the study area, remains of the Blacktown Native Institution site would be considered to be of State significance.

The portion of the study area which falls outside the Blacktown Native Institution heritage curtilage holds little cultural significance or archaeological potential. With the exclusion of the potential timber hut located east of Richmond Road, which has been assessed as being of local significance, and has the potential to be of State significance if found to be associated with Nurragingy, the study area holds no known cultural values.

6.5.3 Potential impacts

Construction

Listed heritage items

The Transport owned lot within the Blacktown Native Institution heritage curtilage (Lot 1 DP1043661) has been granted a site-specific exemption under subsection 57(1) of the *Heritage Act 1977* for road work or traffic control work. Although the proposed works generally meet the criteria of this site-specific exemption (consisting of road works and facilitating activities), it has been determined that the scope and scale of the proposed works requires additional third-party assessment and an application under section 60 of the *Heritage Act 1977* will be made. Further information is provided in section 4.2.4.

An assessment of the impacts of the proposed works on heritage items within and adjacent to the study area are provided in Table 6-33. The terminology for assessing magnitude of heritage impacts is provided in Table 6-27 and for type of heritage impacts is provided in Table 6-28.

Table 6-33 Assessment of construction heritage impact

Item name	Listing	Relationship to study area	Physical impacts*	Visual impacts*
Blacktown Native Institution	SHR No. 01866 Blacktown LEP No. A121 RNE Place ID. 159505 Transport s170 ID (unavailable)	Within (partially)	Little or no impact. Widening of the northbound lanes of Richmond Road would impact the existing informal vehicle access along Richmond Road to the site. The driveway would be relocated to Rooty Hill Road North to allow safe access and egress to and from the site. Provision of safe access to the Blacktown Native Institution would be reestablished and enhanced to ensure continued accessibility of the site to the community. There is ongoing discussion with the DSMG about the final vehicle access location along Rooty Hill Road North, however, an interim location has been included in this assessment. The new flyover, abutment walls and retaining wall proposed adjacent to the Blacktown Native Institution are in previously disturbed sections of the road corridor and would have no further adverse physical impact on the heritage item in its current form.	Minor adverse impact. The construction activities and associated construction equipment and materials would be visible from the Blacktown Native Institution site during the construction period. These activities would impact the visual amenity and aesthetics of the site. However, the impacts are considered minor as the area is already highly visually disrupted by the nearby M7 Motorway bridge, and surrounding road infrastructure. In addition, the proposal would require the removal of vegetation in proximity to the site (around Bells Creek and on the opposite side of Richmond Road at the southern end of the site). The removal of vegetation would have impacts on the community who value the natural environment including the responsibility to care for Country. Planting is proposed

Item name	Listing	Relationship to study area	Physical impacts*	Visual impacts*
			As such it is considered that the proposed works would have little to no physical impact on the existing historic plantings or physical remains of the Blacktown Native Institution within the study area. Potential impacts to known or potential archaeology are assessed below.	towards the northern end of the site in the vicinity of the proposed retaining wall and abutment for the new flyover bridge.
Colebee and Nurragingy Land Grant	SHR No. 01877 Blacktown LEP No. A120 RNE Place ID. 18986 Transport s170 ID (#4311607)	Adjacent	Little to no impact. The works would not be located within the Colebee and Nuragingy Land Grant. As the works are not within the heritage item they would and have little to no physical impacts to the item.	Little or no impact. The Colebee and Nurragingy Land Grant is a partially undeveloped parcel of rural land. Construction activities and vegetation removal would be visible from this location, however, would be limited at this location.

** Refer to Table 6-27 for terminology for assessing magnitude of heritage impacts and Table 6-28 for type of heritage impact*

In relation to potential impacts on the social significance of the Blacktown Native Institution, the need for a relocated and improved driveway access to the Blacktown Native Institution site would be agreed upon in consultation with the DSMG, with the exact location to be finalised as part of detailed design development. The primary aim of the consultation is to ensure that the new location for vehicle access minimises impacts on the social significance and heritage values of the Blacktown Native Institution to the Aboriginal community and improves accessibility and potential for appreciation.

Amenity impacts related to construction noise and vibration and air quality are discussed in sections 6.7.4 and 6.12.3, respectively.

Archaeological resources

Existing road corridor

The majority of the proposed works involve ground disturbing activities within the existing Richmond Road corridor (excluding lands within the heritage curtilage of the Blacktown Native Institution) which would be unlikely to result in impacts to archaeological resources. There is nil-low potential for the identification of former road surfaces or historical utilities within the road corridor. The immediate surrounds, consisting of areas previously subject to disturbance from road widening activities and agricultural use, also have limited archaeological potential.

No archaeological impacts are expected within the existing Richmond Road corridor (excluding lands within the heritage curtilage of the Blacktown Native Institution).

Blacktown Native Institution

Road widening works and the construction of the new bridge over Bells Creek within the Blacktown Native Institution heritage curtilage would be undertaken on land owned by Transport and zoned for road infrastructure (future road widening). The road widening and bridge construction works would include bulk earthworks, grading, and construction of road infrastructure. The proposed road widening works are limited to areas of the Blacktown Native Institution site with low historical archaeological potential. Historical archaeological potential in these areas may include identification of Aboriginal encampments and potential unmarked burials. There is not enough documentary evidence to suggest the location of these potential burials, although it is understood via verbal consultation that they are most likely to be situated in proximity to Bells Creek (not specifically within the section of Bells Creek within the study area). It is considered unlikely that impact to historical archaeological remains would result from the proposed road widening works within the Blacktown Native Institution provided the appropriate safeguards and management measures are implemented. As part of the CMP (GML, 2023) it was recommended that for any ground disturbing works within the DSMG portion of the Blacktown Native Institution site, Ground Penetrating Radar (GPR) survey could be undertaken to better understand the potential for unmarked burials. This recommendation has not been extended to the Transport owned lands within the Blacktown Native

Institution curtilage, for which the CMP recommends the application of the Transport's *Unexpected Heritage Items Procedure* (TfNSW, 2024b).

The ACHAR prepared for the proposal identified that Aboriginal objects are likely to be found near Bells Creek in the Blacktown Native Institution site on Transport owned land. Further information is provided in section 6.4 and Appendix E.

The proposed flyover would require the positioning of at least one pier footing within the Blacktown Native Institution heritage curtilage near the intersection with Rooty Hill Road North and Richmond Road (within the Transport owned portion). Construction of the pier footings is expected to require ground disturbance through excavation and auguring, which would result in impacts to the ground surface within the Blacktown Native Institution heritage curtilage. The proposed flyover is within an area of low archaeological potential, situated away from the areas of historical activity.

Similarly, the interim driveway location proposed would be entirely within the existing road corridor of Rooty Hill Road North and outside of the heritage curtilage. It would also be in an area of low archaeological potential. The proposed driveway access on Rooty Hill Road North should be located to avoid subsequent impacts to the Blacktown Native Institution site and its potential archaeological resources once extended within the DSMG owned portion of the heritage curtilage.

The proposed works within the Blacktown Native Institution site are unlikely to result in physical impacts to known or unknown archaeological resources.

East of Richmond Road

Road widening works and construction compounds on the eastern side of Richmond Road may result in impacts to potential archaeological remains associated with a timber hut on the Williams grant. This structure, which is poorly documented in maps and plans, may represent a small dwelling commissioned for Nurragingy and constructed by Williams. Further detailed research and mapping needs to be undertaken to understand the potential impact of proposed works on this structure. It is recommended that this research be undertaken as part of the detailed design, to ensure the most accurate mapping is considered.

The proposed works east of Richmond Road are likely to result in physical impacts to potential archaeological resources, including the unknown timber hut on the Williams grant.

Assessment against relevant polices

An assessment of the proposal against the relevant policies with the following management plans has been undertaken:

- *Dharug Nura: Blacktown Native Institution Conservation Management Plan (Draft Report)* (GML, 2023)
- *Blacktown Council Development Control Plan* (Blacktown City Council, 2015).

Results of the assessment are provided in Appendix F.

Operation

The operational impacts of the proposal are outlined in Table 6-34. The terminology for assessing magnitude of heritage impacts is provided in Table 6-27 and for type of heritage impacts is provided in Table 6-28.

Amenity impacts related to operational noise and vibration and air quality are discussed in sections 6.7.4 and 6.12.3, respectively.

Table 6-34 Assessment of operational heritage impact

Item name	Listing	Relationship to study area	Physical impacts*	Visual impacts*
Blacktown Native Institution (SHR No. 01866)	SHR No. 01866 Blacktown LEP No. A121 RNE Place ID. 159505 Transport s170 ID (unavailable)	Within (partially)	Little to no impact. Operation of the proposal would not impact non-Aboriginal heritage as ground disturbance and excavation would be restricted to the construction phase.	Moderate adverse impact. The proposed works would require the widening of the northbound lanes of Richmond Road, a new road bridge over Bells Creek that matches the low profile scale of the existing bridge and relocation of the existing vehicle access. The works associated with the widened roadway and relocated driveway is

Item name	Listing	Relationship to study area	Physical impacts*	Visual impacts*
			The Transport owned lot within the Blacktown Native Institution heritage curtilage (Lot 1 DP1043661) has been granted a site-specific exemption under subsection 57(1) of the *Heritage Act 1977* for road work or traffic control work (refer section 4.2.4 for further information). Future maintenance works within this lot could be undertaken under this exemption where the works are consistent with the exemption.	negligible in the scale of the larger Blacktown Native Institution site. The proposed interim relocated driveway access in an area which is mostly open grass area and would not require the removal of significant landscape elements. Works in this area would be low-lying ground works and would not alter the open views across the Blacktown Native Institution. The exact location of the driveway would be subject to further discussion and consultation with DSMG to minimise impacts to the Blacktown Native Institution as part of detailed design development and may be subject to further assessment. Changes to this area would result in little to no visual impacts to the setting and visual amenity of the site. The new flyover and abutment retaining wall are to be constructed at the southern end of the Blacktown Native Institution site in an area that is already highly visually disrupted by the nearby M7 Motorway bridge, and surrounding road and telecommunication infrastructure (road carriageways, overhead traffic light booms, light poles, mobile phone tower). The new flyover and retaining wall would contribute further to the disruption of the setting and visual amenity of the Blacktown Native Institution site in this highly modified section of the item. The scale and positioning of the flyover and associated retaining wall would be highly visible within the significant cultural landscape, sitting directly within the horizon view of the site. The site's landscape character and setting would be impacted by this development and would further impact long-range views and vistas. Overall, it is considered that the impact of the proposed flyover and associated retaining wall would have a moderate adverse visual impact.
Colebee and Nurragingy Land Grant (SHR No. 01877)	SHR No. 01877 Blacktown LEP No. A120 RNE Place ID. 18986 Transport s170 ID (#4311607)	Adjacent	Little to no impact. Operation of the proposal would have not direct physical impacts to the Colebee and Nurragingy Land Grant.	Little to no impact. The works would not be located within the Colebee and Nurragingy Land Grant and would not impact the overall setting of item. The works would create further alteration to a substantially altered vista, and therefore are considered to have an overall little to no visual impacts to the item.

** Refer to Table 6-27 for terminology for assessing magnitude of heritage impacts and Table 6-28 for type of heritage impact*

6.5.4 Safeguards and management measures

Table 6-35 outlines the non-Aboriginal heritage safeguards and management measures to be implemented by the proposal.

Table 6-35 Non-Aboriginal heritage safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
NAH1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared and implemented as part of the CEMP. It would provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage during construction.	Contractor	Detailed design / Pre-construction
NAH2	Non-Aboriginal heritage	If unexpected heritage items are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the *Unexpected Heritage Items Procedure* (TfNSW, 2024b) must be followed.	Contractor	Construction
NAH3	Non-Aboriginal heritage	Consultation with relevant stakeholders, including relevant parties for the Colebee and Nurragingy Land Grant would be undertaken during detailed design.	Transport	Detailed design
NAH4	Non-Aboriginal heritage	Consultation would continue with DSMG throughout detailed design and construction. DSMG input would be sought on: • the location and design of the interim and potential permanent driveway relocation • the opportunity to include cultural interpretations or design into the proposed road infrastructure (i.e. the flyover bridge or abutments) • the opportunity for culturally sensitive and locally indigenous plantings within the road corridor • the opportunity for the proposal to support the proposed development of the Blacktown Native Institution site in accordance with the *Vision for Country* (COLA, 2024) • the ongoing development of the Connecting with Country assessment.	Transport	Detailed design
NAH5	Non-Aboriginal heritage	Consultation with the Sydney Māori community would be undertaken as part of the REF exhibition and continue throughout detailed design as appropriate.	Transport	Detailed design
NAH6	Non-Aboriginal heritage	An opportunity for inclusion of culturally sensitive design and interpretation would be considered throughout detailed design to minimise the visual impacts from the Blacktown Native Institution site in consultation with the DSMG. These opportunities would align with relevant Heritage Council guidelines and the CMP for the site (GML, 2023).	Transport	Detailed design
NAH7	Non-Aboriginal heritage	Further archaeological investigations would be undertaken during detailed design to minimise potential impacts on the archaeological resource on the eastern side of Richmond Road, south of the Colebee and Nurragingy Land Grant and within the Sylvanus Williams grant.	Transport	Detailed design
NAH8	Non-Aboriginal heritage	An application for an approval under section 60 of the *Heritage Act 1977* would be prepared. The section 60 application would include the Aboriginal archaeological salvage works being undertaken in accordance with an Aboriginal Heritage Impact Permit under section 90 of the *National Parks and Wildlife Act 1974*.	Transport	Detailed design

6.6 Property and land use

6.6.1 Existing environment

The proposal is bordered by the suburbs of Marsden Park, Glendenning, Dean Park, Hassall Grove, and Colebee. The broader area comprises industrial, business, semi- rural and residential land uses with further residential development occurring in the vicinity.

The northern section of the proposal is bordered by industrial and large commercial areas on the western side of the road corridor. This area is part of the Sydney Business Park and includes large scale commercial (such as Bunnings and Ikea) and 'Home Maker' type facilities. Also in this area is the Baitul Huda Mosque, which has access from Hollinsworth Road. On the eastern side of the Richmond Road corridor, near the proposal, is predominantly low to medium density residential properties, which are part of recent land releases in the past 10-15 years. A grocery facility is also present on the corner of Alderton Drive and Richmond Road. Some commercial properties are also located on this side at the northern extent of the proposal.

The land adjacent to the southern section of the proposal is currently less developed and more open space/semi-rural properties. This area includes a large section of land reserved for the future Castlereagh Corridor (see information below) which is currently remnant bushland. On the eastern side of the road corridor there is a large private property which is semi-rural property which has been vacant until recently when it was purchased for a landscaping business, as well as a number of utility service properties. On the western side is the Blacktown Native Institution land, which is currently a large open space, which is bordered by low density residential properties further to the west. At the very southern extent of the proposal is the M7 Motorway corridor and low density residential properties bordering both sides of the Richmond Road corridor.

Land use zones

Existing land use zones in and surrounding the construction boundary are defined by the *Blacktown Local Environmental Plan 2015* and the *State Environmental Planning Policy (Precincts – Central River City) 2021.* The land zones are shown in Figure 6-20 and include:

- SP2 Infrastructure along the existing Richmond Road, Rooty Hill Road North, M7 Motorway corridors and the proposed Castlereagh Connection corridor
- R2 Low density residential and R3 Medium density residential within the suburbs of Glendenning, Dean Park, Hassall Grove, and Colebee
- RU4 Primary production small lots to the south on the eastern side of Richmond Road and to the north of Townson Road
- B5 Business development on the either side of Richmond Road associated with Sydney Business Park and other commercial areas
- E1 Local Centre at the Richmond Road / Alderton Drive intersection associated with the local Greenway village in Colebee
- C2 Environmental Conservation including open space associated with the Bells Creek corridor
- C3 Environmental Management including open space associated with the Blacktown Native Institution site
- IN2 Light Industrial at the northern side of the Richmond Road / Hollinsworth Road intersection which includes a home improvement store and other industrial properties
- RE1 Public Recreation in the vicinity of Mittigar Reserve.

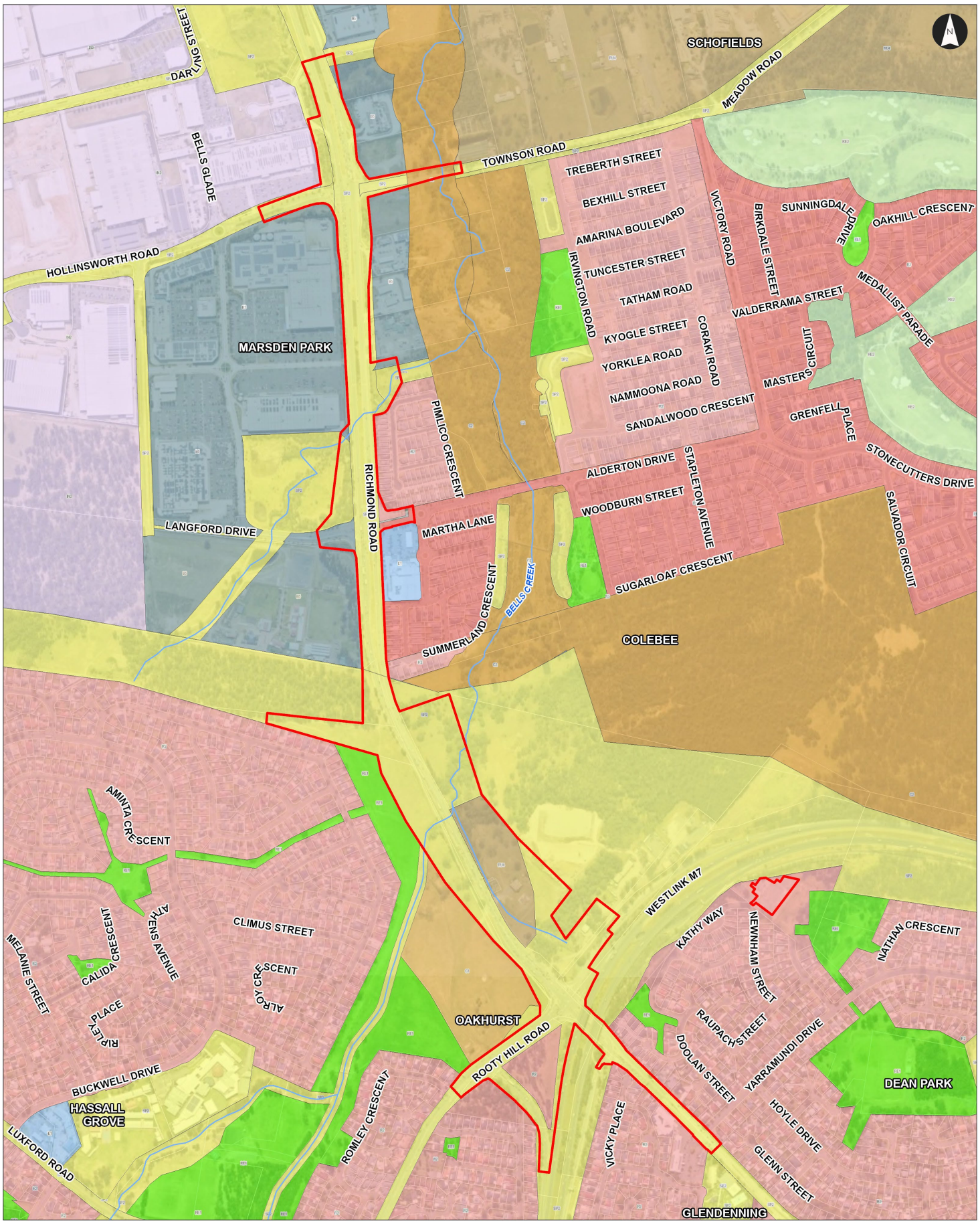

Figure 6-20: Land use zoning

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-008
Drawn By: RA, Checked By: AS
Rev: 01 | Date: 2024-11-14

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Legend

- Construction boundary
- Watercourse
- Cadastre

Land use zoning

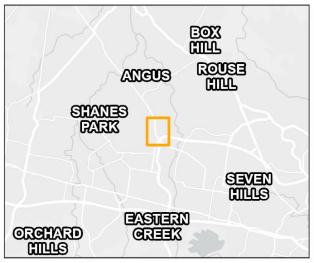
- C2 - Environmental conservation
- C3 - Environmental Management
- B5 - Business development
- E1 - Local centre
- IN2 - Light industrial
- R2 - Low density residential
- R3 - Medium density residential
- RE1 - Public recreation
- RE2 - Private recreation
- RU4 - Primary production small lots
- SP2 - Infrastructure

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sep 2024)
2. Watercourse (NSW SS, 2023)
3. Land use zoning (Blacktown LEP 2015) (NSW DPHI, 2017)
4. Precincts - Central River City (DPE, 2022)

0 100 200 300 400 Metres

Scale at A3: 1:7,500



Future land uses

North West Growth Land Use and Infrastructure Implementation Plan

As noted in section 2.1, part of the construction boundary is identified in the *North West Growth Land Use and Infrastructure Implementation Plan* (DPE, 2017) as part of the infrastructure commitments of the area. Over the next ten years, 33 000 homes will be provided to accommodate around 92,400 people.

The northern section of the proposal is located within the North West Growth Area (NWGA), within the Marsden Park Industrial Precinct. The construction of the proposal would serve as a corridor for easy connection, as the volume of people driving to industrial and employment generating activity in Sydney Park Business Park and Marsden Park Industrial area is anticipated to remain high. The proposal would also link Rouse Hill Town Centre to Marsden Park, with Richmond Road being a main entry road into the growth area.

Blacktown Native Institution

The Blacktown Native Institution area, is an area with deep historical connections with the Aboriginal community and is listed under the State Heritage Register (refer section 6.5). This area is an open space which is owned by the DSMG and is being managed as an area for Aboriginal cultural connection and practices. While currently it is mostly open grass lands with a creekline running through, the DSMG and Aboriginal community have plans to establish this area as an important Connecting with Country area that can be used by the Aboriginal community for a variety of purposes. Currently vehicles access to this site is via an informal access off Richmond Road just south of Bells Creek.

The *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024) is a visioning document that seeks to articulate a sense of place, to continue practices of belonging and connecting through healing, learning and supporting environmental relationships and custodianship. The aspirations of the traditional knowledge-holders and Elders of the DSMG and the local Dharug community include the ultimate layout of the site including design of the edge condition (impacted by the proposed road upgrade). The proposed design for the Blacktown Native Institution site includes:

- a series of nodes that are connected by walking trails, situated within varying ecological areas, providing opportunities for training and education
- new accessible entrance on Rooty Hill Road North with signage
- development of cultural assets on site including a cultural centre and permanent dance circle
- enhancement of biodiversity of the site and beyond with open Dharug eucalyptus woodland forests with grassy understorey
- turfed and/or closed forest berm in the south-east corner to provide a noise and visual barrier to site.

Castlereagh Connection corridor

The Castlereagh Connection corridor would provide for a future motorway within Western Sydney to service its fast growing population. The corridor is located between the Bells Line of Road at Kurrajong Heights and the existing motorway network at the junction of Richmond Road with the M7 Motorway at Colebee. The proposal overlaps with the Castlereagh Connection Corridor. The Corridor crosses over Richmond Road in the vicinity of the Summerland Crescent in the middle of the construction boundary before connecting into the M7 Motorway.

Baitul Huda Mosque

Baitul Huda Mosque is in close proximity to the proposal, located less than 150 metres on the north-west side of the Richmond Road / Alderton Drive / Langford Drive intersection. The Baitul Huda Mosque serves as the national headquarters of the Ahmadiyya Muslim Association Australia (AMAA). There are plans to house hotel or motel accommodation at the site.

Utilities

There are a number of existing water, sewer, electrical, gas and communication utilities within the construction boundary. The asset owners and asset types include (a full list is provided in Table 6-38):

- Sydney water: water main, sewer mains and sewer pump station
- Endeavour Energy: high voltage powerlines
- Jemena: high pressure gas main
- Telstra: telecommunications conduit
- Amplitel: telecom tower.

6.6.2 Potential impacts

Pre-construction

The proposal has been designed and developed to minimise property acquisitions and prioritise the use of Transport owned land. However, full acquisition of one property and partial acquisition of two properties would be required as outlined in Table 6-36. The locations of these properties are shown in Figure 3-16 and Figure 3-17.

Table 6-36 Property acquisition

Lot / DP	Name	Assumed ownership	Description of impact	Land zoning (land use)	Acquisition required (Full or Partial)	Approximate area to be acquired (m2)
Lot 49 / DP1104950	717 Richmond Road, Colebee	Private property	Rural lot containing a residential house, shed and cleared lands. Full acquisition of this property would accommodate the road widening and the open flooding channel.	RU4 Primary production small lots (rural / residential)	Full acquisition	25,134
Lot 2 / DP1198299	Richmond Road, Marsden Park	Blacktown City Council	An area of drainage infrastructure associated with the culvert under Hollinsworth Road. Partial acquisition of this property would accommodate the proposed left turn slip lane from Hollinsworth Road onto Richmond Road northbound.	SP2 Infrastructure (Drainage channel)	Partial acquisition	1572
Lot 101/ DP1169158	Bunnings Marsden Park	Private property	Large format hardware and garden center retail chain. Partial acquisition of this property would accommodate the proposed left turn slip lane from Hollinsworth Road onto Richmond Road northbound. There would be no impact to existing car park.	SP2 Infrastructure and IN2 Light Industrial (road verge / frontage)	Partial acquisition	625

Partial acquisition of Lot 49 / DP1104950 was initially proposed for the road widening and open flooding channel, however, partial acquisition of this property would result in substantial division of the existing property limiting useability of the land by the owner. As such, Transport has offered a full acquisition of this property. Design options were considered for the drainage channel to be located on Transport land, however, this was not feasible.

The triangular parcel of land currently located between the M7 Motorway, the M7 Richmond Road exit ramp and Rooty Hill Road north would become road corridor making up the start of the new flyover bridge. Currently this land is owned by Transport but is zoned as R2 – low density residential. While the purchasing of this land is not required, an internal process would be undertaken to assign this land to the proposal and would be rezoned as SP2 preventing future development of this site into residential properties.

The land acquisition process has commenced and is being carried out in accordance with *the Land Acquisition (Just Terms Compensation) Act 1991* and supporting NSW Government *Land Acquisition Reform 2016* and *Land Acquisition Information Guide* (RMS, 2014). The land uses identified in Table 6-36 would be partially or fully changed to infrastructure as a result of the proposal. This would lead to an overall increase in land used for roads and associated drainage.

The acquisition process would be completed prior to construction. Other property adjustments such as relocation of boundary fences and accesses would be undertaken during construction as outlined in the section below. The socio-economic impacts affected through property acquisition are detailed in section 6.10.

Construction

Direct impacts on land use during construction would mainly relate to the short-term presence of work within the construction boundary and use of the three ancillary sites as detailed in section 3.4. All proposed ancillary facilities would be located on land owned by Transport. Should additional areas be required for construction during detailed design, any lease agreements and temporary impacts would be identified and assessed if required. All sites would be rehabilitated to pre-existing conditions.

Impacts to adjacent land uses during construction, such as temporary noise pollution and amenity impacts are discussed in section 6.7 and section 6.10, respectively.

Property access / adjustments

The businesses that are currently accessed directly from Richmond Road would continue to have direct access during the construction phase. These businesses include:

- Driveway access via Chiswick Glade: McDonald's Drive Thru, Shell
- Ampol Foodary Marsden Park, Boost Juice - Ampol Marsden Park, Dominos Pizza Marsden Park, KFC Marsden Park, AmpCharge Charging Station
- Driveway access via Service Station Access Way: Starbucks Marsden Park, Strive Fitness (24/7 Smart Gym) Marsden Park, Oporto Marsden Park Drive Thru, 7-Eleven Marsden Park, BP Truckstop Wildbean Café
- Blacktown Nursery and Landscape Supplies
- Blacktown Native Institution – DSMG owned land.

Final staging and any temporary adjustments to access during the construction period would be determined during detailed design. Further details on the impacts of the temporary changes to access as a result of construction of the proposal are detailed in section 6.1.3.

A number of properties located on Richmond Road would require new and/or modified driveways to accommodate the road widening (this includes adjustments to the properties that would be fully or partially acquired). Details of the adjustments to access and other property impacts (such as fencing) are outlined in Table 6-37. The locations of these properties are shown in Figure 3-16 and Figure 3-17. The property adjustments would be made at the start of the Stage 1 or Stage 2 works.

Table 6-37 Property adjustments

Lot / DP	Name	Assumed ownership	Description of impact
Lot 5004 / DP1244410	Blacktown Native Institution	DSMG	See detail below.
Lot 50 / DP1104950	Plumpton Sewage Pumping Station SP0394	Sydney Water	A sewage pumping station. The road widening would impact the existing driveway access. A new access would be provided at the same location as the existing.
Lot 101 / DP1109052	Colebee Yard, Richmond Road Colebee	Transport	NSW Government property used primarily as a works depot. The boundary of the property would be adjusted, and a new property fence, gate and driveway access (in the same location as existing) would be provided.

Lot / DP	Name	Assumed ownership	Description of impact
Lot 49 / DP1104950	717 Richmond Road, Colebee	Private property	Rural lot containing a residential house, shed and cleared lands. Adjustments to the existing fence, gate and driveway access would be required.
Lot 2 / DP1198299	Richmond Road, Marsden Park	Blacktown City Council	An area of drainage infrastructure associated with the culvert under Hollinsworth Road. Adjustments to the existing culvert, pedestrian fence and maintenance access gate would be required.
Lot 101/ DP1169158	Bunnings Marsden Park	Private property	Large format hardware and garden center retail chain. Adjustments to the boundary fence line.

Blacktown Native Institution

Currently vehicle access to the Blacktown Native Institution owned site is via an informal access across the road shoulder (where the kerb and guttering ends) located on Richmond Road just south of Bells Creek. The proposed widened road corridor would be constructed over this area, and due to safety issues around its location and lane configuration on the widened road corridor, the access needs to be relocated.

Due to the nature of the road corridor adjacent to the Blacktown Native Institution site, it is not possible to reinstate vehicle access to this site on Richmond Road at all. Therefore, options are being considered for an alternative permanent access. Transport is currently working with DSMG and Blacktown City Council to consider options and develop plans for the best location for a permanent access. This is likely to be on Rooty Hill Road North, although no other options have currently been discounted. The design and construction of the permanent access point is therefore not included as part of this REF and additional assessment would be required under relevant sections of the EP&A Act.

However, vehicle access to this site would be disrupted at the beginning of construction of the southern portion of the proposal, effectively cutting off vehicle access. Therefore, in order to maintain access to this site as a minimum a temporary access driveway needs to be provided. As part of the concept design included in the REF, this access is currently proposed on Rooty Hill Road North north of the M7 Motorway Rooty Hill Road North off-ramp. It would provide for left in and left out only vehicle access to this site during construction and until such times as a permanent solution can be provided. This location was chosen due to a number of road safety concerns along Rooty Hill Road North, including (but not limited to) proximity to the off-ramp signalised intersection, location of bus stops on Rooty Hill Road North and access to existing facilities within the Blacktown Native Institution site. As part of this assessment, this temporary driveway access would be limited to the existing road corridor with no proposed construction works occurring within the Blacktown Native Institution land.

The relocation of this driveway may result in a minor increase in time travelling to the site by the community depending on the direction which they are coming from/to. This relocation provides for the ongoing existing operation and use of this site by the Aboriginal community. The design and construction of this temporary access would be further developed in consultation with the DSMG, and would be constructed prior to the closure of the existing access on Richmond Road.

Further, the design and location of the permanent access and any ancillary facilities for this site would be developed in consultation with the DSMG.

Utilities

The proposal where possible would avoid impact on utilities, protect utilities in existing locations and if needed, relocate the impacted utility.

Table 6-38 lists the utilities type and owners within the construction boundary, along with the proposed treatment for identified impacts. For any utilities where potential for relocation has been identified, further consultation with utility asset owners would be carried out during detailed design. Should utility adjustments require work outside of the construction boundary and vegetation clearing limits, additional environmental assessment may be required prior to the commencement of work.

Table 6-38 Utility adjustment

Asset owner	Asset type	Location	Treatment type (retention, relocation or protection)
Sydney Water	W001 – DN450 trunk water main	Eastern verge of Richmond Road north from the Rooty Hill Road North intersection to the northern limit of works.	Relocation to new western footpath on Richmond Road where impacted.
Sydney Water	W008 – DN150 reticulation water main	Western verge of Richmond Road from 200 m south of the Rooty Hill Road North intersection to 200 m north.	Relocation to new footpath on western verge before crossing to eastern verge.
Sydney Water	S001 – DN 300 gravity sewer main	Surrounding the Bunnings site between Hollinsworth Road and Richmond Road.	Retention within the proposed roadworks.
Sydney Water	S003 – DN300 sewer transfer main	Pipes pass underneath Richmond Road north of Bells Creek for the Quakers Hill Transfer Sewer.	Retention within the proposed roadworks.
Sydney Water	S005 – DN300 gravity sewer main	Runs from SP0394 within Richmond Road before exiting on the eastern verge and crossing the M7 on-ramp.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S007 – OD560 sewer rising main	Runs along the eastern verge of Richmond Road from Yarramundi Drive to the Plumpton Sewage Pumping Station.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S008 – DN450 sewer rising main	Located on the eastern side of Richmond Road between Yarramundi Drive and the Plumpton Sewage Pumping Station, including transversely crossing the northbound M7 Motorway southbound on-ramp.	Relocation to the eastern verge of Richmond Road from the Rooty Hill Road North intersection to the Plumpton Sewage Pumping Station.
Sydney Water	S011 – SP0394 sewer pump station	Located on the eastern side of Richmond Road at the Plumpton Sewage Pumping Station.	Retention of existing pump station and relocation of affected mains.
Sydney Water	S013 – DN900 Gravity Sewer Main	Transversely crosses Richmond Road from west to east connecting to the Plumpton Sewage Pumping Station.	Protection.
Endeavour Energy	E002 – 11kV high voltage cables	Runs along the western side of Richmond Road from 150 m north of the intersection of Rooty Hill Road North to the northern limit of works.	Relocation to the western side of the road corridor.
Endeavour Energy	E006 – 11kV high voltage cables	Runs from Hollinsworth Road / Townson Road intersection before crossing Richmond Road and heading west down the northern verge of Hollinsworth Road.	Relocation outside of the proposed roadworks.
Endeavour Energy	E021 – HV & LV Power Supply	Runs up the M7 Motorway southbound-on ramp and continues north along the eastern verge until 115 m north of the Richmond Road / Rooty Hill Road North intersection.	Relocation to the eastern verge of Richmond Road.
Jemena	G004 – DN150 secondary gas main (high pressure)	Located within in the verge, and below Richmond Road, between Yarramundi Drive to Townson Road.	Relocation of around 350 metres of the main to the eastern verge of Richmond Road. Rest of gas main to be retained.

Asset owner	Asset type	Location	Treatment type (retention, relocation or protection)
Jemena	G010 – DN150 secondary gas main	In the median of the southern side of Richmond Road between Rooty Hill Road North and the M7 Motorway southbound on-ramp.	Protection.
Telstra	C005 – Telstra conduit bank	Located within Richmond Road from Yarramundi Drive to the intersection of Richmond Road and Hollinsworth Road.	Relocation to the verges of Richmond Road.
Amplitel	C041 – Amplitel Telecom Tower	Northern corner of Richmond Road / Rooty Hill Road North intersection, roughly 115 m up Richmond Road.	Retention as outside the primary works zone.

Operation

Land use viability

The majority of the proposed road upgrades are located within the existing Richmond Road corridor and is zoned as such and is owned by Transport.

Approximately 27, 331 square metres of land would be acquired for operation of the proposal. The land zones impacted by acquisition are: RU4 Primary production small lots (rural / residential), SP2 Infrastructure (Drainage channel) and IN2 Light Industrial (road verge / frontage) as outlined in Table 6-36. This land use would change to infrastructure as a result of the proposal, leading to an overall increase in land used for road and associated drainage infrastructure.

The remainder of the road upgrade would be undertaken on land zoned SP2 Infrastructure (Classified Road), with exception of the following:

- the existing road reserve traverses small areas of land zoned B5 Business Development, R2 Low density residential and R3 Medium density residential at the intersection of Richmond Road / Langford Drive and Alderton Drive. The proposed works in this area would be undertaken within the existing road reserve.
- the triangular section of land between the M7 Motorway and Rooty Hill Road North is zoned R2 Low density residential. The proposed flyover bridge would extend into this area.

These operational impacts occur directly adjacent to the existing Richmond Road and M7 Motorway road infrastructure and affect small portions of land outside the SP2 zoning.

Future land uses

There would be no property acquisition of the Blacktown Native Institution land owned by the DSMG. The final location of a permanent access to the Blacktown Native Institution would be confirmed during further consultation with the DSMG and Blacktown City Council with reference to their future plans for this site. Potential opportunities for the proposal to express a connection to Country both in the landscape (e.g. plantings) and for new structures (e.g. artwork integration) with reference to future plans for the Blacktown Native Institution site are considered in section 6.9.

The Castlereagh Connection corridor has been kept clear to future-proof the design and construction of the Castlereagh Connection project. No permanent structures would be constructed in the corridor and median widths have been altered to accommodate future turning lanes if required. Design levels have been maintained to not alter any previous investigations or studies into the Castlereagh Freeway.

6.6.3 Safeguards and management measures

Table 6-39 lists the property and land use safeguards and management measures that would be implemented by the proposal.

Table 6-39 Property and land use safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
PL1	Property acquisition	All property acquisition would be carried out in accor*dance with the Land Acquisition Information Guide* (RMS, 2014) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	Transport	Pre-construction
PL2	Property adjustment	Property access and adjustments for properties impacted by the proposal would be developed in consultation with affected property owners.	Transport	Detailed design
PL3	Property adjustment	Ongoing consultation with properties affected by fencing adjustment, access and other infrastructure would be undertaken.	Contractor	Pre-construction
PL4	Change in land use value during construction	Compound and ancillary facilities would be decommissioned, and the sites rehabilitated to their existing condition or as otherwise agreed with the landowner as soon as possible.	Contractor	Construction
PL5	Changes to property access	Undertake early consultation and regularly communicate with affected landowners and residents where temporary property access changes would be required.	Contractor	Pre-construction
PL6	Blacktown Native Institution property access	The temporary access to the Blacktown Native Institution site would be constructed and opened prior to the closure of the existing access in order to maintain ongoing vehicle access to the site throughout construction.	Contractor	Construction
PL7	Blacktown Native Institution property access	The design and location of the temporary access would be further developed in consultation with DSMG.	Transport	Detailed design
PL8	Blacktown Native Institution property access	No direct impacts to the Blacktown Native Institution curtilage for the construction of the access are permitted, without further assessment and consultation with the DSMG and the NSW Heritage Office.	Transport	Detailed design
PL9	Blacktown Native Institution property access	The location and design of a permanent access to the Blacktown Native Institution would be subject to further assessment and is to be developed in consultation with the DSMG and Blacktown City Council with reference to their future plans for this site.	Transport	Detailed design

6.7 Noise and vibration

A Noise and Vibration Assessment has been carried out to assess the potential noise and vibration impacts during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix G.

6.7.1 Methodology

The assessment has been prepared with reference to the following guidelines and polices:

- *Construction Noise and Vibration Guideline (Roads)* (CNVG-R) (TfNSW, 2023e)
- *Interim Construction Noise Guideline* (ICNG) (DECC, 2009)
- *Assessing Vibration – A Technical Guideline* (AV:ATG) (DEC, 2006)
- *NSW Road Noise Policy* (RNP) (DECCW, 2011)
- *Road Noise Criteria Guideline* (RNCG) (TfNSW, 2023h)
- *Road Noise Mitigation Guideline* (RNMG) (TfNSW, 2024c)
- *Road Noise Model Validation Guideline* (RNMVG) (TfNSW, 2022e)
- *Noise Policy for Industry* (NPfI) (EPA, 2017).

Study area

The operational noise study area was determined in accordance with the RNCG. The adopted operational noise study area includes all sensitive receivers located within a minimum of 600 metres of the proposal. Receivers were identified using aerial photography, GIS databases and information gathered from site visits.

For the assessment of construction noise, the study area was divided into eight noise catchment areas (NCAs) where sensitive receivers are likely to experience similar acoustic environments.

Figure 6-21 shows the operational noise study area and the NCAs.

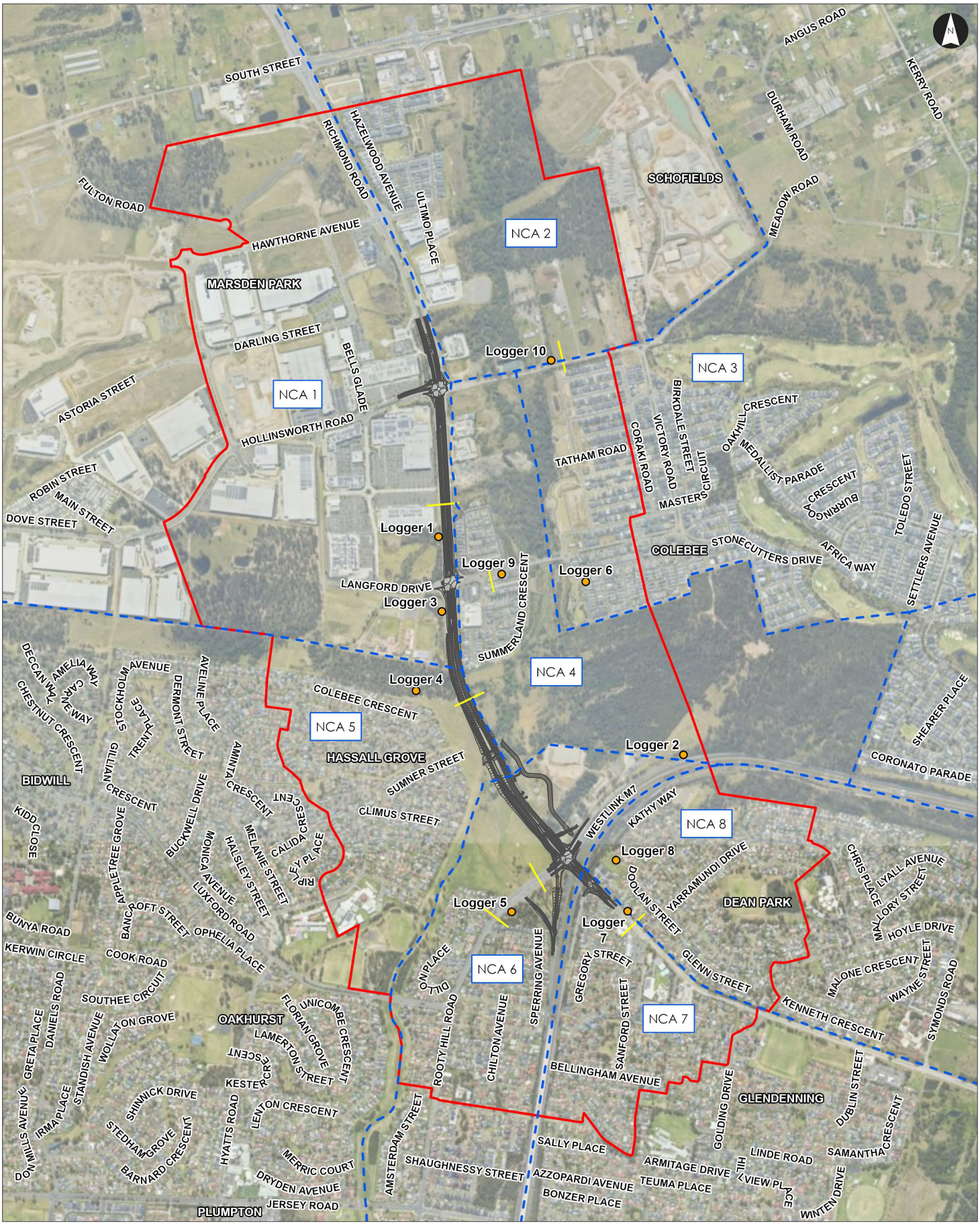


Figure 6-21: Noise catchment areas / logger locations

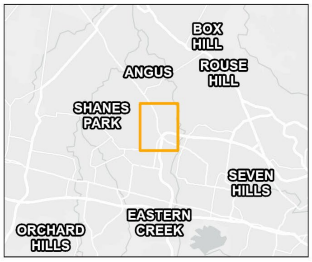
Richmond Road Upgrade between M7 Motorway and Townson Road

Legend

- Noise study area
- Logger
- 80% Design Freeze
- Traffic counts
- NCA

Notes:
1. Map displayed in GDA2020 MGA Zone 56

Reference:
1. Aerial imagery (Metromap, Sep 2024)



0 150 300 450 600 750 Metres

Scale at A3: 1:13,000

Project Code: 305001173-EN-GS-016
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

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Existing ambient noise environment

The assessment involved carrying out background noise monitoring and simultaneous traffic counts to quantify the background environment, develop relevant noise criteria and validate the noise model.

Noise monitoring and traffic counts were undertaken between 27 February and 7 March 2024 at 10 locations near the proposal as shown in Figure 6-21. All monitoring was conducted in accordance with Australian Standard *AS2702 – 1984, Acoustics-Methods for the Measurement of Road Traffic Noise* and Australian Standard *AS1055 – 2018 Acoustics – Description and Measurement of Environmental Noise*. Short term attended monitoring was carried out during the installation and collection of the noise monitors to observe the acoustic environment at the logging location.

Construction noise assessment

The construction noise assessment involved the following:

- Identifying sensitive receivers and NCAs.
- Establishing the construction noise and vibration assessment criteria for the proposal based on monitored data.
- Identifying the likely construction activities and corresponding sound power levels.
- Developing a model to predict the potential noise impacts on the surrounding sensitive receivers and comparing against the construction noise management levels and sleep disturbance criteria.
- Screening assessment to determine whether construction traffic is predicted to increase existing traffic noise levels by more than 2dB(A).
- Assessing the potential construction vibration impacts to sensitive receivers.
- Identifying mitigation measures where required.

Operational noise assessment

The operational noise assessment involved the following:

- Establishing the noise study area in accordance with the RNCG.
- Establishing the operational noise assessment criteria based on land uses and road classifications.
- Identifying current and predicted traffic volumes for year of opening (2028) and design year (2038).
- Developing a traffic noise model (SoundPLAN 8.2) to predict noise for the baseline assessment year (2024), opening year (2028) and design year (2038) for both build and no build options.
- Verifying the traffic noise model.
- Predicting operational road traffic noise impacts, without mitigation, for the year of opening (2028) and the design year (2038) for the day (7am-10pm) and night-time periods (10pm-7am).
- Identifying receivers that qualify for consideration of mitigation measures, such as a noise wall or at property treatments.

6.7.2 Existing environment

Sensitive receivers

A noise receiver refers to premises that are sensitive to noise and require protection. The noise sensitive receivers located near the proposal can be grouped into residential and non-residential receivers. Around 2600 receivers were identified within the study area and consist largely of:

- low to medium density residential dwellings
- primary school, high school, and childcare centres
- commercial and industrial properties.

Noise catchment areas (NCAs) are groups of sensitive receivers that are likely to experience similar acoustic environments. The eight NCA's adopted for the proposal and a description of the sensitives receivers in each are described in Table 6-40. The locations of the NCAs are shown in Figure 6-21.

Table 6-40 Noise catchment areas (NCAs) and sensitive receivers

NCA	Representative background monitoring location	Approximate number of receivers	Description / sensitive receivers
1	Logger 1	2	Mainly commercial and industrial land uses, including a mosque and a child care centre. No residential or other noise sensitive receivers identified.
2	Logger 10	155	Two storey medium density residential dwellings with a small number of rural residential dwellings. The remainder of the catchment area consists of bushland and industrial/commercial uses.
3	Logger 6	417	Single and two storey low to medium density residential dwellings. Includes a childcare centre.
4	Logger 9	164	Single and two storey low to medium density residential dwellings. The remainder of the catchment area consists of bushland and a shopping centre.
5	Logger 4	511	Single and two storey low density residential dwellings. Includes a primary school, high school, and childcare centres.
6	Logger 5	444	Single and two storey low density residential dwellings. Includes a childcare centre.
7	Logger 8	474	Single and two storey low density residential dwellings. Includes childcare centres, two primary schools, and sports fields.
8	Logger 8	488	Single and two storey low density residential dwellings. Includes a childcare centre, a primary school, and sports fields.

Background noise levels

The measured noise level results from the noise monitoring loggers are presented in Table 6-41. The table also highlights which loggers were used to determine representative background noise levels for each NCA.

Attended noise measurements were carried out during the installation and collection of the noise monitors to observe the acoustic environment at the logging locations. The dominant noise sources observed during the attended measurements included traffic from Richmond Road, M7 Motorway, Rooty Hill Road North and local roads. Full results are provided in Appendix G.

Table 6-41 Measured noise levels

Logger*	Measured Environment	Location	Measured noise levels, dB(A)				
			$L_{Aeq, 15hr}$ 07:00-22:00	$L_{Aeq, 9hr}$ 22:00-07:00	Rating Background Level (RBL)		
					Day 07:00-18:00	Evening 18:00-22:00	Night 22:00-07:00
1	Road traffic noise	Langford Park	68	66	52	52	43
2	Road traffic noise	Westlink M7	65	62	59	53	46
3	Road traffic noise / Background NCA 1	45 Hollinsworth Road	67	65	58	56	48
4	Background NCA 5	Colebee Reserve	54	51	46	48	42

Logger*	Measured Environment	Location	Measured noise levels, dB(A)				
			$L_{Aeq, 15hr}$ 07:00-22:00	$L_{Aeq, 9hr}$ 22:00-07:00	Rating Background Level (RBL)		
					Day 07:00-18:00	Evening 18:00-22:00	Night 22:00-07:00
5	Road traffic noise / Background NCA 6	Rooty Hill Road North	62	59	53	53	44
6	Background NCA 3	3 Sugarloaf Crescent	53	53	42	42	41
7	Road traffic noise	6 Shipton Place	69	65	55	54	46
8	Background NCA 7 & NCA 8	8 Cedarwood Grove	56	53	49	46	43
9	Road traffic noise / Background NCA 4	20 Alderton Drive	63	58	47	45	42
10	Road traffic noise / Background NCA 2	35 Townson Road	61	57	46	45	44

**Note: Loggers 4, 6 & 8 were installed for the assessment of background noise levels only, they are not utilised in the assessment of operational road traffic noise (i.e. the measured L_{Aeq} noise levels are not relevant). The remaining loggers were set to record both road traffic noise and background noise levels or just road traffic noise levels.*

6.7.3 Criteria

Construction noise criteria

The *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) defines standard construction hours, where the majority of the works are to occur, as:

- Monday to Friday: 7am-6pm
- Saturday: 8am-1pm
- No work on Sundays or public holidays.

The CNVG-R further defines the out of hours works (OOHW) as follows:

- OOHW Period 1: Mon – Fri (6pm–10pm), Sat (7am–8am & 1pm–10pm), Sun/Public Holiday (8am–6pm)
- OOHW Period 2: Mon – Fri (10pm–7am), Sat (10pm–8am), Sun/Public Holiday (6pm–7am).

The ICNG provides guidance for assessing construction noise impacts. The noise management levels (NML) for residential receivers are derived from the existing background noise levels, or rating background levels RBL, with the relevant criteria applied in accordance with the ICNG for work during recommended standard hours and work outside these hours. Table 6-42 identifies the methodology applied in the development of NMLs for residential receivers.

Table 6-42 Noise at residents using quantitative assessment (DECC, 2009)

Time of day	Management level, $L_{Aeq(15min)}$	How to apply
Recommended standard hours: Monday to Friday: 7am to 6pm Saturday: 8am to 1pm: No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2. (of the guideline).

Notes:

1. *For Residential receivers - Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence.*
2. *Other sensitive use receivers - Internal noise levels are to be assessed at the centre of the occupied room. External noise levels are to be assessed at the most affected point within 50 metres of the area boundary.*

Based on the measured rating background noise levels from Table 6-41 and the NCA in section 6.7.2, the applicable noise management levels (NMLs) for the proposal are outlined in Table 6-43.

Table 6-43 Construction noise management levels (NMLs) – Residential premises

NCA	Noise management level, dB(A)				Sleep disturbance L_{Amax} Mon-Sun: 10pm to 7am
	Standard hours (RBL + 10)	Outside standard hours (RBL + 5)			
	Day Mon-Fri: 7am to 6pm Sat: 8am to 1pm	Day Sat: 1pm to 6pm Sun: 7am to 6pm	Evening Mon-Sun: 6pm to 10pm	Night Mon-Sun: 10pm to 7am	
2	56	51	50	49	65
3	52	47	47	46	65
4	57	52	50	47	65
5	56	51	51*	47	65
6	63	58	58	49	65
7-8	59	54	51	48	65

** In accordance with the Noise Policy for Industry (NPfI) (EPA, 2017), in cases where the RBL for the evening time is greater than the daytime, it is generally recommended that noise management level for the evening be set at no greater than the noise management level for the daytime.*

Other sensitive receivers

Several non-residential land uses have been identified in the study area. Based on the ICNG NMLs for non-residential receivers, the receivers in Table 6-44 have been identified.

Table 6-44 Construction noise management levels (NMLs) – Other noise sensitive land uses

Receiver	Management level, $L_{Aeq(15min)}$[1]
Schools/Education	
Glendenning Public School	External noise level 55dB(A)[2]
St. Francis of Assisi Primary School	
William Dean Public School	
St Clare's Catholic High School	
Hassall Grove Public School	
Places of worship	
Baitul Huda Mosque	External noise level 55dB(A)[2]
Active recreation	
Glendenning Reserve (sports field and tennis courts)	External noise level 65dB(A)
Joe McAleer Park	
Western Raptors Rugby Club	
Baitul Huda Mosque sports fields	
Passive recreation	
Blacktown Native Institution Site	External noise level 60dB(A)
Community centres	
Glendenning Neighbourhood Centre	External noise level 55dB(A)[2]
Hassall Grove Neighbourhood Centre	
Industrial premises	External noise level 75dB(A)

Receiver	Management level, $L_{Aeq(15min)}$[1]
Offices, retail outlets	External noise level 70dB(A)
Childcare	
Kinda-Mindi Early Learning Centre	External noise level 45dB(A) (sleep areas)[2] External noise level 50dB(A) (play areas)[2]
Busy Bees Long Day Care	
Kids' Early Learning Dean Park	
Bright Beginnings Learning Centre	
Goodstart Early Learning Oakhurst	
Kids' Early Learning Hassall Grove	
Prepare Early Education Centre Greenway Village	
Great Beginnings Marsden Park	
Young Academics Early Learning Centre	

[1] *Applies when premises are in use*
[2] *A conservative difference between outside and inside of 10dB applied.*

Sleep disturbance

Appendix E of the CNVG-R provides indicative sleep disturbance distances for various plant and construction scenarios. Receivers located within these distances are at risk of sleep disturbance. The sleep disturbance distances are based on achieving a construction noise impact of 65 dBA L_{AMax} or less at a façade with an open window.

Construction traffic

For Transport projects, an initial screening test if first applied by evaluating whether noise levels would increase by more than 2dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2dBA or less then no further assessment is required. Where noise levels increase by more than 2dBA further assessment is required based upon RNCG.

Construction vibration criteria

Vibration from construction activities associated with the proposal could potentially impact on the amenity of the occupants of dwellings or buildings located close to the construction works. Generally, vibration impacts can be summarised into two categories:

- Effect on human comfort
- Structural or cosmetic damage to buildings.

The CNVG-R provides a framework for the assessment of vibration during the construction phase of a project. It provides recommended minimum separation distances between vibration intensive plant and sensitive receivers for minimising the risk of cosmetic damage. The CNVG-R states that the minimum working distance for both cosmetic damage (refer *British Standard 7385*) and human comfort (AV-ATG) must be complied with at all times, unless otherwise approved by Transport or under the environmental licence as relevant. The minimum working distances are summarised in Table 6-45.

Table 6-45 Recommended minimum work distances for vibration intensive plant from sensitive receivers

Plant item	Rating/description	Minimum working distance (metres)		
		Cosmetic damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (OH&E Vibration Guideline)
Vibratory roller	< 50 kN (Typically 1-2 tonnes)	5 m	14 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	16 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	33 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	41 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	54 m	100 m
	> 300 kN (> 18 tonnes)	25 m	68 m	100 m
Small hydraulic hammer	(300 kg - 5 to 12t excavator)	2 m	5 m	7 m
Medium hydraulic hammer	(900 kg – 12 to 18t excavator)	7 m	19 m	23 m
Large hydraulic hammer	(1600 kg – 18 to 34t 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)	40 m	4 m
Jackhammer	Hand Held	1 m (nominal)	2 m	2 m

Operational noise criteria

Operational road traffic noise has been assessed in accordance with the *Road Noise Policy* (RNP) (DECCW, 2011). The *Road Noise Criteria Guideline* (RNCG) (TfNSW, 2023h) provides guidance on the implementation of the RNP.

The RNP and RNCG provide non-mandatory criteria for residential and 'other sensitive' land uses. Where a proposal results in road traffic noise levels which are predicted to be above the criteria, the proposal should investigate feasible and reasonable noise mitigation measures to minimise the impacts.

For the purposes of the noise assessment, the Richmond Road and adjoining roads are classified 'freeway/arterial/sub-arterial roads', and consists of 'redeveloped' road segments, where works are in the existing road corridor and the existing road is not substantially realigned. The relevant noise criteria for residential receivers are shown in Table 6-46.

Table 6-46 RNP (DECCW, 2011) Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq, (15\ hour)}$ 55 (external)	$L_{Aeq, (9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	$L_{Aeq, (15\ hour)}$ 60 (external)	$L_{Aeq, (9\ hour)}$ 55 (external)
	3. Existing residences affected by noise from a transition zone between new and redeveloped roads	$L_{Aeq, (15\ hour)}$ 55 - 60 (external)	$L_{Aeq, (9\ hour)}$ 50 - 55 (external)
Local roads	4. Existing residences affected by noise from new local road corridors	$L_{Aeq, (1\ hour)}$ 55 (external)	$L_{Aeq, (1\ hour)}$ 50 (external)

Road category	Type of project/land use	Assessment criteria, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
	5. Existing residences affected by noise from redevelopment of existing local roads 6. Existing residences affected by additional traffic on existing local roads generated by land use developments		

The applicable criteria for non-residential sensitive receivers are shown in Table 6-47.

Table 6-47 RNP (DECCW, 2011) Road traffic noise assessment criteria for other sensitive land uses

Existing sensitive use	Location	*Assessment criteria, $L_{Aeq(1hr)}$ dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
School classrooms	External (when in use)	50	-
Playgrounds	External (when in use)	55	-
Places of worship	External (when in use)	50	50
Open space (active use)	External (when in use)	60 ($L_{Aeq,15hr}$)	-
Childcare (sleeping rooms)	External (when in use)	45	-
Childcare (indoor play areas)	External (when in use)	50	-
Childcare (outdoor play areas)	External (when in use)	55	-

**It is generally accepted that most buildings provide a noise reduction of at least 10 dB(A) when windows are left 20 per cent open. Therefore, where the noise goals are specified as internal in the RNCG, a 10 dB(A) reduction from external to internal noise levels has been adopted to allow an external assessment. For the above receivers, further investigation will be required to determine whether the internal noise levels at project completion comply the above criteria.*

Relative increase criteria

In addition to the assessment criteria outlined in Table 6-46, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development is required to be considered.

The RNCG states that residences experiencing increases in total traffic noise level above the relative increase criteria shown in Table 6-48 should also be considered for mitigation. For other existing sensitive land uses as outlined in Table 6-47 the relative increase criteria should be applied to the respective $L_{Aeq,(period)}$ for that land use type, except for open space. For road projects where the main subject road is a local road, the relative increase criterion does not apply.

Table 6-48 Relative increase criteria

Road category	Type of project/land use	Total traffic noise increase, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial roads and transit ways	New road corridor/redevelopment of existing* road/land use development with the potential to generate additional traffic on existing road	Existing $L_{Aeq,\ (15\ hour)}$ + 12 dBA (external)	Existing $L_{Aeq,\ (9\ hour)}$ + 12 dBA (external)

** 'existing' traffic noise level refers to the level from all road categories which would occur for the relevant 'no build' option. Where the existing $L_{Aeq,\ (period)}$ road traffic noise level is found to be less than 30 dBA, it is deemed to be 30 dBA.*

Consideration for mitigation

The *Road Noise Mitigation Guideline* (RNMG) (TfNSW, 2024c) provides guidance on managing and controlling road traffic generated noise and describes the principles to be applied when reviewing noise mitigation.

Noise predictions were used to assess the increase in noise levels from the proposal. The RNMG provides three triggers where a receiver may qualify for consideration of noise mitigation (beyond the adoption of road design and traffic management measures). These are:

- The predicted noise level exceeds the RNCG controlling criterion and the noise level increase due to the proposal is greater than 2 dBA.
- The predicted noise level is 5 dBA or more above the criteria and the receiver is significantly influenced by proposal road noise, regardless of the incremental impact of the project.
- The noise level contribution from the proposal is acute (daytime 65 dB or higher, or night-time 60 dB or higher) then it qualifies for consideration of noise mitigation even if noise levels are dominated by another road.

6.7.4 Potential impacts

Construction

Construction scenarios

To provide an indicative assessment of construction noise impact, a noise model was created for each of the construction scenarios outlined in Table 6-49. The corresponding activities in each scenario are provided in Table 3-3. The adjusted sound power level (SWL) for each construction scenario is provided in Table 6-49 which has been calculated from an indicative list of plant and equipment for each scenario needed to build the proposal. These are typical of any major road construction site and are outlined in Appendix G.

Table 6-49 Construction scenarios and sound power levels

Scenario number	Construction phase	Adjusted total sound power level (SWL) dB(A)
Scenario 1	Mobilisation and site establishment	115
Scenario 2	Installation of erosion and sediment controls	120
Scenario 3	Relocation and protection of existing services	119
Scenario 4	Surface preparation	120
	Earthworks	
	Drainage	
Scenario 5	Road pavement construction	121
Scenario 6	Bridge construction	116
Scenario 7	Finishing works	115
	Site clean-up	

[1] *The Adjusted Total SWL considers an estimate of operating time and number of each plant item over a 15-minute period based on typical construction activities, as opposed to the total cumulative impact of all the listed plant operating simultaneously, which is highly unlikely to occur in reality.*

Construction noise

The predicted construction noise impacts are based on the SWLs presented in Table 6-49. These SWLs consider an estimate of the operating time and number of each plant item over a 15-minute period based on typical construction activities. However, the predicted impacts are likely an overestimation as even works within each scenario would be staged/staggered with plant and equipment spread out over the work site i.e. not all plant would be in use and not all plant would be located at the closest point to receivers. Therefore, during typical works, the noise impacts are likely to be less than those modelled.

Table 6-50 presents an approximation of the number of residential receivers affected by each construction scenario for each NCA. These numbers are provided as an indicative guide, as the number of affected receivers may vary depending on the situation occurring e.g. type of plant/equipment in use, location of activity, additional screening etc. The table includes 'Standard hours' and 'Out of Hours Works Period 2' (OOHW2, night) to present best-case and worst-case time periods

respectively. The number of affected receivers for any works during the 'Out of Hours Works Period 1' (OOHW1) would fall within the 'Standard hours' and 'OOHW2' range presented in the table. Noise contour maps of the predicted noise levels are provided in Appendix G.

Table 6-50 Predicted number of residential properties affected by construction noise impacts

NCA	Perception	Approximate number of residential receivers						
		Construction scenarios						
		1	2	3	4	5	6	7
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 2	Noticeable	0	1	0	1	1	0	0
	Clearly audible	0	0	0	0	0	0	0
	Moderately intrusive	0	0	0	0	0	0	0
	Highly intrusive	0	0	0	0	0	0	0
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 2	Noticeable	0	3	1	3	5	0	0
	Clearly audible	0	0	0	0	0	0	0
	Moderately intrusive	0	0	0	0	0	0	0
	Highly intrusive	0	0	0	0	0	0	0
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 3	Noticeable	0	173	105	173	235	0	0
	Clearly audible	0	0	0	0	4	0	0
	Moderately intrusive	0	0	0	0	0	0	0
	Highly intrusive	0	0	0	0	0	0	0
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 3	Noticeable	0	236	174	236	325	0	5
	Clearly audible	0	4	0	4	18	0	0
	Moderately intrusive	0	0	0	0	0	0	0
	Highly intrusive	0	0	0	0	0	0	0
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 4	Noticeable	13	18	21	18	25	0	33
	Clearly audible	4	73	71	73	77	0	59
	Moderately intrusive	0	32	41	32	38	0	30
	Highly intrusive	0	23	13	23	24	0	5
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 4	Noticeable	8	12	16	12	6	0	19
	Clearly audible	15	57	60	57	52	0	70
	Moderately intrusive	0	57	56	57	67	0	48
	Highly intrusive	0	36	31	36	39	0	9
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 5	Noticeable	61	128	108	128	139	12	55
	Clearly audible	30	72	69	72	84	3	29

NCA	Perception	Approximate number of residential receivers						
		Construction scenarios						
		1	2	3	4	5	6	7
	Moderately intrusive	15	11	3	11	15	0	0
	Highly intrusive	10	0	0	0	0	0	0
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 5	Noticeable	110	162	157	162	248	45	115
	Clearly audible	65	162	118	162	183	15	67
	Moderately intrusive	19	27	25	27	31	0	6
	Highly intrusive	11	0	0	0	0	0	0
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 6	Noticeable	5	14	17	14	20	2	21
	Clearly audible	4	29	24	29	30	2	15
	Moderately intrusive	0	2	1	2	2	0	2
	Highly intrusive	0	4	4	4	5	0	0
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 6	Noticeable	24	76	60	76	88	38	26
	Clearly audible	16	45	42	45	43	19	34
	Moderately intrusive	4	24	22	24	29	0	12
	Highly intrusive	0	5	4	5	6	0	0
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 7	Noticeable	2	21	20	21	30	18	17
	Clearly audible	0	22	20	22	24	0	11
	Moderately intrusive	0	6	3	6	6	0	5
	Highly intrusive	0	11	11	11	12	0	7
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 7	Noticeable	5	114	106	114	106	12	69
	Clearly audible	3	39	34	39	52	25	26
	Moderately intrusive	0	14	11	14	19	0	7
	Highly intrusive	0	12	12	12	12	0	10
Standard hours: Mon - Fri (7am-6pm), Sat (8am-1pm), Sun/Pub Hol (Nil)								
NCA 8	Noticeable	0	96	80	96	90	6	22
	Clearly audible	0	38	31	38	48	3	20
	Moderately intrusive	0	5	5	5	4	0	3
	Highly intrusive	0	13	13	13	13	0	10
Out of Hours Works Period 2 (OOHW2): Mon - Fri (10pm-7am), Sat (10pm-8am), Sun/Pub Hol (6pm-7am)								
NCA 8	Noticeable	1	114	116	114	111	70	92
	Clearly audible	0	130	119	130	136	12	52
	Moderately intrusive	0	20	19	20	19	3	9

NCA	Perception	Approximate number of residential receivers						
		Construction scenarios						
		1	2	3	4	5	6	7
	Highly intrusive	0	13	13	13	16	0	10

Based on the results in Table 6-50, *Scenario 5: Road pavement construction* is generally predicted to affect the greatest number of receivers with receivers located within approximately 60 metres of these works at risk of being highly noise affected. Table 6-50 shows that the NMLs are likely to be exceeded for all construction scenarios during all time periods to varying extents.

Table 6-51 presents the predicted noise impacts from construction activities to non-residential receivers located within the study area. Predicted exceedance of the relevant noise management level (NML) is shown in red.

Table 6-51 Predicted construction noise impacts – Non-residential receivers

Receiver	NML, dB(A)	Predicted construction noise level, dB(A)						
		Construction scenario						
		1	2	3	4	5	6	7
Schools/Education								
Glendenning Public School	55	26	40	39	40	41	29	35
St. Francis of Assisi Primary School	55	39	57	56	57	58	45	52
William Dean Public School	55	21	32	31	32	33	29	27
St Clare's Catholic High School	55	43	50	49	50	51	44	45
Hassall Grove Public School	55	37	44	43	44	45	38	39
Places of worship								
Baitul Huda Mosque	55	64	72	71	72	73	41	67
Active recreation								
Glendenning Reserve (sports field and tennis courts)	65	29	41	40	41	42	34	36
Joe McAleer Park	65	25	35	34	35	36	30	30
Western Raptors Rugby Club	65	43	50	49	50	51	44	45
Baitul Huda Mosque sports fields	65	53	74	73	74	75	39	69
Passive recreation								
Blacktown Native Institution Site	60	60	75	75	75	75	74	72
Community centres								
Glendenning Neighbourhood Centre	55	31	41	40	41	42	34	36
Hassall Grove Neighbourhood Centre	55	40	42	41	42	43	37	37
Offices, retail outlets								
Retail outlets fronting/backing onto Richmond Road	70	45	80	79	80	81	34	75
Childcare								
Kinda-Mindi Early Learning Centre	50	34	47	46	47	48	40	42
Busy Bees Long Day Care	50	29	71	70	71	72	44	66
Kids' Early Learning Dean Park	50	22	32	31	32	33	26	27

Receiver	NML, dB(A)	Predicted construction noise level, dB(A)						
		Construction scenario						
		1	2	3	4	5	6	7
Bright Beginnings Learning Centre	50	35	49	48	49	50	41	44
Goodstart Early Learning Oakhurst	50	21	27	26	27	28	19	22
Kids' Early learning Hassall Grove	50	39	42	41	42	43	37	37
Prepare Early Education Centre Greenway Village	50	39	49	48	49	50	37	44
Great Beginnings Marsden Park	50	36	53	52	53	54	31	48
Young Academics Early Learning Centre	50	27	49	50	49	50	25	44

The majority of predicted exceedances for non-residential receivers are expected for locations fronting or backing onto Richmond Road, adjacent to the proposed construction works. Minor exceedances may also be predicted for receivers located further back from Richmond Road where construction works at intersections extend into side roads.

Sleep disturbance

A review of the noise monitoring data indicates that residential receivers located near Richmond Road are already affected by maximum noise impacts of greater than 65dB(A) during the night time period, likely related to existing road traffic. The approximate offset distances for each construction scenario for night-time works are presented in Table 6-52.

Table 6-52 Approximate distance from construction works to receiver – Sleep disturbance L_{Amax} 65 dB(A)

Time	Approximate distance from construction works to receiver (metres)*						
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7
Night-time 10pm – 7am (Mon-Sun)	90	180	180	140	180	90	125

**The offset distances are based on direct line of sight or minimal screening to the construction works. These distances may be increased where residential receivers are heavily screened by other buildings or structures.*

Construction traffic noise

A screening assessment was conducted to determine whether traffic associated with construction is predicted to increase existing traffic noise levels by more than 2dB(A). The assessment considered the three ancillary sites proposed as part of the proposal (refer Figure 3-15 for locations and section 3.4 for further details):

- Site 1: Richmond Road
- Site 2: M7 Motorway (adjacent to Rooty Hill Road North)
- Site 3: Adjacent to Newnham Street.

Sites 1 and 2

Based on the existing high traffic volumes on the surrounding road network, any predicted increase in traffic noise levels would be due to the increase in the percentage of heavy vehicles as a result of these compounds. Based on the high traffic volumes on the surrounding road network, the number of heavy vehicles associated with each site (1 and 2) during the daytime period (7am-10pm) would need to average over 400 trucks per hour per compound to increase traffic noise levels by more than 2dB(A). Similarly, for the night-time period (10pm-7am), the number of heavy vehicles associated with each compound would need to be over 120 truck movements per hour per compound during the night-time period. Given the nature of this construction proposal, these volumes of heavy vehicles are highly unlikely.

Site 3

The site is proposed to be used for staff parking and site offices, with no heavy vehicle access. Therefore, any predicted increase in traffic noise levels would be due to the increase in overall traffic volumes on the local road network as a result of the site access. Based on the estimated daily traffic volumes for the quietest section of the access route (i.e. Newnham Street) and the cumulative noise impact from the M7 Motorway during the lowest Leq(1hr) period, approximately 12

vehicles movements during any one hour of the night-time period could increase noise levels by more than 2dB(A). Given the proposed 24-hour use of the compound, these traffic volumes could be reached especially during the busiest one-hour periods (e.g. shift changes). Therefore, a further assessment would be required in accordance with RNCG for the Newnham Street compound.

Construction vibration impacts

For the purposes of this assessment, the following proposed plant with the potential to generate the most vibration have been considered:

- Bored piling
- Rollers and compactors
- Pneumatic drilling
- Excavating equipment
- Loaded truck movements.

Construction vibration levels vary depending on the distance from the equipment in use, the energy level imparted to the ground by the construction process, and the bedrock type. The highest vibration sources associated with the construction work would be piling, and vibratory rollers and compactors. The minimum working distance for vibration intensive plant from sensitive receivers is listed in Table 6-45.

The minimum working distances are indicative and will vary depending on the particular item of plant, local geotechnical conditions and the dominant frequency of the construction vibration levels. They apply to cosmetic damage of typical light-framed residential buildings and heritage/fragile buildings and assume that construction vibration could include low frequency content with associated increased risk of cosmetic damage. Contour maps showing the minimum working distances for cosmetic damage for the largest plant and equipment are shown in Appendix G.

For high vibration sources, vibration monitoring is recommended to confirm the minimum working distances at specific site locations. Additionally, further detailed analysis based on the frequency dependent guideline vibration levels in BS7385-2:1993 and DIN4150-3:2016 may be utilised in conjunction with site-specific measurements to derive alternative cosmetic damage objectives and minimum working distances.

Furthermore, it is also recommended that the contractor undertakes a Before You Dig Australia (BYDA) search to determine the location of any underground services that may be sensitive to vibration impacts.

Heritage structures

The adjacent Blacktown Native Institution (SHR No. 01866) heritage site contains archaeological remains and structures and therefore may potentially be impacted by construction vibration. If works are proposed at less than safe working distances in Table 6-45 for heritage listed items, specialist advice should be sought from an appropriately qualified structural engineer who is familiar with heritage structures to support any proposed relaxation of the initial cosmetic damage screening criterion.

Operation

Operational road traffic noise impacts, without mitigation, have been assessed for the year of opening (2028) and the design year (2038). Tabulated results of the predicted operational road traffic noise impacts at receivers and the corresponding noise contour maps are presented in Appendix G.

Overall, the proposal is not predicted to increase traffic noise levels by more than 2 dBA at the assessed receiver locations. However, due to pre-existing high traffic noise levels from roads within the study area the predicted traffic noise levels mean up to 109 residential receiver locations are predicted to qualify for the consideration of mitigation. The number is summarised as follows:

- NCA 4 – 56 Receiver locations on Summerland Crescent, Pimlico Crescent, Clearfield Street, Stratheden Avenue and Coombell Avenue
- NCA 5 – 28 Receiver locations on Colebee Crescent
- NCA 6 – 2 Receiver locations on Pepperidge Avenue
- NCA 7 – 10 Receiver locations on Will Close and Josephine Way
- NCA 8 – 13 Receiver locations on Burrowes Grove and Shipton Place.

Non-residential receivers qualifying for the consideration of mitigation are the Baitul Huda Mosque and associated Khilafat Centenary Hall and the childcare centre located at 5 Woodburn Street.

Receivers qualifying for the consideration of mitigation predominantly consist of dwellings with pre-existing exposure to Richmond Road. For receivers in NCAs 4, 7, and 8, the traffic stream would not be substantially closer to the receivers. The maximum noise levels assessment found that maximum noise level events are unlikely to increase as a result of the proposal.

The alignment of Richmond Road would move closer to residents within NCA 5 (Colebee Crescent residents). A number of receivers qualify for the consideration of mitigation in this area due to exceedance of the cumulative criteria. Residents in NCA 5 may also experience slightly louder (i.e., 1-2 dBA) maximum noise level events due to the traffic stream moving from 145 metres to 115 metres away.

Design of noise mitigation

The RNMG provides a consistent approach to implementing feasible and reasonable noise mitigation measures for road projects within NSW. In cases where affected receivers qualify for consideration of noise mitigation, the order of preference for treatments under the RNP is as follows:

1. Quieter pavement surfaces
2. Noise mounds
3. Noise walls
4. At-property treatments.

A feasibility assessment to identify specific treatments would be undertaken during the detailed design phase of the proposal.

6.7.5 Safeguards and management measures

Table 6-53 outlines the noise and vibration safeguards and management measures to be implemented by the proposal.

Table 6-53 Noise and vibration safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the *Interim Construction Noise Guideline* (DECC, 2009) and identify: • all potential significant noise and vibration generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, procedures and principles* (TfNSW, 2023i) • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design / Pre-construction
NV2	Noise and vibration	All sensitive receivers (e.g., schools and local residents) likely to be affected would be notified at least seven days before commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification would provide details of: • the proposal • the construction period and construction hours	Contractor	Detailed design / Pre-construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• contact information for project management staff • complaint and incident reporting • how to obtain further information.		
NV3	Construction hours	Where feasible carry out works within standard hours as follows: • 7am-6pm Monday to Friday • 8am-1pm Saturdays • no work on Sundays or public holidays.	Contractor	Construction
NV4	Construction hours	Where night works are essential, the use of high impact machinery such as pile-driving, vibratory rollers and impact devices (rock breakers and jackhammers) would be avoided in the vicinity of sensitive receivers, where possible.	Contractor	Construction
NV5	Construction traffic	Further assessment of traffic noise at the Newnham Street compound would be undertaken in accordance with the RNCG (TfNSW, 2023h).	Transport	Detailed design
NV6	Construction noise	Where feasible, implement standard mitigation measures in accordance with the CNVG-R (TfNSW, 2023e).	Contractor	Pre-construction / Construction
NV7	Construction noise	Where feasible, implement additional mitigation measures in accordance with the CNVG-R (TfNSW, 2023e) where noise levels are predicted to exceed the noise management levels. This may include notification, respite periods and alternative accommodation.	Contractor	Pre-construction / Construction
NV8	Construction vibration	For high vibration sources, vibration monitoring would be undertaken to confirm the minimum working distances at specific site locations. Additionally, further detailed analysis based on the frequency dependent guideline vibration levels in BS7385-2:1993 and DIN4150-3:2016 may be utilised in conjunction with site-specific measurements to derive alternative cosmetic damage objectives and minimum working distances.	Contractor	Pre-construction
NV9	Construction vibration on heritage structures	If works are proposed at less than the safe working distances for heritage listed items, specialist advice would be sought from an appropriately qualified structural engineer who is familiar with heritage structures.	Contractor	Pre-construction
NV10	Operational noise	Undertake an assessment to identify feasible and reasonable noise mitigation measures for properties where operational noise is predicted to exceed relevant criteria.	Transport	Detailed design

6.8 Biodiversity

A Biodiversity Assessment Report (BAR) has been carried out to assesses the potential impacts on biodiversity during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix H.

6.8.1 Methodology

Study area and certified lands

The following areas have been defined for the biodiversity assessment:

- Clearing limit – area to be impacted as part of the proposal which includes certified, non-certified and uncertified lands (refer Figure 6-22).
- Subject land – the non-certified and uncertified areas of the clearing limit used to calculate the direct impacts of the proposal (refer Figure 6-22).
- Study area – the land on which field surveys were undertaken for the assessment (refer Figure 6-22).
- Study locality – land within 10 kilometres of the study area used for desktop analysis of potential biodiversity values.

The study area includes areas of certified land under the (refer Figure 6-22):

- *State Environmental Planning Policy (Precincts—Central River City) 2021* (SEPP (Central River City)) within the North West Growth Area (NWGA).
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP (Biodiversity and Conservation)) within the Cumberland Plain Conservation Plan (CPCP) area.

Further assessment under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is not required in these certified areas, provided that the development occurs in accordance with the relevant biocertification orders. Refer section 4.1.1 for further information.

Assessment

The biodiversity assessment was carried out in accordance with *Biodiversity Assessment Method* (BAM) (DPIE, 2020). The aquatic survey was carried out in accordance with the Fish Management Guidelines and the assessment requirements outlined in *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003). The following provides a summary of the methodology used in the BAR:

- Background research – a desktop assessment of the study locality, including a review of existing literature and databases, to understand biodiversity values and determine the likelihood of occurrence of threatened species, populations and ecological communities.
- Vegetation assessment – field investigations were undertaken in the study area on the 10-11 August 2023 and the 30-31 January 2024. This involved:
    - review of existing vegetation mapping relevant to the study area
    - vegetation and floristic plots to verify plant community types, broad condition classes and extents.
- Threatened species assessment – targeted flora and fauna field surveys were completed between August 2023 and May 2024 to determine their presence within the study area. This involved:
    - Habitat suitability assessment to map important habitat features and evidence of fauna activity. Features collected included hollow-bearing trees (HBTs), stags, burrows, aquatic habitat, culverts, and signs of fauna activity (such as feeding evidence, claw marks, scats).
    - Targeted surveys for species considered likely to occur in the study area and/or those generated by the BAM-Calculator.
    - Survey methods included: diurnal bird surveys, Koala spot assessment, microbat surveys, nocturnal surveys, amphibian surveys and Cumberland Plain land snail searches.
- Aquatic assessment – field survey on 31 January 2024 at three sites within the study area was undertaken to assess aquatic biodiversity including fish, riparian and aquatic habitat and water quality.

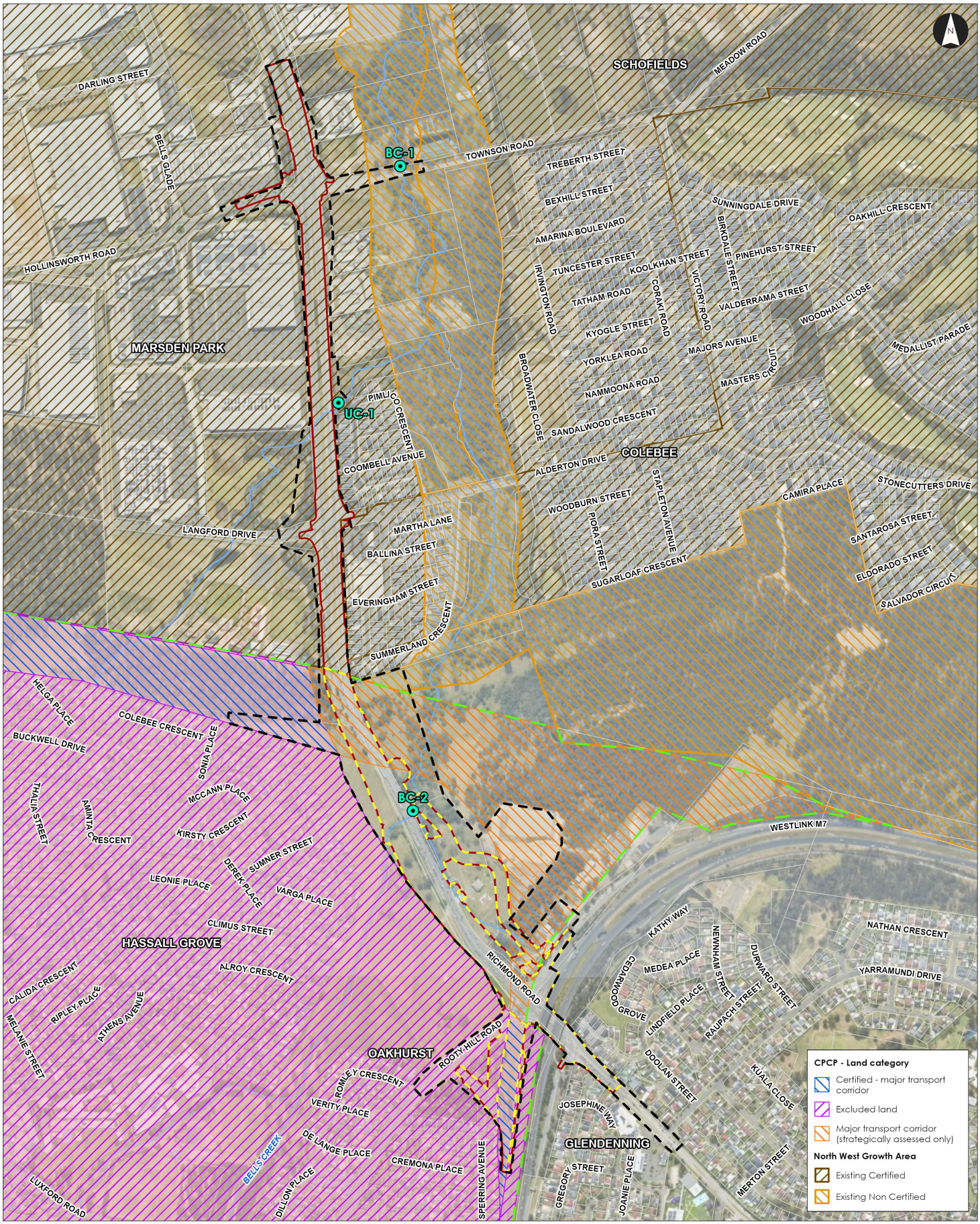


Figure 6-22: Biodiversity context

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-017
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

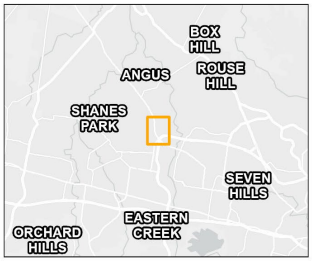
- Biodiversity study area
- Subject land
- Aquatic sampling sites
- Watercourse
- Cadastre
- Clearing boundary (5m)
- Cumberland Plain Conservation Planning (CPCP) Area boundary
- CPCP - Nominated areas

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. North West Growth Area (DPE, 2023)
3. CPCP Area boundary, CPCP - Nominated areas, CPCP - Land category (NSW DPE, 2022)
4. Watercourse and Cadastre (NSW SS, 2023)

0 100 200 300 Metres

Scale at A3: 1:7,500



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6.8.2 Existing environment

The study area is located in Sydney's north west, within the Blacktown LGA. The Blacktown LGA falls within the Cumberland Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the Sydney Basin IBRA bioregion. This region is important for biodiversity, supporting several endemic flora and fauna species found only on the Cumberland Plain.

The study area occurs within the catchment of Bells Creek which forms part of the Hawkesbury-Nepean Catchment. It occurs predominately within the Cumberland Plain NSW Mitchell landscape region, with a small portion of Hawkesbury-Nepean Channels and Floodplains occurring where Bells Creek crosses the study area.

No conservation reserves occur within the study area. The nearest reserve is Yiraaldiya National Park, located approximately 2.7 kilometres to the west of the northern extent of the study area.

No areas of outstanding biodiversity value (AOBV) occur within the study area. The closest AOBV is the Little Penguin population in Sydney's North Harbour, located approximately 40 kilometres east of the study area.

Plant community types

The vegetation types within the study area are listed in Table 6-54 and shown in Figure 6-23 (a) to 6-23 (d). The table includes the plant community types (PCTs) within the study area and vegetation types that could not be reasonably assigned to a known PCT.

Table 6-54 Vegetation types within the study area

Vegetation type	Description	Photograph
PCT 3320: Cumberland Shale Plains Woodland	Within the study area, PCT 3320 consists of a canopy dominated by *Eucalyptus moluccana* and *Eucalyptus tereticornis,* with *Eucalyptus crebra* and *Casuarina glauca* also occurring. The density of the shrub layer varies throughout the study area, but typically includes *Bursaria spinosa.* Other species present throughout the study area include *Dillwynia sieberi, Grevillea juniperina* subsp. *juniperina* and *Melaleuca decora.* Common groundcover species include *Microlaena stipoides, Sporobolus creber, Brunoniella australis, Commelina cyanea, Dichondra repens, Glycine tabicina,* and *Lobelia purpurascens.* Dominant weed species within PCT 3320 include *Chloris gayana, Asparagus asparagoides, Eragrostis curvula, Onopordum acanthium* subsp*. acanthium, Senecio madagascariensis* and *Sida rhombifolia*.	
PCT 4025: Cumberland Red Gum Riverflat Forest	Within the study area, PCT 4025 consists of a canopy dominated by *Eucalyptus tereticornis,* with *Eucalyptus fibrosa, Eucalyptus moluccana* and *Casuarina glauca* also occurring. A sparse layer of shrubs typically included species such as *Bursaria spinosa*, *Melaleuca decora* and *Melaleuca squarrosa.* Groundcover species include *Microlaena stipoides, Sporobolus creber, Brunoniella australis, Centella asiatica, Commelina cyanea, Dichondra repens, Glycine clandestina,* and *Lobelia purpurascens.* Dominant weed species within PCT 4025 include *Cenchrus clandestinus, Chloris gayana, Phalaris*	

Vegetation type	Description	Photograph
	aquatica, Setaria pumila, Solanum pseudocapsicum and *Xanthium occidentale.*	
Planted native trees	In accordance with the *Tree and Hollow Replacement Guidelines* (TfNSW, 2023c), trees and hollows that are not part of a recognisable PCT or are below the offset area thresholds are required to be replaced. Sixty six planted native trees were identified in the study area, including 60 within the subject land. An inventory of planted native trees is provided in Appendix H.	
Landscaped natives	Landscaped areas consist of native plantings of shrubs, forbs and grasses in designated areas of landscaping adjacent to Richmond Road, including median strip plantings. These areas occur predominantly in the north of the study area, within biocertified lands.	
Exotic	There are areas of vegetation mapped within the study area that do not conform to any known native PCT due to exotic species abundance. A total of 55 exotic species were recorded in the study area. Twenty of the exotic species recorded in the study area have a listing at National, State and/or local level as: • Weed of National Significance (WoNS) • High threat weeds (HTWs) • Priority weeds (PWs).	
Mixed native exotic instream	Within the study area, mapped patches of mixed native exotic instream vegetation consist predominantly of dense stands of *Typha orientalis* within both permanently and ephemerally wet areas such as the tributaries of Bells Creek and drainage lines adjacent to Richmond Road.	
Cleared land	Cleared land within the study area includes all hardstand areas, such as Richmond Road and associated infrastructure, footpaths and driveways.	

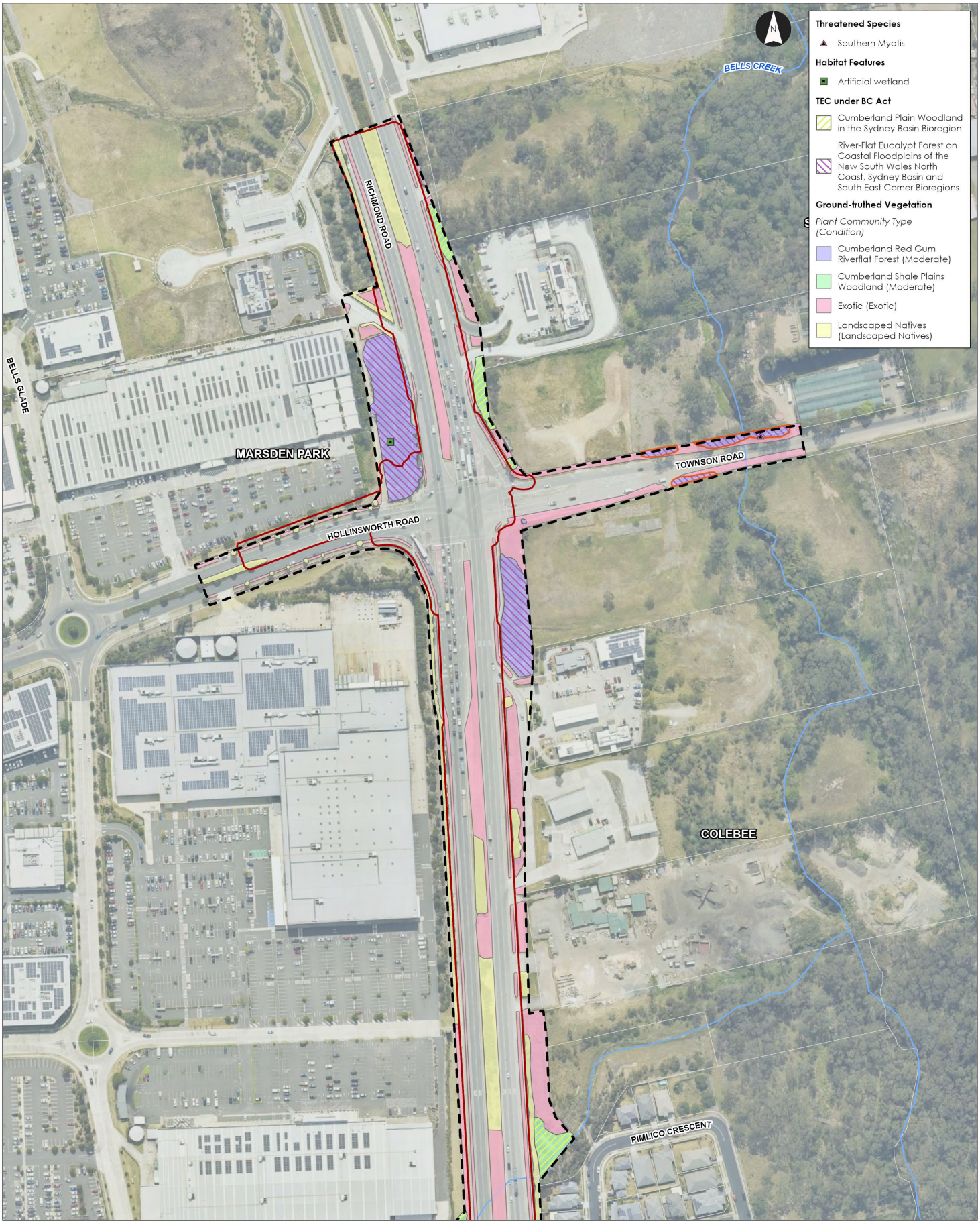

Figure 6-23 (a): Vegetation types and threatened species

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-018
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

- Biodiversity study area
- Watercourse
- Cadastre
- Clearing boundary (5m)

EPBC_Act_TECS

- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Ground-truthed vegetation (Stantec, May 2024)
3. EPBC_Act_TECs, Habitat Features, TEC under BC Act, and Threatened Species (Stantec, June 2024)
4. Watercourse and Cadastre (NSW SS, 2023)

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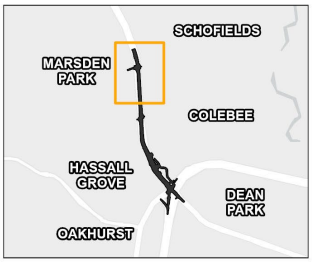
Scale at A3: 1:2,500



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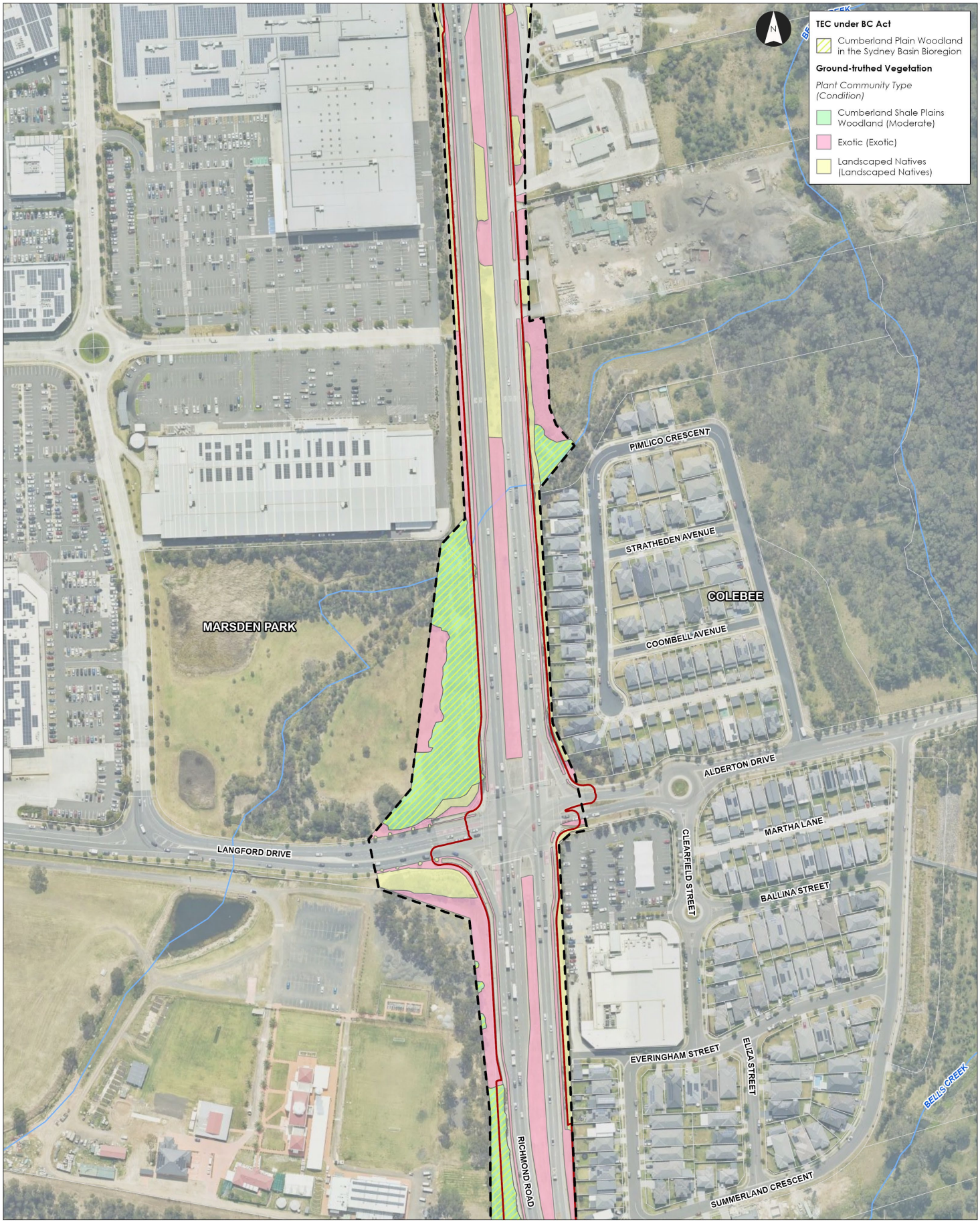

Figure 6-23 (b): Vegetation types and threatened species

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-018
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

- Biodiversity study area
- Watercourse
- Cadastre
- Clearing boundary (5m)

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Ground-truthed vegetation (Stantec, May 2024)
3. EPBC_Act_TECs, Habitat Features, TEC under BC Act, and Threatened Species (Stantec, June 2024)
4. Watercourse and Cadastre (NSW SS, 2023)

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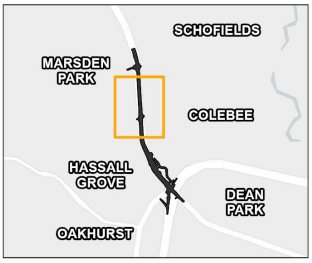
Scale at A3: 1:2,500



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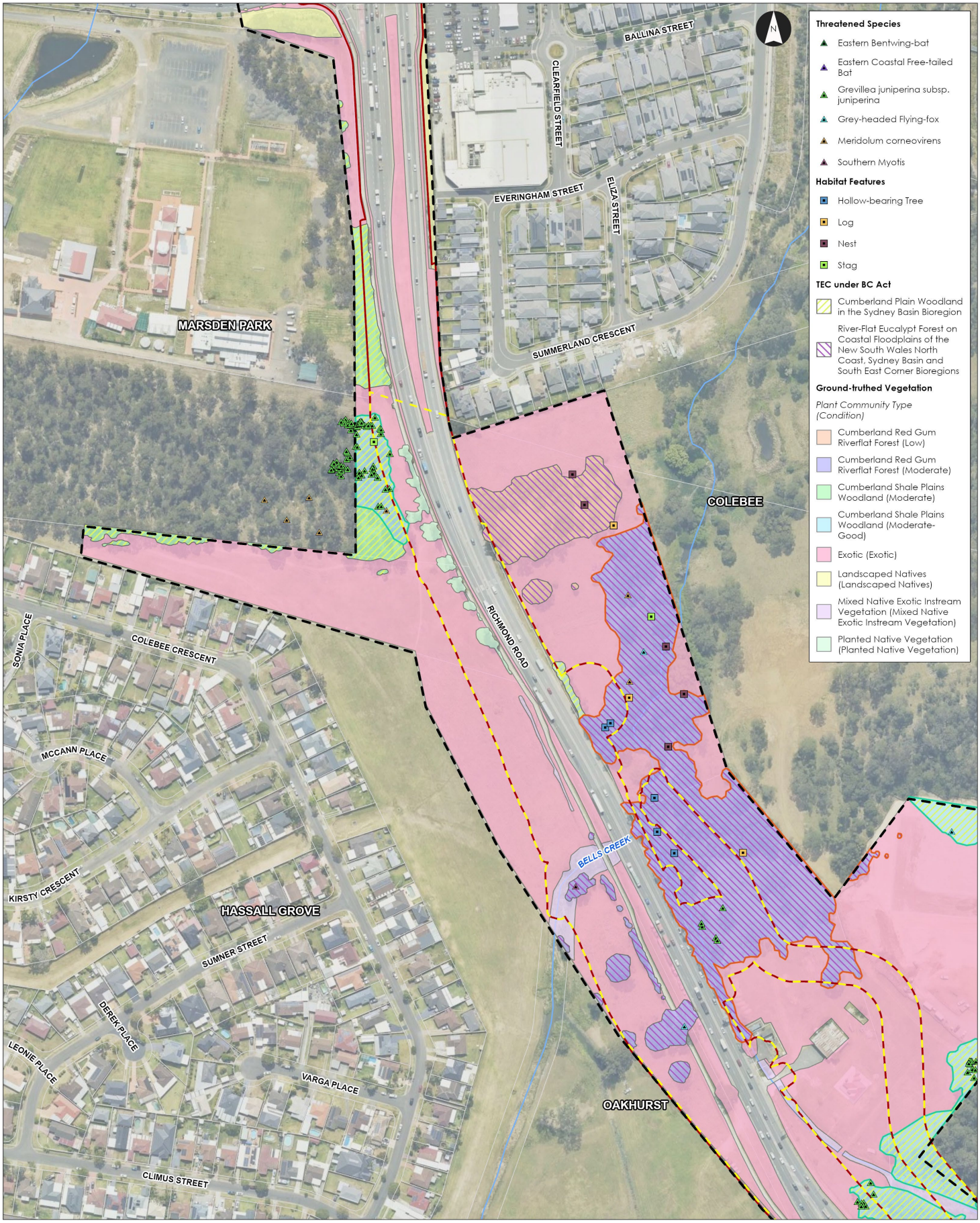


Figure 6-23 (c): Vegetation types and threatened species

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-018
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

- Biodiversity study area
- Subject land
- Watercourse
- Cadastre
- Clearing boundary (5m)

EPBC_Act_TECS

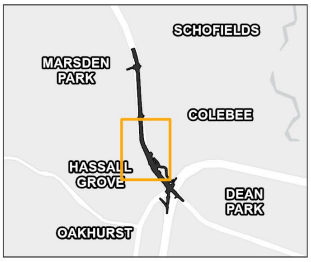
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Ground-truthed vegetation (Stantec, May 2024)
3. EPBC_Act_TECs, Habitat Features, TEC under BC Act, and Threatened Species (Stantec, June 2024)
4. Watercourse and Cadastre (NSW SS, 2023)

0 25 50 75 100 Metres

Scale at A3: 1:2,500



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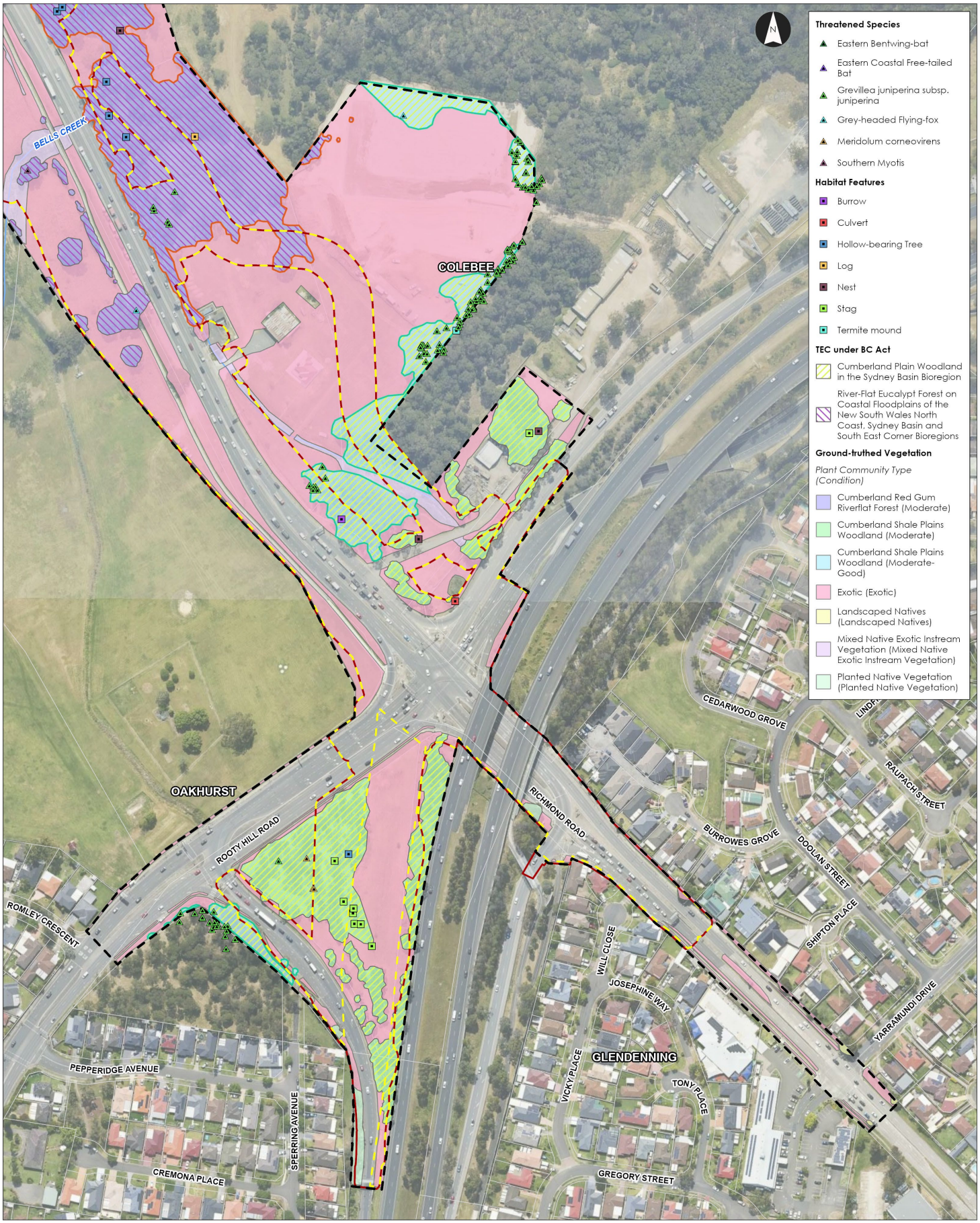

Figure 6-23 (d): Vegetation types and threatened species

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-018
Drawn By: RA, Checked By: MM
Rev: 01 | Date: 2024-11-14

Legend

- Biodiversity study area
- Subject land
- Watercourse
- Cadastre
- Clearing boundary (5m)

EPBC_Act_TECS

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sept 2024)
2. Ground-truthed vegetation (Stantec, May 2024)
3. EPBC_Act_TECs, Habitat Features, TEC under BC Act, and Threatened Species (Stantec, June 2024)
4. Watercourse and Cadastre (NSW SS, 2023)

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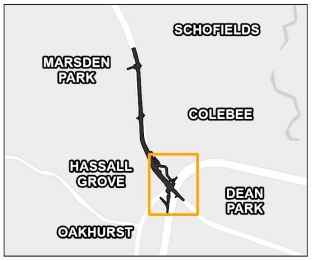
Scale at A3: 1:2,500



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The vegetation types and areas within each boundary of the study area are provided in Table 6-55.

Table 6-55 Vegetation types within the study area

Vegetation type	Area (ha)				
	Subject land	Clearing boundary	Study area certified	Study area not biocertified	Study area
PCT 3320: Cumberland Shale Plains Woodland (Moderate)	0.49	0.77	1.17	1.24	2.41
PCT 3320: Cumberland Shale Plains Woodland (Moderate- Good)	0.31	0.31	0	1.07	1.08
PCT 4025: Cumberland Red Gum Riverflat Forest (Moderate)	0.95	1.01	0.43	2.42	2.85
PCT 4025: Cumberland Red Gum Riverflat Forest (Low)	0.01	0.01	0	0.51	0.51
Planted Natives	0.13	0.16	0.05	0.13	0.18
Landscaped Natives	0.00	0.33	0.8	0.01	0.81
Exotic	3.29	5.16	3.59	8.68	12.30
Mixed Native Exotic Instream	0.19	0.19	0	0.27	0.27
Total	**5.37**	**7.94**	**6.04**	**14.33**	**20.41**

Threatened ecological communities

Table 6-56 outlines threatened ecological communities (TECs), listed under the BC Act, which are associated with PCTs occurring within the study area. It provides an assessment of the commensuration of the PCTs within the study area.

Table 6-56 BC Act listed TECs associated with PCTs occurring in the study area

PCT ID	PCT Name	Associated TEC	TEC Status	Vegetation within study area commensurate with TEC?
3320	Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Yes
3320	Cumberland Shale Plains Woodland	Shale Gravel Transition Forest in the Sydney Basin Bioregion	Endangered	No
4025	Cumberland Red Gum Riverflat Forest	Elderslie Banksia Scrub Forest	Critically Endangered	No
4025	Cumberland Red Gum Riverflat Forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Yes

Groundwater dependent ecosystems

The Atlas of Groundwater Dependent Ecosystems provides broad-scale mapping of potential GDEs and has been used with contemporary, location-specific data collected as part of the BAR to determine the presence of GDEs.

PCT characteristics, including vegetation class based on the *Ocean Shores to Desert Dunes: The Native Vegetation of New South Wales and the ACT* (Keith, 2004), were used to determine and categorise GDEs in the study area. Cumberland Shale Plains Woodland is mapped as a high potential GDE at the northern and southern extremities of the study area. An area of Cumberland Shale Plains Woodland within the central portion of the study area is mapped as a moderate potential GDE (refer Figure 6-7).

Threatened species

A review of the DCCEEW BioNet Atlas, Department of Primary Industries and Regional Development (DPIRH) Fisheries Spatial data portal, the Commonwealth DCCEEW Protected Matters Search Tool and BAM-Calculator identified 128 threatened species with potential to occur in the study area. Species were inclusive of 55 flora, 44 birds, 19 mammals, three amphibians, three reptiles, two invertebrates and two fish species.

Based on habitat within the study area, an assessment of the likelihood of occurrence of all threatened species, was carried out to determine the potential for these species to occur. Due to the presence of suitable habitat in the study area, 48 species were considered to have a moderate or higher likelihood of occurrence before survey.

Following field surveys, 26 threatened species were considered to have a moderate or higher likelihood of occurring within the study area. This included one flora species, and five fauna species recorded within the study area during field surveys:

- *Grevillea juniperina subsp. juniperina* (Juniper-leaved Grevillea)
- *Meridolum corneovirens* (Cumberland Plain Land Snail)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Myotis Macropus* (Southern Myotis)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

An additional eight threatened flora species will be surveyed and, if applicable, subject to further assessment prior to consideration of the proposal for determination.

Aquatic environment

Bells Creek is an urban watercourse in the western suburbs of Sydney that forms part of the Hawkesbury-Nepean catchment. It is approximately nine kilometers in length flowing north to north-east, to its confluence with Eastern Creek. Bells Creek runs through urban landscapes, with the surrounding landscape at the upstream extent predominantly urban residential and the landscape at the downstream extent predominantly light industry and semi-rural lots.

A drainage culvert and channel are located to the east of Richmond Road at the intersection with the M7 Motorway which drains water from the road towards Bells Creek. This channel is mapped as an unnamed watercourse.

A review of the key fish habitat (KFH) mapping on the DPI Fisheries Spatial Data Portal showed that no KFH was mapped within the study area. The closest mapped KFH is Eastern Creek which is located approximately 3.5 kilometres downstream from the northern extent of the proposal.

Three sites were assessed for aquatic habitat and biodiversity during the field survey. Sites were selected at points where a watercourse intersected the study area. The sites are described in Table 6-57 and locations are shown in Figure 6-22.

Table 6-57 Aquatic survey sites and descriptions

Site	Description	Photograph
BC-1	The site was a long pool with a width varying from 4 to 7 m and depth of up to 1 m. The substratum was dominated by bedrock and cobbles, with soft sediment predominantly of silt and clay. The bank on the eastern side was gently sloped and stable than the western edge which was more steeply sloped and comprised of looser sediments. The approximate bank height on both sides was 2 m. The riparian zone was in fair condition with greater riparian tree cover on the eastern bank. An unbroken strip of *Casuarina sp*. with a few mixed exotics extended along the bank edge on the eastern side of the creek and provided moderate shading over the creek. On the western side, riparian tree vegetation was sparse and the groundcover was dominated by a very large patch of Slender Knotweed (*Persicaria decipens*), at the downstream end of the site. Small patches of Common Rush (*Juncus usitatus*) were dispersed amongst exotic herbs and grasses, present along the western bank edge, at the upstream end of the site. A moderate amount of *Cladophora sp.* (filamentous green algae) (~20 per cent) was observed along the edge of the western bank and covering submerged rocks within the waterway. The site was classified as moderately disturbed, and the waterway was identified as being a Class 2 moderate fish habitat.	
BC-2	The site was a long pool with varying width and little to no flow. The creek was wider upstream near the road bridge where it spanned to a maximum width of 10 m and then narrowed out downstream to an approximate width of two metres. The depth of the waterway ranged from around 0.5 to 2 m. The substratum was dominated by soft sediment, predominantly of silt and clay, with some finer gravel and pebble substrate. There was a moderate amount of macrophyte coverage and detritus along the bank with some overhanging vegetation. The bank was predominantly flat with a maximum bank height of 0.5 m. The bank was stable over most of the site with small patches of visible erosion. Underneath the bridge, artificial boulders are present for bank and bridge stabilisation. The riparian zone was in fair condition with greater riparian tree cover downstream from the site. Upstream the riparian cover was minimal. Large tree coverage was dominated by exotic species including *Ulmus parvifolia* (Chinese Elm), *Ligustrum sinense* (Narrow-leaved Privet) and *Fraxinus sp. Few Eucalyptus sp*. and *Casuarina sp*. were spread sparsely along the bank. The groundcover was dominated by Slender Knotweed and Common Rush, amongst a mix of native and exotic grasses. A small amount of *Cladophora sp*. (~5%) was observed covering submerged rocks within the waterway. On the western side of the bridge the creek, upstream from the site, the vegetation was dominated by in-stream aquatic species including *Typha orientalis* and *Persicaria decipens*.	

Site	Description	Photograph
	The site was classified as moderately disturbed, and the waterway was identified as being a Class 2 moderate fish habitat.	
UC-1	The stream channel was a combination of a natural and artificial channel due to an existing concrete culvert that runs under Richmond Road. Water was stagnant and water levels were low, with poor water visibility. The natural substrate was dominated by soft silty sediment and wetland vegetation, which had a dense coverage extending along the whole channel on both sides of the culvert. The riparian vegetation was fair, with a mix of exotic and native tree coverage. To the east, there is a large cleared area of trees along the banks. Aquatic vegetation dominated the site and included *Typha orientalis*, *Persicaria decipens*, *Juncus usitatus* and *Schoenoplectus validus* (River Club Rush).e site was classified as a highly disturbed, and the waterway was identified as being a Class 3 minimal fish habitat.	

Water quality

Water quality was measured at sites BC-1 and BC-2 and the results are outlined in Table 6-58. Site UC-1 did not have sufficient water to undertake readings. The recorded measurements were assessed against the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (the ANZECC 2000 guideline)(ANZECC, 2000) default trigger values (DTV) for south-east Australian slightly disturbed lowland river ecosystems.

The pH and electrical conductivity were within the guideline range for the DTV for both sites. Dissolved Oxygen (DO) was above the guideline range for site BC-1 but was low for site BC-2 with a reading below the guideline range. Turbidity at site BC-1 was below the guideline range and within range at site BC-2.

Table 6-58 Water quality parameters measured during the field survey in January 2024

Reference	Ecosystem type	Temperature (°C)	Electrical conductivity (µS/cm)	Salinity (ppt)	pH	Oxygen Reduction Potential (mV)	Dissolved oxygen (% saturation)	Turbidity (NTU)
ANZECC (2000) Guideline value	Lowland River	-	125-2200	-	6.5-8	-	85-110	6-50
BC-1	Lowland River	23.22	1298	0.65	7.4	151.35	127.3	1
BC-2	Lowland River	24.64	667	0.33	7.17	98.15	59.6	12.35

Fish biodiversity

During the survey at site BC-1 approximately five small fish, likely *Retropinna semoni* (Australian Smelt), were observed swimming in the water. Australian Smelt are common in freshwater creeks and are widespread through south-east Australia. They are not listed as a threatened species.

Downstream of site BC-2 a medium sized *Cyperus carpio* (Black Carp) was noted swimming in the waterway. Black Carp are an invasive species that are widely distributed throughout freshwater waterways across Australia and are commonly found in urban creeks such as Bells Creek.

Wildlife connectivity corridors

Wildlife connectivity across the study area is limited by the existing road corridor and industrial and urban development in the north and south, respectively. The Biodiversity Values map includes mapped 'biodiverse riparian land' along the riparian corridor of Bells Creek which would facilitate the movement of wildlife throughout the broader locality. Larger patches of remnant vegetation occur to the east of Bells Creek and, on the west of Richmond Road, north of Colebee Cresent, Hassall Grove, also providing connectivity corridors for the movement of fauna throughout the locality. Most patches of native vegetation within the study area are contiguous with a larger area of native vegetation consisting of mapped native vegetation and regional corridors under the CPRP. Isolated patches of vegetation within the study area, including planted vegetation, provide 'stepping stones' to facilitate the movement of mobile fauna species, such as birds, between these more intact patches of vegetation. The existing road corridor limits connectivity between the open spaces and remnant vegetation to the east and west of Richmond Road, particularly for larger animals, such as *Macropus giganteus* (Eastern Grey Kangaroo). Eastern Grey Kangaroo were observed foraging within the open space to the west of the study area.

Matters of National Environmental Significance

Threatened species and ecological communities listed under the EPBC Act are considered matters of national environmental significance (MNES). Based on a Protected Matters Search Tool (PMST) the applicable MNES to the subject land are:

- eight Threatened Ecological Communities (TECs) are predicted as likely or may occur within 10 kilometres of the subject land.
- 72 listed threatened species were predicted to occur within the subject land.
- 17 migratory species were predicted to occur within 10 kilometres of the subject land.

Table 6-59 outlines TECs, under the EPBC Act, which are associated with PCTs occurring within the study area. It provides an assessment of the commensuration of PCTs in the study area with the definition of each TEC. The results are provided in Figure 6-23 (a) to 6-23 (b).

Table 6-59 EPBC Act listed TECs associated with PCTs within the study area

PCT ID	PCT Name	Associated TEC (EPBC Act)	TEC status (EPBC Act)	Vegetation within study area commensurate with TEC?
3320	Cumberland Shale Plains Woodland	Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Yes^
4025	Cumberland Red Gum Riverflat Forest	Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion	Critically Endangered	No
4025	Cumberland Red Gum Riverflat Forest	River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Yes*

^ For PCT 3320 in Moderate-Good condition.

** PCT 4025 meets the minimum condition threshold where the patch is in moderate condition and over 0.5 ha in size.*

One EPBC listed threatened fauna species, *Pteropus poliocephalus* (Grey-headed Flying-fox), listed as vulnerable under the EPBC Act, was recorded within the study area. No active breeding camps are present within the study area and the nearest camp to the study area occurs approximately 6.4 kilometres to the south-west of the study area at Ropes Creek.

No migratory species were considered to have a moderate or higher likelihood of occurrence based on the habitat assessment carried out.

6.8.3 Potential impacts

Construction

Removal of native vegetation

The proposal would require the removal of 60 planted native trees and 2.11 hectares of native vegetation as outlined in Table 6-60. This includes 0.35 hectares of native vegetation within certified areas, which has previously been offset under the NWGA and CPCP biodiversity certification processes. As such, no further assessment of these areas is required, provided that the development occurs in accordance with the relevant biocertification order.

The proposal would directly impact 1.76 hectares of native vegetation and 60 planted native trees outside of certified areas. This includes 1.76 hectares of vegetation commensurate with TECs listed under the BC Act, of which 1.07 hectares are commensurate with TECs listed under the EPBC Act.

The removal of native vegetation relates to several key threatening processes listed under the BC Act, including clearing of native vegetation, bushrock removal, invasion of native plant communities, loss of hollow-bearing trees and removal of dead wood and dead trees. Similar key threatening processes are also listed under the EPBC Act, including land clearance.

Table 6-60 Summary of direct impacts on native vegetation within the subject land

Plant community type (PCT)	Broad condition class	TEC	Area to be impacted (ha)	
			Certified	Subject land
PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically Endangered (BC Act)	0.28	0.49
PCT 3320: Cumberland Shale Plains Woodland	Moderate-Good	Critically Endangered (BC Act) Critically Endangered (EPBC Act) *	0.00	0.31
PCT 4025: Cumberland Red Gum Riverflat Forest	Moderate	Endangered (BC Act) Critically Endangered (EPBC Act) *	0.07	0.95
PCT 4025: Cumberland Red Gum Riverflat Forest	Low	Endangered (BC Act)	0.00	0.01
Sub-total			0.35	1.76
Total			**2.11**	

** Where the patch is greater than 0.5 ha in size.*

Removal of threatened fauna habitat

This assessment relates to impacts within the subject land (i.e., does not include certified land). Two fauna species credit species were recorded in the subject land during field surveys:

- *Meridolum corneovirens* (Cumberland Plain Land Snail)– listed as endangered under the BC Act
- *Myotis macropus* (Southern Myotis) – listed as vulnerable under the BC Act.

Three additional threatened fauna species were also recorded in the subject land, however, the subject land does not contain suitable breeding habitat for these species:

- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)– listed as vulnerable under the BC Act
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat) – listed as vulnerable under the BC Act
- *Pteropus poliocephalus* (Grey-headed Flying-fox) – listed as vulnerable under the BC Act and EPBC Act.

Following field surveys, an additional 19 fauna species, consisting of two mammal species and 17 bird species, were considered to have a moderate likelihood of occurring within the study area based on the presence of potential habitat. Impacts to these species would be limited to foraging habitat and potential breeding habitat.

Direct impact on threatened fauna habitat was identified as 1.76 hectares for all but one species. The habitat was associated with foraging habitat within PCT 3320 and PCT 4025. The exception was *Myotis Macropus* (Southern Myotis) which had an

impact area of 1.33 hectares as associated habitat for this species was limited to PCT 3320 and PCT 4025 within 200 metres of Bell's Creek.

Other threatened species may also occur within the subject land, however, are highly mobile, not dependent on identified suitable habitat features within the subject land and/or have not recently been recorded within the study area. As such these species are considered to be transient visitors to the study area and have not been considered further.

Removal of threatened flora

This assessment relates to impacts within the subject land (i.e., does not include certified land). The proposal would result in the removal of 0.44 hectares of habitat for *Grevillea juniperina* subsp. *juniperina*.

Potential habitat for an additional eight threatened flora species is present within the subject land. Targeted surveys for these species will be undertaken prior to the proposal being considered for determination, and are:

- *Deyeuxia appressa*
- *Dillwynia tenuifolia*
- *Hibbertia sp. Bankstown*
- *Hibbertia puberula*
- *Pomaderris brunnea* (Rufous Pomaderris, Brown Pomaderris)
- *Pterostylis Saxicola* (Sydney Plains Greenhood)
- *Pultenaea parviflora*
- *Pultenaea pedunculata* (Matted Bush-pea).

Fish passage

The proposal requires the construction of a new bridge structure along Richmond Road across Bells Creek, adjacent to the existing bridge.

Construction of waterway crossings such as bridges can impact fish passage by creating barriers or by altering the natural flow patterns and changing the hydrology of the creek. For construction of permanent or temporary barriers in Class 2 waterways adequate fish passage needs to be provided for. In these circumstances waterway crossings are to be designed in accordance with '*Why do fish need to cross the road? Fish passage requirements for waterway crossings*' (Fairfull and Witheridge, 2003).

The foundations of the existing bridge structure have already altered the natural flow of the creek. The proposed bridge design is similar to that existing so it is not anticipated that construction of the new bridge foundations would impact fish passage. The new bridge is likely to only have a minor impact on natural flow within the waterway.

Other potential impacts to fish passage from the construction of temporary bunds or silt fences as sediment and erosion controls would be temporary during construction and would be removed following the completion of the work.

Disturbance of riverbank aquatic vegetation

On the western side of the existing Bells Creek bridge, at the upstream end of site BC-2, the waterway was found to have dense in-stream aquatic vegetation. Construction of the new bridge foundations would require excavation causing direct disturbance to the riverbed, bank and associated aquatic vegetation. In stream excavation can impact aquatic habitats and increase turbidity via the mobilisation of sediments. Approximately 0.1 hectares of aquatic vegetation would be impacted by the proposed works. No listed threatened species were identified during the survey. Rehabilitation of aquatic vegetation would be undertaken following the completion of construction to re-instate any aquatic habitat lost during construction.

Erosion and sedimentation

Sediment mobilised by excavation during construction and from runoff from discharges during construction activities have the potential to increase turbidity in downstream waters. Elevated turbidity can have detrimental effects on aquatic fauna and flora. Sediments can clog the gills and feeding apparatus of aquatic invertebrates and fish and can directly smother in-stream macrophytes. Excess turbidity can also potentially reduce light filtration, reducing photosynthesis in submerged macrophytes. Mobilisation of sediments may impact on habitats further downstream, altering the existing substratum and/or smothering aquatic habitats. The watercourses within the study area are likely to already be exposed to elevated turbidity and sedimentation from urban and semi-rural catchment flows and thus the biota present are likely to be tolerant to these conditions. Erosion and sediment controls, in accordance with standard industry practice, are recommended.

Water quality

Water quality has the potential to be impacted by increased sedimentation during construction of the bridge and open channel particularly where excavation is involved. There is also the potential for contaminants from construction equipment or other sources, to be mobilised and potentially enter the waterway via run-off, accidental releases or if bound to mobilised sediments. The solubility, bioavailability and persistence of contaminants are compound specific. Common compounds that could be mobilised during construction include those that may be present in the sediments (e.g. nutrients, heavy metals and ASS) and/or those associated with the use of construction plant, equipment and vehicles (e.g. petroleum hydrocarbons). A separate Preliminary Site Investigation (PSI) was undertaken to assess potential contamination within the construction boundary (refer Appendix D). Given the existing road and use of the area the biota present are likely to already have been exposed to some of these contaminants. Freshwater biota toxicity varies among species and among life stages within species. Algal blooms also have potential to affect water chemistry and clarity. Further contributions to contaminant concentrations and/ or the introduction of new contaminants via the proposed works have potential to affect freshwater biota through toxicity (from, for example, heavy metals) and/or induce algal blooms (from nutrients). Standard erosion and sedimentation management measures implemented during construction should reduce the likelihood of contaminants entering the nearby waterways. Refer section 6.2 for further information.

Key threatening processes

Two KTPs listed under the *Fisheries Management Act 1994* (FM Act) are relevant to the proposal including:

- alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
- degradation of native riparian vegetation.

Injury and mortality

The proposal has potential to cause injury and mortality to fauna during the construction phase. Risks to fauna are associated with vegetation clearing and the mobilisation of plant. It is expected that mobile fauna would relocate to undisturbed areas during construction activities, however, less mobile fauna may be directly impacted during these activities. Fauna injury and mortality impacts would be managed through the implementation of mitigation measures.

Invasion and spread of weeds, pests, pathogens and disease

The introduction and spread of weeds have the potential to occur during the construction phase of the proposal. This can occur by the spread of opportunistic exotic vegetation from adjacent private properties or new species can be introduced via equipment, plant and footwear. Weed cross-contamination and spread can be avoided and minimised by implementing weed management as per the *Biodiversity Management Guidelines* (TfNSW, 2024d).

Pest fauna species could use disturbed areas to increase their movement across the landscape. Edges provide opportunities for invasive pest animals to move into newly accessible areas. Given the minimal scale of the proposed clearing, it is not expected that the proposal would facilitate invasive species incursion. There is the potential for pests to spread beyond the proposal footprint as 'hitchhikers' on earthmoving equipment, machinery or materials being moved to site. The risk of spread of pests can be avoided and minimised by implementing appropriate mitigation measures.

Any foreign equipment or materials brought onto the construction site also has potential to introduce diseases, such as *Phytophthora cinnamomi* (Phytophthora), *Puccinia psidii* (Myrtle Rust) and *Batrachochytrium dendrobatidis* (Chytrid Fungus), to the surrounding environment. The risk of spread of pathogens and disease can be avoided and minimised by implementing a cleaning and decontamination protocol for equipment and machinery.

Groundwater dependent ecosystems

Impacts to groundwater quality and quantity may result from:

- erosion and sedimentation
- sealing of land surface in recharge zones
- changes in land drainage
- excavation and shaping of the upper soil profile
- removal of overlying vegetation, altering hydrological linkages.

The proposal is unlikely to require groundwater extraction or result in a significant impact on GDEs within the locality.

Operation

Indirect impacts occur when the proposal or activities relating to the construction, operation and general change in land-use patterns of the proposal affect native vegetation, threatened ecological communities, threatened species and their habitats beyond the subject land (direct impact area).

Edge effects on adjacent native vegetation and habitat

Edge effects occur at the boundary of vegetated areas due to changes in the level of protection and exposure to disturbance factors. Generally, edges of vegetation have reduced protection for flora and fauna species and increased effects of environmental (e.g., wind, artificial light, dust) and biological (e.g., more exposure to predators, increased weed colonization and increased competition with exotic species) factors when compared with conditions found further into a vegetation patch.

Clearing of native vegetation as a result of the proposal would be restricted to 1.76 hectares of native vegetation within PCTs and 60 planted trees, within the subject land. This clearing would predominantly be restricted to vegetation located in close proximity to the existing alignment of the road corridor. Although the proposal would expose new areas of vegetation, by 'pushing back' current edge effected areas, these areas are already subject to edge effects and anthropogenic disturbances as a result of their proximity to the existing alignment. The proposal would not result in fragmentation of existing remnant patches or the creation of new edges. It is expected that edge effects, as a result of the proposal, would be minimal.

Wildlife connectivity and habitat fragmentation

Potential impacts to wildlife connectivity may occur where roads affect the movement of plants and animals between habitats. Wildlife connectivity across the study area is currently limited by the existing road corridor and industrial and urban development in the north and south, respectively, however the riparian corridor along Bells Creek would facilitate the movement of wildlife throughout the broader locality. The existing road corridor limits connectivity between the open spaces and remnant vegetation to the east and west of Richmond Road, particularly for larger and more mobile animals, such as *Macropus giganteus* (Eastern Grey Kangaroo), in the area. Eastern Grey Kangaroo were observed foraging within the open space to the west of the study area. Eastern Grey Kangaroo are largely nocturnal, so during the day they will rest amongst the shade of dense vegetation or other sheltered areas and become more active in the early evening. The proposal would involve the widening of the existing road corridor and would increase the existing gap between habitat patches within the study area, however the existing riparian corridor along Bells Creek would remain intact. As the existing road corridor presents a barrier to movement, the widening of the road is not considered to result in significant impacts to connectivity as no new barrier is being introduced. As such, it is not expected that the proposal would result in landscape scale impacts to connectivity.

Fish passage

Once installed the bridge structure has the potential to impact fish passage and aquatic fauna by impacting light penetration and increase shading of the water which can be a deterrent for fish species that avoid darker shaded habitats during the day and can reduce vegetation growth which provides habitat for aquatic fauna. Other potential impacts are changes to flow velocities and increased water turbulence which may impact fish passage through the waterway.

The proposed bridge design is similar to the existing bridge and it is likely that aquatic fauna in the area have already migrated or adapted to the changed conditions. Therefore, it is not anticipated that the operation of the new bridge structure would impact fish passage.

Erosion and sedimentation

Road crossings and in stream structures have been linked to increased sedimentation and erosion. As there is an existing road it is unlikely that the operational impact of the proposal would result in increased sedimentation.

The new bridge structure has the potential to impact localised sediments from large scale turbulence at the bridge piers and changes to instream and bank vegetation that would be removed. These impacts are not anticipated to be significantly different from the current environment and appropriate scour protection would be provided.

A new open flooding channel is proposed to be constructed to the eastern side of Richmond Road. During flood conditions water would flow from this channel into Bells Creek, increasing flow velocities and risk of sedimentation. The proposed channel would operate similarly to the existing drainage and the impacts on flow velocity (and consequently erosion and sedimentation) of the new structure are considered minimal. Refer section 6.2.3 for further information.

Water quality

Water quality has the potential to be impacted during operation of the road from contaminant-laden runoff particularly during significant rain events where water runoff increases. An increase to impervious surfaces is expected from widening of the road carriageway and construction of the open flooding channel however impacts from run off are not anticipated to be significantly greater than current impacts from the existing road and bridge infrastructure Refer section 6.2.3 for further information.

Injury and mortality

The proposed road upgrades may result in increased operational traffic which may increase the likelihood of vehicle strike. Species likely to be at risk of vehicle strike include more common species, such as *Macropus giganteus (*Eastern Grey Kangaroo), which were observed foraging within the open space to the west of the study area.

Assesssments of significance

Assessments of significance (AoS) have been completed for each threatened species, population or ecological community that has been recorded in the study area, is assumed present, or has been assigned a moderate to high likelihood of occurrence and is likely to be impacted by the proposal.

The AoS were undertaken for two threatened communities, one flora species and 24 fauna species under the BC Act, and two threatened communities and six fauna species under the EPBC Act. The assessments determined that significant impacts are not anticipated. Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

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

Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination.

6.8.4 Safeguards and management measures

Table 6-61 outlines the biodiversity safeguards and management measures to be implemented by the proposal.

Table 6-61 Biodiversity safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
B1	General	A Flora and Fauna Management Plan (FFMP) would be prepared in accordance with Transport for NSW's *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) and implemented as part of the CEMP. The FFMP would include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the *Landscape Guideline* (TfNSW, 2023k) • pre-clearing survey requirements, including specific pre-clearance measures for Cumberland Plain Land Snail and Southern Myotis (i.e. roost searches of culverts and bridges prior to any impacts) • procedures for the management of resident Kangaroo populations during construction	Contractor	Detailed design / Pre-construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI *Policy and guidelines for fish habitat conservation and management* (DPI, 2013) • protocols to manage weeds and pathogens.		
B2	Removal of native vegetation	Native vegetation removal would be minimised through detailed design and during construction.	Transport / Contractor	Detailed design / Construction
B3		Pre-clearing surveys would be undertaken in accordance with Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Pre-construction
B4		Vegetation removal would be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B5		Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Post construction
B6		The unexpected species find procedure is to be followed under the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction
B7		A Biodiversity Offset Strategy would be developed, in accordance with the guidelines, to detail obligations under the *Biodiversity Policy* (TfNSW, 2022f).	Contractor	Pre-construction
B8		A Tree and Hollow Replacement Plan would be developed, in accordance with the guidelines, to detail obligations under the *Biodiversity Policy* (TfNSW, 2022f).	Contractor	Pre-construction
B9	Removal of threatened fauna habitat	Threatened fauna habitat removal would be minimised through detailed design and during construction.	Transport / Contractor	Detailed design / Construction
B10		Fauna would be managed in accordance with Guide 9: Fauna handling of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d). Specific pre-clearance measures for Cumberland Plain Land Snail have been included in Appendix G of the BAR (Appendix H). Pre-clearance surveys for Cumberland Plain Land Snail would be undertaken in all areas of PCT 3320 and PCT 4025 prior to any vegetation clearing. Any individuals located during the pre-clearance surveys would be relocated directly into suitable vegetation outside of the proposal area.	Contractor	Pre-construction / Construction
B10		Habitat removal would be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B12		Habitat would be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and	Contractor	Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		Guide 8: Artificial hollows of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).		
B13		The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction
B14		Pre-clearing surveys would be undertaken in accordance with Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Pre-construction
B15	Removal of threatened flora	Threatened flora removal would be minimised through detailed design and during construction.	Contractor	Detailed design / Construction
B16		Prior to the determination of the proposal, targeted flora surveys would be completed for all identified candidate species that have not yet been surveyed. Assessments of significance and calculations of offsetting obligations would be completed for any additional threatened species detected on site.	Contractor	Detailed design
B17		Pre-clearing surveys would be undertaken in accordance with Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B18		The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened flora species, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction
B19	Aquatic impacts	Impacts to aquatic habitat would be minimised through detailed design and during construction. Any instream/flow structures (e.g. the proposed bridge structure) would be designed and installed in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI, 2013), *Why do fish need to cross the road?: fish passage requirements for waterway crossings* (Fairfull and Witheridge, 2003).	Contractor	Detailed design / Construction
B20		A primary site-specific ESCP and progressive ESCPs would be prepared and implemented as part of the SWMP.	Contractor	Pre-construction
B21		Aquatic habitat would be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) and section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI, 2013).	Contractor	Construction
B22		A site-specific emergency spill plan would be developed and include spill-management measures in accordance with the Transport *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment,	Contractor	Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		notification of emergency services and relevant authorities (including Transport EPA officers).		
B23		Following construction affected aquatic habitat would be rehabilitated and removed aquatic habitat re-instated in accordance with Guide 10: Aquatic habitats and riparian zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Post construction
B24	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems would be minimised through detailed design.	Contractor	Detailed design
B25	Changes to hydrology	Changes to existing surface water flows would be minimised through detailed design.	Contractor	Detailed design
B26	Edge effects on adjacent native vegetation and habitat	Exclusion zones would be set up at the limit of clearing in accordance *with* Guide 2: Exclusion zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B27	Injury and mortality of fauna	Fauna would be managed in accordance with Guide 9: Fauna handling of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B28	Invasion and spread of weeds	Weed species would be managed in accordance *w*ith Guide 6: Weed management of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B29	Invasion and spread of pests	Pest species would be managed within the proposal area.	Contractor	Construction
B30	Invasion and spread of pathogens and disease	Pathogens would be managed in accordance with Guide 2: Exclusion zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B31	Noise, light, dust and vibration	Shading and artificial light impacts would be minimised through detailed design.	Contractor	Detailed design

6.8.5 Biodiversity offsets

The Biodiversity Offset Scheme (BOS) has not been triggered by the proposal. As such, the requirements for the provision of biodiversity offsets, conservation measures and tree and hollow replacement have been considered in accordance with the following Transport guidelines:

- *No Net Loss Guidelines* (TfNSW, 2023b) and supporting resources.
- *Tree and Hollow Replacement Guidelines* and supporting resources (TfNSW, 2023c).

Direct impacts to native vegetation as a result of the proposal, exceed the offset thresholds and preliminary offsetting estimates indicate 51 ecosystem credits would be required to offset the proposal impacts on these vegetation zones. The remaining vegetation zone and planted native vegetation do not trigger the offset thresholds and have been considered against the requirements of the *Tree and Hollow Replacement Guidelines* (TfNSW, 2023c). Preliminary estimates of tree and hollow replacement indicate that approximately 172 trees would be required to meet the obligations of the guidelines. Three species credit species have been recorded within the subject land, however do not require offsetting as per the *No Net Loss Guidelines* (TfNSW, 2023b) thresholds.

6.9 Landscape character and visual impacts

An Urban Design Concept and Landscape Character and Visual Impact Assessment (LVCIA) has been prepared by Design Inc (2024) to assess the potential impacts on landscape character and visual amenity during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix I.

6.9.1 Methodology

The LCVIA was carried out in accordance with the *Guideline for landscape character and visual impact assessment* (TfNSW, 2023j).

Landscape character assessment

The study area was divided into a number of Landscape Character Zones (LCZ) which are zones of similar spatial or character properties.

Landscape character assessment considers the impact of a proposal on an area's sense of place, deriving from all built, natural and cultural aspects, whether rural, suburban or urban. 'Landscape' in this sense encompasses all those aspects. Landscape character impact is therefore about the 'fit' of the proposal within its context. Where appropriate, the context includes the future character.

The impacts of the proposal on these LCZs were assessed and ranked in terms of sensitivity to change and magnitude of impact on an area's character and sense of place as per Table 6-62.

'Sensitivity' for landscape character assessment considers the landscape's inherent capacity to absorb change. The assessment is informed by background research, including the quality of the landscape, it's cultural and historical importance to the community, scenic quality and the overall composition of the place.

'Magnitude' refers to the scale, form and material composition of proposal elements and their location or setting. The magnitude impact rating also considers whether the proposal has a positive or negative impact on the LCZ.

Visual impact assessment

The potential visual impact of a proposal was assessed in relation to a number of key viewpoints. The locations of chosen viewpoints are representative of the range and diversity of viewpoints within the visual catchment of the proposal. Each of the viewpoints are illustrated with 'before' (prior to construction) and 'after' views, with the 'after' views consisting of a photomontage. The 'after' view shows the proposal as a high level concept only. Median planting is at 12 months after construction, while proposed new trees are shown after five years.

Visual impact is concerned with what people see, and how the proposal might change views and outlook, whether the viewpoints are from public spaces (streets, parks, rail corridors, shared paths for example) or from private spaces (homes, gardens). Visibility is also influenced by distance and direction of view.

The visual impact of the proposal was assessed by considering the sensitivity of the view and the magnitude of change to the view as a result of the proposal as per Table 6-62.

'Sensitivity' refers to the quality of the view and how sensitive that view or character is to the proposed change. It is measured by assessing a combination of factors including the composition of the view, its capacity to absorb change, and potentially also by duration (length of exposure) and frequency from key viewpoints.

'Magnitude' refers to the nature and scale of the proposal in relation to the viewer. It is measured as the degree of change the particular view undergoes as a result of the proposal. It includes physical character, size and scale considerations, proximity, the frequency and duration of views, and also night-time as well as day-time conditions.

Landscape character and visual assessment matrix

Table 6-62 summarises the LCVIA matrix which presents the overall impact rating based on the sensitivity and magnitude of change in landscape character and visual amenity due to the proposal.

Table 6-62 Landscape character and visual impact assessment matrix

		Magnitude			
		High	*Moderate*	*Low*	*Negligible*
Sensitivity	*High*	High	High – moderate	Moderate	Negligible
	Moderate	High -moderate	Moderate	Moderate - Low	Negligible
	Low	Moderate	Moderate - Low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Safeguards and management measures

Safeguards and management measures were identified based on the LCVIA. The mitigation strategy comprises of principles or treatments recommended to manage the identified landscape character and visual impacts of the proposal.

Strategies, plans and guidelines

The proposal is guided by the overarching best practice urban design principles and project-specific documents, project-specific principles and guideline documents including:

- *Guidelines for landscape character and visual impact assessment* (TfNSW, 2023j)
- *Beyond the Pavement – Urban design policy, procedures and design principles* (TfNSW, 2023d)
- *Reconciliation Action Plan 2022-2025* (NIAA, 2022)
- *Landscape design guideline- Design guideline to improve the quality, safety and cost effectiveness of green infrastructure on roads and street*s (TfNSW, 2023k)
- *Bridge Aesthetics – Design guideline to improve the appearance of bridges in NSW* (TfNSW, 2023l)
- *Shotcrete Design Guideline – Design guidelines to improve the appearance of shotcrete in NSW* (TfNSW, 2023)
- *Water sensitive urban design guideline – Applying water sensitive urban design principles to NSW transport projects* (TfNSW, 2023m)
- *Connecting with Country – Good practice guidance on how to respond to Country in the planning, design and Delivery of the built environment projects in NSW* (Government Architect NSW, 2023)
- *Vision for Country - Blacktown Native Institute for DSMG 2024* (COLA, 2024).

6.9.2 Existing environment

Local context

Around the proposal area is a variety of land uses including: medium to low density residential, terrestrial and scenic biodiversity, light industrial, open spaces and green corridors. Areas of cultural significance include the Blacktown Native Institution, the Colebee and Nurragingy Land Grant and the Baitul Huda Mosque.

Vegetation within the construction boundary consists of remnant vegetation communities and introduced vegetation (both native and exotic) associated with rural and residential land uses. The remnant native vegetation consists of three communities: Cumberland Shale Plains Woodland, Castlereagh Ironbark Forest and River-flat Eucalyptus Forest. Planted native and introduced exotic species are found along the east and west fringes of Richmond Road at the front of residential properties, the commercial properties and along median strips. Further information is provided in section 6.8.

The topography of the proposal area is relatively flat with water running north away from the M7 Motorway. The landforms from Rooty Hill Road North to Bells Creek undulates on a downward slope and slopes back up towards the industrial area, creating the creek line that intersects beneath Richmond Road within the proposal area. The low-lying landforms enables wide, opens views across the floodplain surrounding Bells Creek, taking in the rural grasslands with scattered trees.

Aboriginal cultural heritage

The proposal lies on the traditional lands of the Dharug people. There are two sites of significance that are important considerations for the design:

- At the intersection of Rooty Hill Road North and Richmond Road is the state heritage listed Blacktown Native Institution, a former residential school for Aboriginal and Māori children that was operational between 1823 and 1829.
- The Colebee and Nurragingy Land Grant is a site of state heritage significance because of its combination of historical, social and cultural values. It marks the first land grant ever given to Aboriginal people in Australia and is linked to two pivotal Aboriginal figures of the early colonial era, Nurragingy and Colebee, who received the joint grant in 1816.

Further information is provided in section 6.4 and section 6.5.

Transport access and movement

Richmond Road is a primary access route to the north-western suburbs in Sydney and experiences large amounts of congestion where it meets the Rooty Hill Road North intersection. Public bus services 751 and 747 operate along Richmond Road, connecting the local community to Blacktown and the Hills area. All bus stops are signposted with bus lanes at the key intersections of the proposal. There is some existing cycleway infrastructure running along the western fringe of Richmond Road, nominated as a shared path for pedestrians and cyclists. There is also an existing cycleway and pedestrian connection on the M7 Motorway that links active commuters to Western Sydney Parklands and Sydney's east.

Further information is provided in section 6.1.

Landscape character zones

The landform, vegetation, views and vistas, settlement patterns and built structures within and adjoining the study area combine to define its landscape character. Within and surrounding the study area, seven Landscape Character Zones (LCZs) were identified as follows:

- LCZ 1A – Residential A
- LCZ 1B – Residential B
- LCZ 2 – M7 Motorway
- LCZ 3 – Semi-open grassland
- LCZ 4 – Open rural grassland
- LCZ 5 – Enclosed Native Bushland
- LCZ 6 – Industrial/ commercial.

The LCZs are described in Table 6-63 and the locations are shown in Figure 6-24.

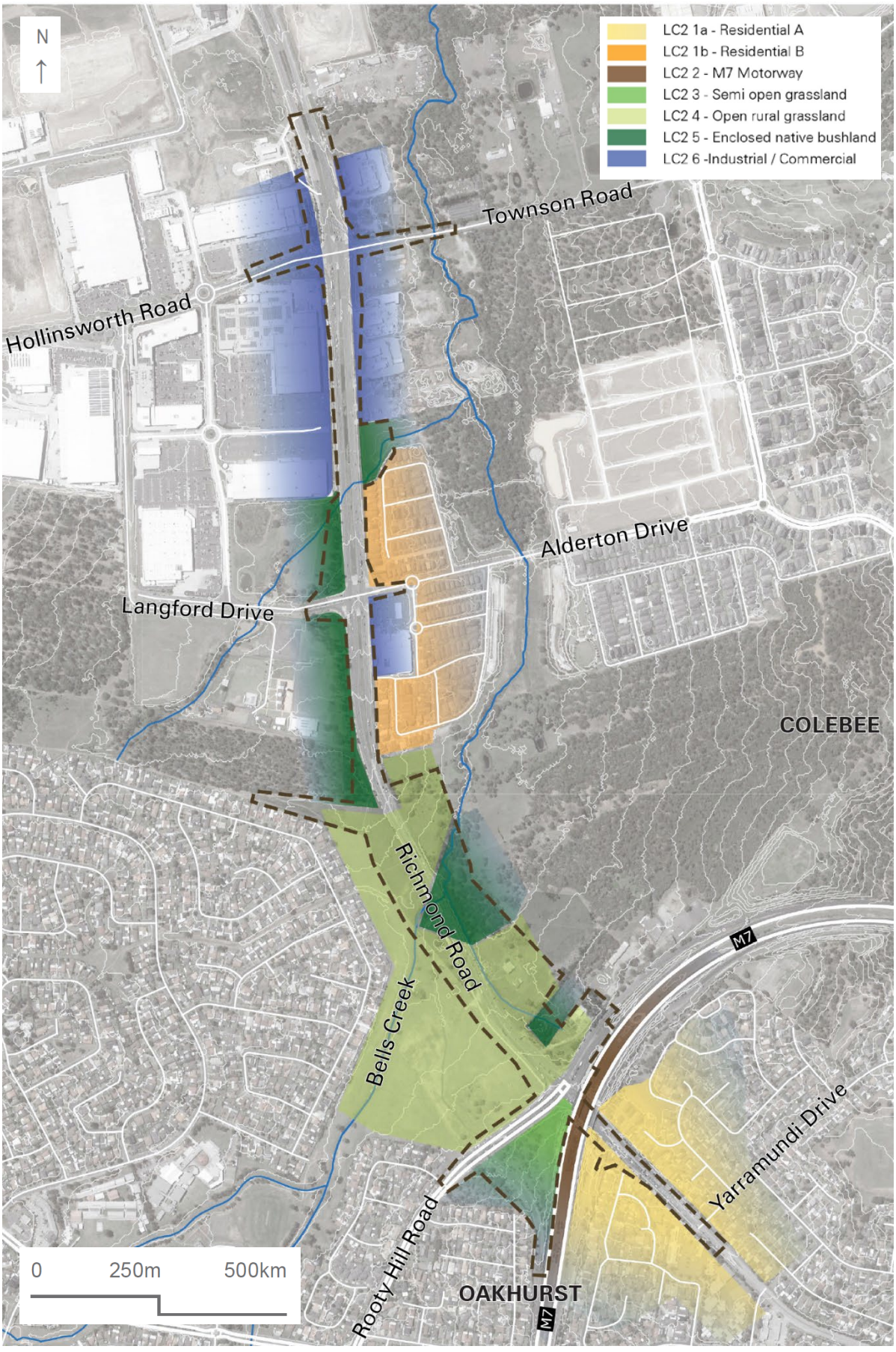
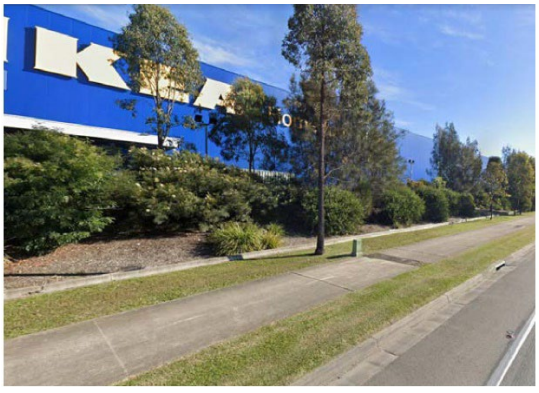


Figure 6-24 Landscape character zones

Table 6-63 Landscape character zones

LCZ	Description	Existing view
LCZ 1A - Residential	This character zone includes the residential area to the south of the proposal area along Richmond Road. The scale is low density, with typically single-storey houses screened by average height (1.5 - 1.8m) rear fences of various colours and designs that present a 'closed' edge to the footpaths along Richmond Road. Within the rear gardens a mix of native and exotic species creates a pattern of intermittent vegetation of varying heights, seen above the fences. The narrow area between the road and property boundaries contains concrete shared paths on both sides, flanked by narrow turf verges. There is also a large amount of road infrastructure: power poles, overhead electrical wires and multiple traffic signs, including large directional signage. The topography of this zone is largely flat across the road corridor and within the property boundaries.	
LCZ 1B - Residential	This character zone includes the residential area further north along Richmond Road. Similarly to LCZ 1A the houses are typically single-storey and screened by average height (1.5 - 1.8m) fences. However, the setbacks of the fences from the road are wider and there is more mature vegetation screening them and the houses from the road. Notwithstanding the extent of solid fencing, the overall spatial character is more open than closed, as larger trees are spaced intermittently and there are large areas of clear skyline above the houses. As well as the mature trees, there is a dense understorey of low and medium shrubs against the fence line, set behind a footpath with a grass verge separating it from the road. The topography of this zone is flat across the road corridor and within the property boundaries.	
LCZ 2 - M7 Motorway	The M7 Motorway character zone is characterised by the motorway infrastructure. Richmond Road in this zone is a divided carriageway of three lanes in either direction, and two M7 Motorway overbridges within a clearly defined road corridor. The infrastructure is large in the vertical as well as the horizontal scale. Vegetated batters rising to meet the bridge infrastructure on the eastern side integrate the built form to some extent within the landform and help visually soften the hardscape. Overall, however, the concrete retaining walls, piles and straight girders of the bridges, and the large extent of surface paving, are the dominant features of this zone.	

LCZ	Description	Existing view
LCZ 3 - Semi-open grassland	This zone is wedge-shaped land between the M7 Motorway and its northbound off-ramp, and Rooty Hill Road North. Characterised by a large area of pasture grasses through the middle, with tree cover and well-established planted native vegetation at the edges. From within the LCZ there are views north over Rooty Hill Road to the Blacktown Native Institution site and more distantly towards the residential subdivision. The view east is blocked by noise walls along the M7 northbound carriageway, atop a vegetated slope. There is a sense of enclosure.	
LCZ 4 - Open rural grassland	This pocket of land contains a mix of rural pasture, and areas of native grasses and scattered mature, native trees in a loose, irregular arrangement. East of the Richmond Road corridor there is a semi-enclosed spatial quality. The topography slopes up towards the M7 Motorway, which can be glimpsed through the trees but which sits well below the canopies on the skyline. West of the corridor the land is more open, and includes views to and across the site of the former Blacktown Native Institution, a site of heritage and cultural significance which makes up a large proportion of the LCZ	
LCZ 5 - Enclosed native vegetation	This character zone encompasses the areas that comprise dense native vegetation associated with Bells Creek and its tributaries. The land is flat or slightly undulating as it descends towards the waterway. A mix of riparian species lines the creek corridor, with Casuarina dominating, together with some clusters of Eucalypts. There are a number of threatened ecological communities. There is a sense of enclosure, with the vegetation acting as a visual buffer to areas beyond.	
LCZ 6 - Industrial/ commercial	Commercial land uses dominate this character zone, with large, simple orthogonal 'big box' building types accommodating businesses including Ikea, Bunnings, Home Consortium and service stations. The buildings are typically set in, and surrounded by, large areas of hardstand used for car parking, storage, and internal roads. There is little if any relationship to or overlooking of the road. The landform generally slopes in a west-east direction with batters gently rising up from the road corridor towards the built form of the western side and dropping down along the east. Some properties have a decorative landscaped strip along the front boundary, with a mix of	

LCZ	Description	Existing view
	native and exotic species, generally confined to lower shrubs or formal hedging with intermittent tree planting.	

Viewpoints

The potential visual impacts are assessed in relation to a number of key viewpoints throughout the study area. These locations and directions of chosen viewpoints are representative of the range and diversity of viewpoints within the visual catchment. The viewpoints are:

- Viewpoint 1 – junction of Richmond Road and Rooty Hill Road north, looking south-west.
- Viewpoint 2 – corner of Romley Crescent and Rooty Hill Road North, looking north-east.
- Viewpoint 3 – Rooty Hill Road North in front of the Blacktown Native Institution, looking north-east.
- Viewpoint 4 – view along Richmond Road just north of the M7 Motorway, looking north towards Bells Creek bridge crossing.
- Viewpoint 5 – from the rear property boundary of 131 Colebee Crescent, looking east across the Blacktown Native Institution.
- Viewpoint 6 – view along Richmond Road at the Bells Creek bridge crossing, looking north.
- Viewpoint 7 – view from between Nos. 79 and 81 Colebee Crescent, at the culvert, looking east.
- Viewpoint 8 – corner of Alderton Drive and Richmond Road intersection, looking south.

The viewpoints are described in Table 6-64 and their locations are shown in Figure 6-25.

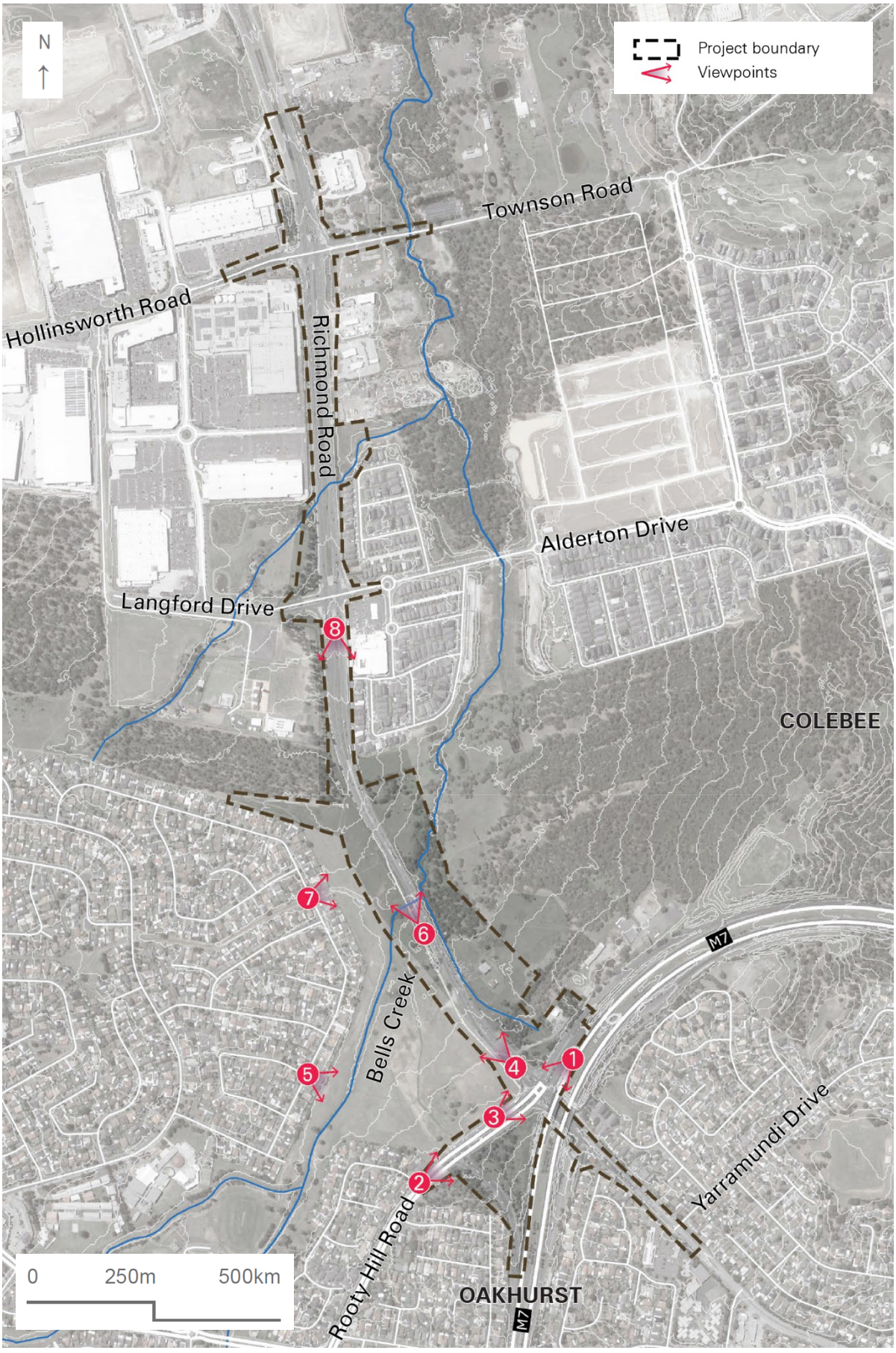


Figure 6-25 Visual impact assessment viewpoints

Table 6-64 Viewpoints

Viewpoint	Description	Existing view
VP1	Location: Junction of Richmond Road and Rooty Hill Road north, looking south-west. This view is at the intersection of Richmond Road with Rooty Hill Road North, looking towards the proposed new bridge connecting the M7 Motorway to Richmond Road. The view is composed of road infrastructure in the foreground and middle ground, with some canopy trees visible on the skyline. Road surface takes up a significant portion of the view.	
VP2	Location: Corner of Romley Crescent and Rooty Hill Road North, looking north-east. This view is along Rooty Hill Road North, towards the proposal in the middle distance. The view is composed of the carriageway (three lanes in each direction), single-storey dwellings on the western side of the roadway, and a fenced reserve to the east with large mature eucalypts behind. Road furniture includes light poles, overhead gantry and directional signage.	
VP3	Location: Rooty Hill Road North in front of the Blacktown Native Institution, looking north-east. This view is further along Rooty Hill Road North than Viewpoint 2, towards the corner with Richmond Road and looking across the intersection towards the north-east. The view is composed of wide carriageway, with the existing M7 Motorway overbridge seen obliquely in the foreground. There is a backdrop of tall tree canopy behind the M7 Motorway overbridge, against the skyline. Apart from the trees, vegetation is limited and at ground level.	

Viewpoint	Description	Existing view
VP4	Location: View along Richmond Road just north of the M7 Motorway, looking north towards Bells Creek bridge crossing. This view is from the road, travelling north with the Blacktown Native Institution site on the left and the edge of a pocket of open space on the right. This view is composed of a mixture of road infrastructure (three lanes in each direction) and a building/shed (foreground), and both cleared and forested landscape (mid-range and in the background). The skyline is defined by the tree canopy, including along the edge of Richmond Road.	
VP5	Location: From the rear property boundary of 131 Colebee Crescent, looking east towards and across the Blacktown Native Institution site. This view is of mostly cleared land, with some scattered eucalypts in the foreground, and native forest trees in the background on the other side of Richmond Road in the middle distance. Bells Creek runs across the front of the view, visible as a line of low grasses along its banks. The main characteristic of this viewpoint is its open, flat character with the strong green of remnant native forest planting as a backdrop.	
VP6	Location: View along Richmond Road at the Bells Creek bridge crossing, looking north. This view is shared by people in vehicles, and pedestrians and cyclists on the shared path. Here the road is enclosed on the east with established tall and dense riparian planting, and on the west with intermittent groups of trees and shrubs. The street vista is long and interrupted towards the north.	

Viewpoint	Description	Existing view
VP7	Location: View from between Nos. 79 and 81 Colebee Crescent, at the culvert, looking east. Houses along Colebee Cresent back on to public open space around Bells Creek. A stormwater culvert runs underneath the road and into the open space, through a grassed channel. This view is taken from the rear property line between Nos. 79 and 81 Colebee Crescent, and is over the open space towards Richmond Road, which is partially screened by individual or small groups of trees. There is a backdrop of dense native vegetation behind the road, which defines the skyline. The outlook is open and green.	
VP8	Location: View from the corner of Alderton Drive and Richmond Road intersection, looking south. Road infrastructure dominates the foreground of this view. Industrial and services land uses front the eastern side of Richmond Road into the distance, behind grass verges, footpath and some vegetation in the front set-backs. On the west side a row of tall established native trees is a strong visual element. The tree canopy dominates the occasional buildings among it, including two-three storey dwellings at the edge of the residential neighbourhood.	

6.9.3 Potential impacts

Construction

During the construction phase, the proposal would generate temporary localised visual impacts including:

- the use of three temporary ancillary facilities
- use of traffic control measures, vehicles and personnel
- presence of construction vehicles, machinery and plant, as well as site equipment
- stockpiled materials
- earthworks
- light spill during night works
- vegetation removal.

Residents living near the proposal, businesses and their customers, the Blacktown Native Institution and Baitul Huda Mosque would view construction activities and associated construction equipment and materials throughout the construction phase. This would impact the visual amenity of these receivers. However, in the context of an existing, highly utilised road corridor with a large amount of road infrastructure (e.g. signs, light poles and overhead electrical wires) the impacts are not considered significant and would be temporary in nature.

Road users would experience impacts as they travel along the proposal roads. As the duration of the impacts would for a short period, and drivers would be mobile and focused on the immediate road environment the impacts are considered low.

The proposal would require some vegetation removal for road widening and utility adjustment, which would also have impacts on the community who value the natural environment. The removal of vegetation would result in visual impacts to surrounding receivers. The loss of vegetation would be mitigated via plantings as outlined in the operational assessment below.

Overall, the impacts on visual amenity and landscape character during construction would be of a temporary nature, limited to the construction period and would not have a long-term visual impact.

Ancillary facilities

Three ancillary sites are proposed to operate during the construction phase of the proposal as outlined in section 3.4. These facilities are:

- Site 1: Richmond Road
- Site 2: M7 (adjacent to Rooty Hill Road North)
- Site 3: Adjacent to Newnham Street.

The ancillary facilities at Site 1 and Site 2 would require site offices, sheds, workshops, plant laydown and storage area, materials laydown and storage, stockpiled material and construction employee parking. The visual impacts of the ancillary facilities would be experienced by road users as they travel along Richmond Road, Rooty Hill Road North and the M7 Motorway Rooty Hill Road North off-ramp, and also by pedestrians and cyclists where infrastructure allows. The impact is considered to be low due to the mobile nature of the receiver, and the temporary nature of construction.

Residences along Colebee Crescent near Site 1 may have views of the ancillary site from the rear of their properties although these would be partially screened by fencing. Likewise, residences at the northern end of Pepperidge Avenue near Site 2 would have partial views of the ancillary site and bridge construction works, although views would be obscured by vegetation and an existing noise wall.

The third ancillary facility would be located on Newnham Street, a residential street in proximity to the M7 Motorway. The site would be used for site offices and employee parking areas. The limited activity at this site would limit the visual impact, although these uses would be visible from the residences in close proximity.

Generally, the visual impacts due to construction of the proposal has been considered low due to their immediate link to the construction works of the proposal and the low population density which minimises the number and nature of receivers.

Operation

In general, the impacts of the proposal on the landscape and visual environment would vary along the length of the study area. The majority of changes resulting from the proposal would affect residents, pedestrians, cyclists and motorists. Some features of the proposal would impact on visual amenity and landscape character during operation including the removal of existing vegetation and the construction of the new bridges.

Landscape character assessment

Table 6-65 outlines the results of the landscape character assessment in terms of the sensitivity and magnitude of the works, and the overall impact assessment. Across the seven LCZs the impact of the proposal varies from high to negligible, with more falling into the lower range. One LCZ is considered to have a moderate-high impact, and for two LCZs the impact is considered high.

Table 6-65 Landscape character assessment results

LCZ	Sensitivity	Magnitude	Landscape character impact
Zone 1A – Residential A	Low The sensitivity within this zone is considered low due to the highly modified and visually cluttered road environment, high fences of varying materiality and condition and lack of consistent vegetation.	Negligible This LCZ marks the limit of works. It is largely unaffected by the proposal, as the road widening and new structures are focused north of the M7 Motorway which bounds the character zone. Existing mature planting edging the M7 Motorway southbound on- ramp is retained, as is the location of the cycleway and signalised pedestrian crossings.	Negligible
Zone 1B – Residential B	Moderate The sensitivity within this zone is considered moderate due to the established landscape buffer between the road and property boundary, and the general absence of vertical and overhead infrastructure associated with the road corridor.	Low The proposal in this location includes widening of Richmond Road with an additional lane in each direction, and an upgrade to the intersection with Alderton Drive. The median is proposed to be narrowed to accommodate a right turn lane for southbound traffic. The median is currently set to lawn, and would be planted with endemic grasses (maximum 1 m high). Given that the changes remain at grade and in keeping with the existing form and scale of the corridor, the magnitude is low.	Moderate-low
Zone 2 – M7 Motorway	Low The sensitivity within this zone is considered low due to the highly modified environment characterised by large-scale motorway infrastructure.	Low The proposal introduces a flyover bridge that connects the M7 Motorway to Richmond Road. The bridge runs between the elevated M7 Motorway through lanes and its off-ramp to Rooty Hill Road North. It would be concealed from view on the main corridor by an existing noise wall that edges the M7 Motorway. This LCZ comprises road infrastructure in its entirety, and the proposal is serving the same purpose and is of a scale consistent with what is existing. Notwithstanding the cumulative impacts of new infrastructure, for all these reasons the magnitude is low.	Low
Zone 3 – Semi-open grassland	High The sensitivity of this area is considered high. Whilst modified to some extent, it is spatially contained and retains strong and consistent stands of mature native trees and shrubs.	High This LCZ would have the new flyover bridge running through it. The bridge has a haunched superstructure, with piers widely spaced at 50 metres and 75 metres to straddle Rooty Hill Road North and the shared path and northbound lanes on Richmond Road. The proposal landscape concept is for native grassland to supplement the existing character, including a high proportion of flannel flowers. However, this does not offset the different and larger scale, form and materiality of the new structure.	High

LCZ	Sensitivity	Magnitude	Landscape character impact
Zone 4 – Open rural grassland	High This area has been modified from its original natural setting but has a consistent character with cleared land and some remnant mature trees. It includes a site of significant heritage and cultural significance, with an open character and views from within the site to native forest areas, and distant hills on the skyline.	High The proposal impacts this LCZ with the widening and realignment of the road corridor, additional lanes, relocation of shared path to the west, diversion of the existing swale and new plantings. The magnitude of these changes considered together is high.	High
Zone 5 – Enclosed native bushland	High The sensitivity of this LCZ is considered high due to the generally unmodified environment, including the riparian vegetation and tall tree canopy, and the continuing presence of ecological species that belong to the area. It is sensitive to change, from potential loss of planting density and discontinuity of canopy as well as from the introduction of built form amongst vegetation.	Moderate The proposal impacts this LCZ with road widening, removal of roadside vegetation and large trees near the boundary of the Blacktown Native Institution, new bridges and new planting along the western edge of the road corridor and in the median. While the proposal introduces changes to the LCZ, these are typically at-grade. Tree removal is contained to those immediately alongside the corridor and there is extensive new planting including riparian species to the western side of the corridor, to mitigate the loss of existing vegetation around the creek. The new bridge in this area is not distinguishable from the rest of the road.	High-moderate
Zone 6 – Industrial/Commercial	Low The sensitivity of this area is considered low due to the large-scale, internalised building types, large areas of hard stand, and relatively sparse and lower-scale vegetation, which together can readily absorb a measure of change.	Low This character zone is at the northern limit of works for the proposal. Here the proposed new work essentially ties back into the current alignment and lane arrangements, largely within the existing corridor width. The median has been narrowed to accommodate the new through lanes, right- turn lane and slip lane. The median is proposed to be planted with native grasses instead of the existing mown grass. Established vegetation either side of the corridor is retained.	Low

Visual impact assessment

Table 6-66 outlines the results of the visual impact assessment. Refer Figure 6-26 to Figure 6-41 for the existing and proposed visual changes. Of the eight viewpoints selected, two have a low impact rating, four have a moderate impact rating, one has a high-moderate impact rating and one has a negligible impact rating.

Table 6-66 Visual impact assessment results

Viewpoint / Figure references	Sensitivity	Magnitude	Visual impact
VP1 Figure 6-26 Figure 6-27	Low This view is experienced by road users, both in moving vehicles if traffic is flowing and also at a standstill if waiting at the traffic lights. The duration of view therefore varies from some seconds to several minutes. As the approach is 'head on', directly towards the intersection, the proposal would also be fully visible in the foreground. The view is experienced by a large number of viewers, but whose focus is on the immediate road environment. The composition of the view is divided horizontally into road and road infrastructure in the foreground, with wide open sky across the background.	High The proposal would alter this view with a proposed new bridge, a large elevated structure straddling the intersection. The bridge would dominate the foreground, introducing a strong horizontal datum that partially obscures the skyline. The bridge design is for haunched girders atop solid piers: it is not a slender structure (by comparison, the proposed superstructure is deeper than the nearby existing bridge across Richmond Road, seen at the left of the view).	Moderate
VP2 Figure 6-28 Figure 6-29	Low The view is experienced by road users, pedestrians and on-road cyclists. Rooty Hill Road is a major connector road and is dominated by traffic including large trucks and service vehicles. The large stand of mature trees along the south-east side of the road frame and somewhat offset the wide road corridor. Tree canopy is visible in the background, beyond the intersection, but is less immediately apparent than the road infrastructure including the large signage elements.	Low The proposal is visible in the middle distance from this viewpoint. The proposed new bridge extends across most of the view, on axis from the viewer. However, the structure is relatively low within the overall view composition, sitting just below the canopy trees that define the skyline in the background. The strong element of the large trees to the south-east is unchanged. Overall, the scale and character of the change is framed by and complementary to the existing setting.	Low
VP3 Figure 6-30 Figure 6-31	Low The view is experienced by road users, pedestrians and cyclists travelling on this major connector road. Road infrastructure makes up most the view, with lighting, signage, paving and the large M7 Motorway overbridge dominant. Traffic includes large trucks and service vehicles as well as cars. Overall, there is a sense of visual clutter. While there are many and frequent viewers in this location, the composition of the view is dominated by the foreground infrastructure.	High The proposal is visible in the foreground as a large horizontal element that extends across most of the view, on axis from the viewer. It obscures some of the existing M7 Motorway infrastructure and the canopy trees in the background.	Moderate

Viewpoint / Figure references	Sensitivity	Magnitude	Visual impact
VP4 Figure 6-32 Figure 6-33	Low The view is experienced by road users, and also by pedestrians and cyclists on the shared path along Richmond Road. For road users, with a posted speed limit of 70km/hr. the view is oblique and relatively fleeting. For path users, the view is longer in duration (due to slower speeds) but potentially slightly buffered by the northbound travel lane. Given that road infrastructure dominates and the overall view composition is mixed rather than consistent, the sensitivity is considered to be low.	High The proposal in this location is a bridge that follows the alignment of Richmond Road, from the foreground into the middle distance. It introduces an elevated structure to what is currently an at-grade roadway, with additional traffic lanes and a realigned shared path. The overall composition of the view is altered by the widening itself – with a larger area of hard surface – and by closing down the outlook and obscuring some of the roadside and background tree canopy on the western side of the corridor.	Moderate
VP5 Figure 6-34 Figure 6-35	High This view is from the rear of private properties along Colebee Crescent. Tall back fences limit the view of these residents from ground level and garden areas, although views may be available from upper floor windows. The view is also available to members of the public, being within the open space network that connects to Mittigar Reserve (to the south) with the reserve around Bells Creek. The background view includes the M7 Motorway overbridge, visible at the intersection of Richmond Road and Rooty Hill Road North. Tall vehicles on Richmond Road can also be seen. Across the creek, the Blacktown Native Institution is a site of cultural and heritage significance and is owned and regularly used by Dharug people for ceremony, cultural practice, education and as a place for gathering.	Moderate The proposal is towards the backdrop of this viewpoint, some 350 m from the viewer. The proposed new bridge is set below the treeline but does obscure some of the vegetation. Its scale and form are not inconsistent with the M7 Motorway overbridge, and glimpses of the backdrop are retained under the parapet and between the piers. The 'proposed' view shown in Figure 6-35 is an indicative impression of the new bridge including the solid component of the structure, the off-ramp portion. This is proposed to be partially screened, and the structure softened by planting of native shrubs and trees towards the northern end of the Blacktown Native Institution site where the overpass meets the abutment. This combined with the distance from the view make the magnitude of the proposal in this location moderate. It is important to note, however, that increased visual impacts from within the Blacktown Native Institution are an additional consideration. A closer viewpoint would trigger a magnitude of high, and potentially require additional landscape treatment and / or screening within the site as mitigation. This is appropriate to investigate in future stages of the proposal, subject to consultation with the Dharug owners of the Blacktown Native Institution.	High-moderate

Viewpoint / Figure references	Sensitivity	Magnitude	Visual impact
VP6 Figure 6-36 Figure 6-37	Moderate Richmond Road is busily trafficked by car users, cyclists and pedestrians. This is a 'long view' where road and path users experience the landscape on approach and where this viewpoint is therefore also representative of part of the journey, and of the outlook for recreational cyclists and pedestrians. While the native riparian vegetation is highly visible and a strong feature of the landscape, on the west the outlook is more varied.	Moderate This viewpoint shows where the new flyover bridge lands on Richmond Road to join the right (inner) lane of northbound traffic. The proposal widens and realigns the road corridor towards the west, with southbound traffic using the existing carriageway and northbound traffic lanes on the new alignment, which has resulted in the removal of all the trees visible on the left in the 'existing view' image (Figure 6-36). The shared path is now closer to the vehicle lanes than at present where it is separated by a wide grassed verge. The proposal includes an avenue of tall trees, with understorey planting, along the western edge to replace the vegetation removed by the proposal. The new median is wide and would be planted with native grasses to break up the wide expanse of paving and visually narrow and soften the hardscape.	Moderate
VP7 Figure 6-38 Figure 6-39	Moderate This is not a heavily used area by the public but is part of the open space network. Residents' back fences obscure it from their gardens or ground level rooms. In this location most houses are single storey so more elevated views are not currently available. As with VP5, this view is defined by its open, green outlook, with the brighter mown grass strongly contrasting with the darker colour of the native forest vegetation. The sensitivity, because of this consistency across the wide view, is moderate.	Negligible The proposal is in the background of this viewpoint, about 300 m from the viewer. No elevated structures are visible from this location and the proposed widening, being at grade, is not readily apparent. New planting proposed adjacent to Richmond Road, when mature, would further screen the road and road traffic. The view remains strongly defined by its 'green' character, both the dense backdrop and the open grass areas.	Negligible
VP8 Figure 6-40 Figure 6-41	Low The view is at a busy intersection and is seen by people in vehicles, cyclists and pedestrians. The large scale and mixed quality of the elements that comprise the view mean its sensitivity is low.	Low The proposal in this location retains the overall width of the carriageway but narrows the median to accommodate an additional through lane. The median is proposed to be planted with low native grasses instead of what is currently mown grass, by way of offsetting the reduction of unpaved area. The grasses, being higher (up to 1 m), are intended to soften and enhance the appearance of the planted median.	Low

Figure 6-26 Existing viewpoint 1 -M7 off ramp, looking south-west

Figure 6-27 Proposed viewpoint 1 -M7 off ramp, looking south-west

Figure 6-28 Existing viewpoint 2 -Corner Romley Cresent and Rooty Hill Road North, looking north-east

Figure 6-29 Proposed viewpoint 2 -Corner Romley Cresent and Rooty Hill Road North, looking north-east

Figure 6-30 Existing viewpoint 3 - Rooty Hill Road North in front of Blacktown Native Institution, looking east

Figure 6-31 Proposed viewpoint 3 - Rooty Hill Road North in front of Blacktown Native Institution, looking east

Figure 6-32 Existing viewpoint 4 - Richmond Road, looking north towards Bells Creek bridge crossing

Figure 6-33 Proposed viewpoint 4 - Richmond Road, looking north towards Bells Creek bridge crossing

Figure 6-34 Existing viewpoint 5 - Rear property boundary of 131 Colebee Cresent, looking east

Figure 6-35 Proposed viewpoint 5 - Rear property boundary of 131 Colebee Cresent, looking east

Figure 6-36 Existing viewpoint 6 - Richmond Road Bells Creek bridge crossing, looking north

Figure 6-37 Proposed viewpoint 6 - Richmond Road Bells Creek bridge crossing, looking north

Figure 6-38 Existing viewpoint 7 - Colebee Cresent culvert crossing between No. 79 and 81, looking east

Figure 6-39 Proposed viewpoint 7 - Colebee Cresent culvert crossing between No. 79 and 81, looking east

Figure 6-40 Existing viewpoint 8 - Alderton Drive and Richmond Road intersection, looking south

Figure 6-41 Proposed viewpoint 8 - Alderton Drive and Richmond Road intersection, looking south

6.9.4 Safeguards and management measures

Table 6-67 outlines the landscape character and visual safeguards and management measure to be implemented by the proposal.

Table 6-67 Landscape character and visual safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
LC1	Urban Design Plan	The *Urban Design Concept Plan* (Design Inc (2024), Appendix I) would form the basis of future landscape and detailed design development, providing an integrated urban design for the proposal, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan would include design treatments for: • location and identification of existing vegetation and proposed landscaped areas, including species to be used • built elements including retaining walls, bridges and noise walls • pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • fixtures such as seating, lighting, fencing and signs • details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • procedures for monitoring and maintaining landscaped or rehabilitated areas.	Contractor	Detailed design / Pre-construction
LC2	Urban design	The urban design objectives and principles outlined in section 2.3.2 of this REF would be considered during subsequent design stages.	Transport	Detailed design
LC3	Visual impact of construction work	Work sites, including construction areas and supporting ancillary facilities would be managed to minimise visual impacts, including appropriate fencing or screening (e.g. use of shade cloth), storage of equipment, parking, stockpile screening and arrangements for the storage and removal of rubbish and waste materials.	Contractor	Construction
LC4	Visual impact of construction work	Compound and ancillary facilities would be decommissioned, and the sites rehabilitated to their existing condition or as otherwise agreed with the landowner as soon as possible.	Contractor	Construction
LC5	Light spill	The design of temporary lighting would be undertaken in accordance with the requirements in Australian Standard AS 4282-2019 *Control of the Obtrusive Effects of Outdoor Lighting* and would avoid unnecessary light spill on adjacent receivers.	Contractor	Construction
LC6	Vegetation removal	Native vegetation removal would be minimised through detailed design and during construction.	Transport / Contractor	Detailed design / Construction
LC7	Vegetation removal	Clearly define clearance limits and exclusion zones to protect existing vegetation cover.	Contractor	Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
LC8	Vegetation removal	Undertake landscape planting on the basis of the Urban Design Concept Plan (Design Inc (2024), Appendix I) including: • Screening planting with local plant species that match the community and landscape character to minimise the impacts. • Median planting with native grasses to reduce the apparent extent of hard paving and mitigate visual impact of the widening.	Transport	Detailed design
LC9	Visual impact of flyover bridge	Design of the curvature of the bridge would include small enough segments to achieve a smooth curved profile rather than a faceted profile, to achieve the elegant form envisioned for the structure.	Transport	Detailed design
LC10	Visual impact of flyover bridge	High quality design and finish to the bridge abutment walls, particularly where they face the Blacktown Native Institution site, and ongoing engagement with Aboriginal stakeholders around the potential for cultural interpretation.	Transport	Detailed design
LC11	Visual impact of flyover bridge	Opportunities for artwork and/or design on the flyover bridge and retaining walls would be developed in consultation with local knowledge holders.	Transport	Detailed design
LC12	Visual impact of flyover bridge	Opportunities for landscape treatment in the south-east corner of the Blacktown Native Institution site would be developed in consultation with local knowledge holders.	Transport	Detailed design

6.10 Socio-economic

A Socio-economic Impact Assessment (SEIA) has been carried out to assess the potential socio-economic impacts during construction and operation of the proposal (Stantec, 2024f). A summary of the assessment is presented in the following sections.

6.10.1 Methodology

The SEIA has been prepared in accordance with the *Environmental Impact Assessment Practice Note (EIA-N05): Socio-economic Assessment* (Practice Note) (TfNSW, 2020b). The following sub-sections outline the SEIA methodology.

Scoping of socio-economic impacts

An initial scoping worksheet was completed in accordance with the Practice Note to identify the appropriate level of SEIA required for the proposal. This was based on a preliminary understanding of the existing environment, the sensitivity of the existing environment and the community in which the proposal occurs, and a review of the proposal design and activities which are likely to occur during construction and operation.

After the scoping process was completed, it was concluded and agreed with Transport that a 'Moderate' level of SEIA assessment would be applied.

Identifying the study area

The geographical extent of the study area for purposes of this SEIA comprises the communities that have the greatest potential to experience changes due to the construction and operation of the proposal. To provide a comprehensive evaluation of the population and community that may be affected by the proposal, the SEIA study areas have been defined as the Blacktown Local Government Area (LGA) and the identified Australian Bureau of Statistics (ABS) Statistical Areas – Level 2 (SA2) as shown in Figure 6-42.

The Blacktown LGA provides a broad coverage of the population and communities that might be impacted by the proposal. In addition, to inform a comprehensive evaluation, data has been provided for the population living closest to the proposal that have potential to experience changes due to the construction and operation of the proposal. This population has been defined on the ABS delineation of the following five SA2s (SA2 codes are shown in the brackets):

- Riverstone (116021630)
- Marsden Park – Shanes Park (116021629)
- Schofields (West) – Colebee (116021631)
- Hassall Grove – Plumpton (116031315)
- Glendenning – Dean Park (116031314).

ABS SA2s are designed to represent communities with similar social and economic characteristics, that interact socially and economically, generally reflecting a single geographic community such as a suburb, town, or rural district. SA2s provide reliable data for detailed local analysis.

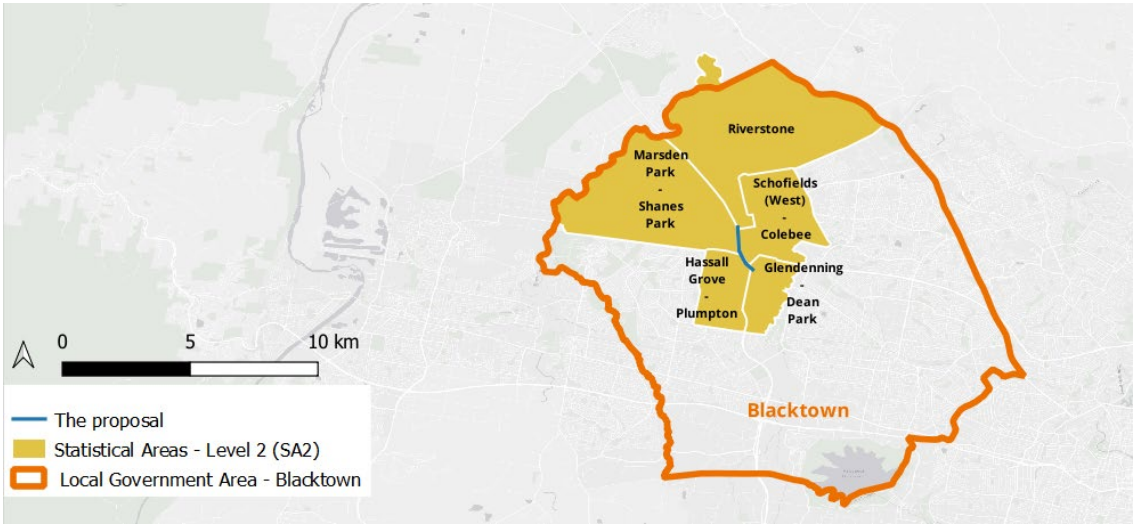


Figure 6-42 The SEIA study areas

Establishing a baseline

To better understand the existing socio-economic characteristics of the study area, a number of data sources and information have been reviewed including the ABS census data, relevant business and economic data, relevant socio-economic policies, inventory of social infrastructure, community values and technical reports and chapters prepared as part of the REF (for example noise and vibration assessment). Stakeholder consultation also formed part of establishing the baseline.

Assessment

The methodology for identifying and assessing the socio-economic impacts associated with the proposal is adopted from the Practice Note, accompanied with:

- Identification of potential issues through proposal design review. Matters considered included; property; changes to population and demography; economic, employment and business; social infrastructure; community values and local amenity; and access and connectivity.

- Review of the results and outcomes of targeted consultation with key community, interest groups, and local council stakeholders, and state government stakeholders to identify specific impacts and mitigation measures.
- Review of other technical studies and chapters prepared for the REF.

The proposal has the potential to affect multimodal transport users, nearby residents, businesses, social infrastructure users and the wider community, both positively and negatively. The level of significance of the identified socio-economic impacts have been assessed through two dimensions:

- The sensitivity of the receptor (vulnerability to change and capacity to adapt), and
- The magnitude of the potential impacts (scale, duration, intensity, and scope of the proposal).

The matrix shown in Table 6-68 is used to assess the level of significance of the potential impacts. This is done by combining the level of sensitivity and magnitude. Opportunities to enhance positive impacts are investigated as appropriate.

Table 6-68 Level of significance of socio-economic impacts

		Magnitude			
		High	*Moderate*	*Low*	*Negligible*
Sensitivity	*High*	High	High – moderate	Moderate	Negligible
	Moderate	High -moderate	Moderate	Moderate - Low	Negligible
	Low	Moderate	Moderate - Low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Development of mitigation measures

Proposal-specific management measures to mitigate, reduce, or all together avoid the negative impacts of the proposal on quality of life or socio-economic conditions within the study area were determined.

6.10.2 Existing environment

The proposal is in the Blacktown LGA, in NSW. The Blacktown area has a total land area of about 240 square kilometres and is located approximately 23 kilometres north-west of the Sydney Central Business District (CBD).

Over the past 10 to 15 years, this part of Sydney has experienced significant transformation. Once a rural landscape and former airfield, the rise of highway-oriented businesses around 2015 marked the area's evolution. This change has continued since the 2021 ABS Census, with further residential growth in Colebee. While Colebee still has some lots under development, many developments were only established in 2022 and 2023.

Social policy and context

The proposal is considered to align with State and local policies which are relevant for the socio-economic assessment including:

- *Future Transport Strategy* (TfNSW, 2022a)
- *A Metropolis of Three Cities - Greater Sydney Region Plan* (Greater Sydney Commission, 2018a)
- *Central City District Plan* (Greater Sydney Commission, 2018b)
- *North West Priority Growth Area Land Use and Infrastructure Implementation Plan* (DPE, 2017)
- *Our Blacktown 2041 Community Strategic Plan* (Blacktown City Council, 2022)

Further information on the relevance of these policies to the proposal is provided in section 2.1.

Population and demography

At the time of 2021 Census, the total population of the Blacktown LGA was 396,776, and the population in the five SA2s ranged from 8374 in Glendenning to 21,414 in Hassall Grove. The population growth in the Blacktown LGA was 3.32 per cent. The gender distribution is similar across all SA2s and the LGA, with females comprising approximately half of the population.

Blacktown LGA has the largest urban Aboriginal and Torres Strait Islander population in Australia, with 11,328 people identifying their Aboriginal or Torres Strait Islander heritage, comprising 2.86 per cent of the LGA population. This ranged from 0.88 per cent in Schofields to 3.84 per cent in Riverstone.

In 2021, the median age in Blacktown LGA was 34 years, and the SA2s median age ranged from 32 in Riverstone to 34 in Hassall Grove and Glendenning.

The Blacktown LGA has a similar profile compared to the five SA2s with regards to country of birth. It had Australia as the most common birthplace (50.4 per cent), followed by India (11.9 per cent) and then the Philippines (6.4 per cent). The remaining countries of birth account for a much smaller proportion of the total Blacktown LGA population.

Punjabi is the most commonly spoken language other than English in Riverstone, Glendenning, and the Blacktown LGA overall. It is also the second most spoken language in Schofields and Marsden Park. Hindi is the top language in Schofields and the second most spoken language in Hassall Grove and Glendenning.

In 2021, the average household size of Blacktown LGA was three people. The occupancy ratio within the five SA2s was quite similar, ranging from three to 3.4. The family composition of 'couple family with children' was the predominant household type in the Blacktown LGA as well as each of the five SA2s.

Economic profile

In 2021, the unemployment rate (expressed as a percentage of the total labour force) was five per cent for Riverstone, 5.5 per cent for Hassall Grove, 3.8 per cent for Marsden Park, 3.8 per cent for Schofields, 5.1 per cent for Glendenning and 5.8 per cent for the Blacktown LGA. By comparison, the national unemployment reported in the 2021 Census was 5.1 per cent.

The predominant industry of employment in both the Blacktown LGA and the five SA2s was Health Care and Social Assistance. However, the subsequent industries differ. In the Blacktown LGA, the next largest sectors were Retail Trade and Transport, Postal and Warehousing. In the SA2s, the secondary industries vary and include a mix of Construction, Retail Trade, Transport, Postal and Warehousing, Professional, Scientific and Technical Services, and Financial and Insurance Services.

In 2021, the median weekly household income in the Blacktown LGA was $2107, and for the five SA2s it ranged from $2073 in Glendenning to $3104 in Schofields. A similar trend was evident in the median weekly individual income.

In the financial year 2021/22, there were 30,543 local businesses in the Blacktown LGA, creating 136,102 local jobs (idCommunity, 2022). Richmond Road provides access to a large range of businesses and commercial hubs including Sydney Business Park, fast food stores, cafes, restaurants and pubs, petrol stations and large format retail and supermarkets.

Presence of vulnerable or marginalised groups

The ABS has developed a summary tool, the socio-economic indexes for areas (SEIFA), which provides four measures to rank areas based on their relative social and economic wellbeing. One measure is the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) with a score ranging from one (most disadvantaged) to 10 (most advantaged). The Blacktown LGA has a IRSAD decile of eight and is relatively advantaged. In contrast the Hassall Grove and Glendenning SA2s are more disadvantaged with a IRSAD index of five and four, respectively.

Census data reveals that 30,244 individuals in the Blacktown LGA were provided unpaid assistance due to a disability, health conditions, or old age. This represents 9.9 per cent of the population Blacktown LGA population. By comparison, this proportion is lower than the national figure of 11.9 per cent.

Access and connectivity

The transport network in the Blacktown LGA consists of trains, buses, roads (including the M7 Motorway) and pedestrian and cycle paths. Currently it takes about 1.5 hours of public transport to travel from Marsden Park to Sydney CBD and 45 minutes by car. The key transport networks including bus transport, train transport, active transport and freight transport are discussed in section 6.1.

There are no existing provisions for parking along either side of Richmond Road or on either side of the connecting local roads within the construction boundary. Key parking facilities are provided at; Marsden Park Home and Lifestyle Centre carpark; Bunnings Warehouse carpark; IKEA carpark and the CostCo Wholesale carpark.

In terms of business vehicle accessibility, the following businesses are currently accessed directly from Richmond Road:

- Driveway access via Chiswick Glade: McDonald's Drive Thru, Shell

- Ampol Foodary Marsden Park, Boost Juice - Ampol Marsden Park, Dominos Pizza Marsden Park, KFC Marsden Park, AmpCharge Charging Station
- Driveway access via Service Station Access Way: Starbucks Marsden Park, Strive Fitness (24/7 Smart Gym) Marsden Park, Oporto Marsden Park Drive Thru, 7-Eleven Marsden Park, BP Truckstop Wildbean Café
- Blacktown Nursery and Landscape Supplies
- Blacktown Native Institution – DSMG owned land.

The Blacktown LGA is car dependent, with only 6.6 per cent of households in the LGA without a motor vehicle. In the SA2s this ranged from 1.7 per cent in Schofield to 3.9 per cent in Hassel Grove.

In 2021, the majority of the residents in the Blacktown LGA as well as the five SA2s used a car to travel to work, followed by the train. Car usage as a method of travel to work (either as a driver or passenger) was highest in Hassall Grove at 55.9 per cent and lowest at Schofields (36.1 per cent), while the Blacktown LGA average was 45 per cent.

Public transport as a method to travel to work was low in Blacktown LGA at 5.7 per cent. Most of these journeys were by train. Bus travel accounted for a negligible proportion of journeys to work, accounting for less than one per cent for each SA2 and for the Blacktown LGA. Active transport as a method of travel to work was only listed among the top five methods in three of the SA2s. It was also not in the top five methods for Blacktown LGA.

Social infrastructure

Social infrastructure refers to community facilities, services and networks which help individuals, families, groups, and communities meet their social needs, maximise their potential for development, and enhance community wellbeing.

Key social infrastructure in proximity to the proposal is shown in Figure 6-43 and includes the following:

- local parks, reserves, and recreational areas
- educational facilities including schools and childcares
- healthcare and medical services
- emergency facilities including Ambulance stations and a Fire and Rescue NSW Fire Station
- places of worship including the Baitul Huda Mosque
- cultural places including the Blacktown Native Institution and the Colebee and Nurragingy's Land Grant.

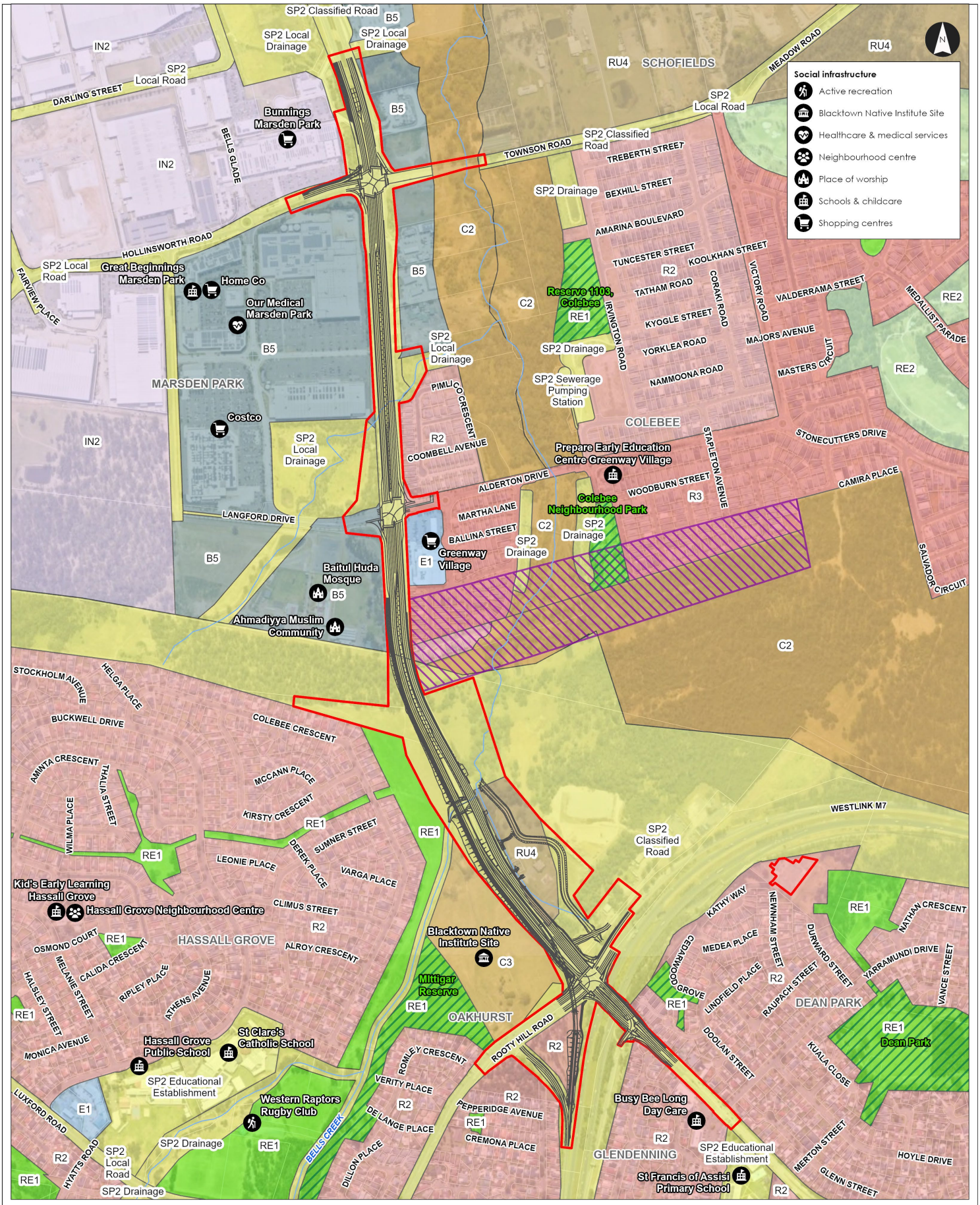


Figure 6-43: Social infrastructure in the vicinity of the construction boundary

Richmond Road Upgrade between M7 Motorway and Townson Road

Project Code: 305001173-EN-GS-022
Drawn By: RA, Checked By: SM
Rev: 02 | Date: 2024-11-14

Legend

- REF construction boundary
- 80% Design freeze
- Watercourse
- Colebee and Nurragingy Land Grant
- Local parks & reserves

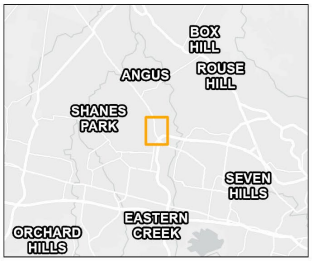
Land Zoning

- B5 - Business Development
- C2 - Environmental Conservation; C2, Environmental Management
- C3 - Environmental Management
- E1 - Local Centre
- IN1 - General Industrial
- IN2 - Light Industrial
- R2 - Low Density Residential
- R3 - Medium Density Residential
- RE1 - Public Recreation
- RE2 - Private Recreation
- RU4 - Primary Production Small Lots
- SP2 - Infrastructure

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Aerial imagery (Metromap, Sep 2024)
2. Watercourse (NSW SS, 2023)
3. Social infrastructure (Google Map Data, 2024)
4. Land use zoning (Blacktown LEP 2015) (NSW DPHI, Mar 2024)

0 100 200 300 Metres
Scale at A3: 1:7,500



Stantec | NSW Government | Transport for NSW

Community values

Community values are those socio-economic aspects considered to be important to the quality of life and wellbeing of the community. The Blacktown LGA has social strategic directions aiming to build (Blacktown City Council, 2022):

- a vibrant, inclusive and resilient community
- a clean sustainable and climate resilient city
- a smart and prosperous economy
- a growing city supported by accessible infrastructure
- a healthy, sporting and active city
- a leading city.

Blacktown is a city of diverse cultures representing around 188 birthplaces and 184 different languages other than English spoken at home (Blacktown City Council, 2022). Blacktown has a diverse range of local community groups that cater to a wide range of interests and needs and build community cohesion. They include the following:

- cultural and multicultural groups
- Indigenous community groups
- social and support services
- environmental and sustainability groups
- recreational and sports groups
- senior and aged care groups.

The proposal lies on the unceded Traditional Lands of the Dharug peoples who have lived in this region for thousands of years. This was a living country intertwined and connected with the many clan groups of the Dharug. Sites in close proximity to the proposal hold highly significant cultural value including the Blacktown Native Institution and Colebee and Nurragingy's Land Grant due to their association with historical events and people. The identified cultural values of the proposal area are both specific to these two sites and a wider feeling of attachment and responsibility for the land. Further information on the cultural value for the study area for the local Aboriginal community is provided in section 6.4.

Stakeholder and community engagement

A *Community and Stakeholder Engagement Plan* (CSEP) (TfNSW, 2023a) has been prepared for the proposal to outline communications objectives, delivery methods and key stakeholders the proposal will need to consult. Consultation to date has included:

- community and stakeholder consultation on the early concept design features in June and July 2024. The key areas of comment included proposal justification, safety concerns, property and environmental impacts and the surrounding transport network
- consultation with Aboriginal people in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (RMS, 2011), the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) and the requirements of section 60 of the National Parks and Wildlife Regulation 2019
- ongoing consultation with the Dharug Strategic Management Group (DSMG) as part of the design development and the Connecting with Country process
- consultation with key stakeholders has also been carried out during development of the concept design including the Blacktown City Council, Westlink M7, Sydney Business Park and relevant utility authorities
- landowners affected by property acquisitions.

Detailed information on the consultation activities undertaken and the issues raised are provided in section 5.

6.10.3 Potential impacts

Construction

Property and land use

The proposal would require the full acquisition of one private property, 717 Richmond Road, Colebee (Lot 49 / DP1104950), to accommodate the road widening and the open flooding channel. This property is zoned for primary production and contains a dwelling and associated rural production outbuildings, however, is not currently occupied. This property was recently acquired by the current owner for businesses purposes. The owner would need to relocate to obtain a similar property.

Partial acquisition of two properties would also be required to accommodate the proposal: Lot 2 / DP1198299 owned by Blacktown City Council (partial acquisition of a stormwater detention area) and Lot 101 / DP1169158 occupied by Bunnings Marsden Park (partial acquisition of a landscaped road setback). The partial acquisition of Council's detention area would not compromise its role in stormwater control. The partial acquisition from Bunnings would not impact its building, business operation, or car parking availability.

While property acquisition (both full acquisition and partial acquisition) is permanent, the impacts on affected property owners are generally not expected to be long term where they are able to adjust and plan for the change. The land acquisition process has commenced and will be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and supporting NSW Government Land Acquisition Reform 2016 and Land Acquisition Information Guide (RMS, 2014).

Five properties along Richmond Road would require modified access, including Transport's Colebee Yard, 717 Richmond Road, Blacktown City Council maintenance gate, the Sydney Water pump station and vehicle access to the Blacktown Native Institution site (refer section 3.6). No businesses would be affected by changed access, although construction traffic management would affect customer movement and delivery times.

Access to the Blacktown Native Institution site would be relocated to Rooty Hill Road North requiring (potentially) additional travel time for Aboriginal participants of activities/cultural ceremonies on the site (depending on the direction of travel). However, the proposal would result in a more structured and safer vehicle access of the site. Property adjustments (such as fencing) and driveway/access relocations are expected to be minor and limited to a small number of properties resulting in a negligible level of impact.

There would be no impact on private properties for construction and use of the ancillary sites. This would however involve a temporary change in land use at the locations of the ancillary sites. As these sites would be returned to pre-existing conditions following the construction period the impacts are considered negligible.

Access and connectivity

Traffic

Construction of the proposal may result in increased traffic and travel time along the Richmond Road proposal corridor and surrounding local roads, however, the traffic impact assessment for the proposal (refer section 6.1) predicts this would be minimal during peak periods due to the current level of peak congestion and associated poor performance of the local road network. Increased congestion and delay would lead to user frustration and inconvenience, increased transport costs, and take time from other activities in daily life. However, as traffic changes would be temporary, limited in scale and relevant stakeholders would be notified, impacts are considered low.

Construction of the proposal would not disrupt or alter community networks, patterns of community movement or interaction. Access to community facilities and social infrastructure would be maintained, albeit with minor travel delays.

Emergency services

Any delays leading to increased travel times would impact emergency response times, which could have negative public health and safety outcomes. Emergency services are highly sensitive to changes in response times, however, impacts are considered low as they can be acceptably managed through consultation and the implementation of a traffic management plan.

Richmond Road is a state Evacuation route for emergency flood and weather events. Construction would be managed to ensure, if required, it could remain open as an evacuation route in consultation with emergency services and the State Emergency Service (SES).

Public transport

There are three bus routes travelling along the proposal roads and seven bus stops are located within the construction boundary (refer section 6.1.2). The intention is for bus stops to remain in operation during construction, however they may be relocated slightly (less than 50 metres). There may be delays to services in line with that experienced by other road users. This would affect users including students and commuters, potentially needing them to change their departure time to ensure they arrive on time. Impacts are considered low as temporary alteration/relocation of bus stops would be considered a minor inconvenience for people to walk or otherwise travel when coming to or from the bus.

Any changes to bus stop locations, timetables or routes would be advised prior to their occurrence and this is expected to enable users to adapt their travel plans to minimise potential impacts.

Active transport

During construction, all pedestrian and cyclist facilities would be maintained. A realigned path would be constructed on the western side of Richmond Road and opened to sensitive road users prior to decommissioning the existing path to maintain access along the length of the proposal. Pedestrians and cyclists may experience increased travel times, and reduced path amenity however impacts would be limited to a small geographical area within the construction boundary.

Parking

Parking provision adequate to accommodate all anticipated construction personnel would be provided at the ancillary facilities. It is not expected that surplus parking demand from construction activities would reduce the availability of surrounding public parking or commercial parking.

Local amenity

Construction of the proposal may result in impacts on local amenity including:

- changes to visual amenity and landscape character (refer section 6.9)
- increased noise and vibration levels (refer section 6.7)
- dust generation which may impact air quality on nearby residential and commercial areas (refer section 6.12)
- operation of temporary ancillary construction facilities.

Road users, residents living near the proposal, businesses and their customers, Blacktown Native Institution users and users of social infrastructure (refer to section below) would view construction activities and associated construction equipment and materials as outlined in section 6.9.3. Overall, from a socio-economic perspective the proposal is considered to have a moderate level of impact. This impact occurs in the context of an existing, highly utilised and noise affected road corridor, and, at the southern end, is proximate to the M7 Motorway elevated structures. There is a large amount of road infrastructure such as signs, light poles and overhead electrical wires, which result in a high level of visual clutter. Impacts are considered moderate.

The proposal would require some vegetation removal for road widening and utility adjustment, which would also have impacts on the community who value the natural environment including the responsibility to care for Country. The removal of vegetation would result in visual impacts to surrounding receivers and impact the liveability around the construction boundary.

Exposure to noise and vibration has the potential to affect people's work, recreation, social and home lives. The predicted number of residential properties affected by construction noise impacts varies by construction activity. Noise management levels would be exceeded at some receivers during different stages of construction as outlined in section 6.7. Residents of affected properties may experience annoyance, stress and a loss of amenity. Construction noise may lead to changes in behaviour (such as not using outdoor spaces or closing windows) potentially affecting enjoyment of homes. Impacts are considered moderate.

The potential for some works to be undertaken up to five consecutive nights per week is likely to result in some potential sleep disturbance or discomfort for residential receivers. However, review of the noise monitoring data indicates that residential receivers located in close proximity to Richmond Road are already affected by sleep disturbing noise levels during the nighttime period, likely related to existing road traffic (refer section 6.7).

Vibration during construction works may lead to impacts on the amenity of nearby properties, however, as minimum working distances would be specified for specific construction activities, and vibration impacts on property amenity would be temporary and limited to a small area the impacts are considered negligible.

Increased dust caused by exhaust from heavy vehicles and construction machinery, construction works, and earthworks could lead to negative impacts on local residents' way of living, such as needing to keep windows closed and reducing outdoor activities in their yards. Impacts are considered low as they would be temporary and limited to the small area in the vicinity of the construction boundary.

Operation of the ancillary facilities could result in negative impacts on nearby amenity, from noise, visual change, and dust emission and are considered to have moderate to low level of significance. Details on the ancillary facilities are provided in section 3.4. An assessment of the construction traffic noise is provided in section 6.7.

Cultural heritage and community values

Construction impacts on Blacktown Native Institution

The Blacktown Native Institution holds a profound place in Dharug history. Considered the birthplace of assimilationist policies, this place represents great sorrow for many First Peoples, and holds within its soils the stories of those displaced from their families, land and communities. Following colonisation of NSW, the British sought to change the social practices of Aboriginal people in the region through the establishment in 1814 of the Native Institution in Parramatta, in which Aboriginal children were taught European domestic and religious practices. In 1823, the Native Institute was moved from Parramatta to land now known as the Blacktown Native Institution, located on the north-western corner of Richmond Road and Rooty Hill Road North (within and adjacent to the proposal area). Aboriginal (and some Māori) children were institutionalised at this facility until about 1829. The return of these lands to Dharug custodianship in 2018 represents a deeply significant step towards healing. It holds continuing cultural, spiritual and heritage significance as a Dharug place and offers a powerful foundation for building Dharug futures. Further information on the significance of the Blacktown Native Institution and the proposed masterplan for the site is provided in section 6.4 and section 6.5.

The proposal and how it is developed and carried out could lead to potential impacts, both intangible and tangible on Blacktown Native Institution stakeholders. For example, if the community feels they are not being heard and involved in decisions that relate to the sensitive history of the site, this could create and exacerbate existing trauma.

Impacts on the Blacktown Native Institution during construction would include:

- Visual impacts (refer section 6.9): The scale and positioning of the flyover bridge across the road corridor is inherently highly visible, with the overall sensitivity and magnitude assessed to be high. Measures which can be implemented to respond to this proposal element would be explored with stakeholders during co-design to reduce the magnitude of this impact.
- Noise impacts (refer section 6.7): the site would be highly noise affected during certain construction activities. This would impact the site as it is a place for singing, dancing, cultural expression and connection - cultural practice that breaths life, spirit and healing into the land and people. However, given that use of the site has typically been event driven at defined times, it should be possible to accommodate planned events within the construction works program, reducing the severity of impact. The Blacktown Native Institution would be consulted during construction planning to further consider how potential impacts can be minimised as far as possible, such as through where possible scheduling the timing and duration of noisy works outside of community event times, aiming to minimise potential disruption to the use.
- Change in access (refer section 6.6): access to the site would be relocated as part of the proposal. Further consultation with key stakeholders about the final location of the access to Blacktown Native Institution would be undertaken during detailed design.
- Vegetation removal (refer section 6.8): The proposal would require the removal of vegetation in proximity to the site (around Bells Creek and on the opposite side of Richmond Road at the southern end of the site). The removal of vegetation would have impacts on the community who value the natural environment including the responsibility to care for Country. Planting is proposed towards the northern end of the site in the vicinity of the proposed retaining wall and abutment for the new flyover bridge.

The proposal provides a significant opportunity to positively benefit the Aboriginal community of the study area and assist with healing and friendship. Transport will continue to consult and work with the Aboriginal community and managers of DSMG to develop a design which can benefit the future plans for the Blacktown Native Institution site. These opportunities include associated design enhancements, landscaping and mitigation measures.

Impacts of Aboriginal archaeology and the Colebee and Nurragingy Land Grant

Four Aboriginal archaeological sites are identified to be at least partially impacted by construction of the proposal as outlined in section 6.4. Changes are not expected to reduce the overall heritage character in the precinct, and are limited to the small area in the vicinity of the construction boundary and as such impacts are considered negligible.

The Colebee and Nurragingy Land Grant is a partially undeveloped parcel of rural land on the north-eastern side of the proposal area, and the construction boundary does not intersect with it.

Population and demographics including cultural and linguistic diversity

With only one dwelling affected by full acquisition, there would be negligible impact on population or demography. However, by improving accessibility to the NWGA, the proposal would support the ongoing planned future population and economic growth in the sub-region / NWGA.

There would be a temporary influx of construction workers from outside of the immediate locality, but from within the study area and other parts of Greater Sydney.

The study area has a multicultural population including people with Filipino, Indian and Nepalese backgrounds. Pre-construction, consultation would be undertaken to identify if there is a need in the community for proposal information to be made available in languages other than English (i.e., Tagalog, Punjabi, Hindi, Nepali, etc.). Multi-lingual materials would be made available as needed in response to those consultation findings to help ensure that the community is able to access information and be informed about the proposal and it's impacts.

Social infrastructure

The following social infrastructure are likely to experience potential impacts associated with the construction of the proposal, due to the close proximity to the construction boundary:

- Baitul Huda Mosque and associated Khilafat Centenary Hall (up to 700 congregants)
- Baitul Huda Mosque sports fields
- Busy Bees Long Day Care (approved for 99 places)
- Great Beginnings Marsden Park (approved for 124 places)
- St. Francis of Assisi Primary School (approximately 415 students and 40 staff)
- Colebee Neighbourhood Park
- Active transport infrastructure (considered above)
- The Blacktown Native Institution site (considered above).

Use of the Baitul Huda Mosque, associated facilities and sports fields would be disrupted during certain construction periods and activities. The Ahmadiyya Muslim community use the site for large outdoor community events, such as sit down meals, particularly in the evening. Organisations using these facilities would be consulted during detailed design and construction planning to further consider how potential impacts can be minimised as far as possible, such as through where possible scheduling the timing and duration of noisy works outside of prayer times, ceremony days, key sporting or other community events, aiming to minimise potential disruption to their use.

Construction noise and air quality impacts on schools or childcare centres would be a key community concern. Noise and air quality impacts are assessed in section 6.7 and section 6.12, respectively. Exceedances of noise management levels at Busy Bees Long Day Care and St Francis of Assisi Primary School may occur during certain construction scenarios. Noise can affect student performance and educational achievement. It is not clear whether noise affects school performance directly or rather it results from cumulative loss of teaching time where disrupted by loud noise. For teachers to be clearly understood by their students, it is important that regular voice communication is clear and uninterrupted.

Construction noise may affect the use of outdoor areas at certain times. Outdoor play enables children to learn, explore, experience, value and connect with the natural environment and provides access to sunlight. Childcare services typically aim for at least one to two hours of outdoor time each day, split into shorter sessions depending on the children's age, and attention spans, and enrolment numbers and their varying age groups. Any impact upon this use would be of moderate magnitude.

Busy Bee Long Day Care and St Francis of Assisi Primary School are located adjacent to the southern end of the construction boundary and may be impacted by reduced visibility and compromised pedestrian infrastructure. The construction barriers,

equipment, altered landscapes, as well as dust from construction sites may obstruct drivers' views or reduce visibility, making it harder to spot children crossing roads or walking along sidewalks. Sidewalks and cross walks may be temporarily altered, and children may need to take unfamiliar and potentially more dangerous paths. Further, schools may need to alter their usual drop-off and pick-up zones to accommodate construction, potentially creating confusion and new safety challenges.

Ongoing engagement would be undertaken with NSW Department of Education, St. Francis of Assisi Primary School, and affected childcare centres to continue to investigate mitigation measures related to construction traffic, pedestrian safety, construction noise and vibration, air quality and impacts on outdoor spaces.

The remaining social infrastructure in the study area are not expected to be impacted during construction. Some minor noise impacts and visual impacts may occur, creating a degree of amenity impact, some inconvenience and annoyance to users, and lessened enjoyment. Overall, the proposal is considered to have a high-moderate level of impact.

Located about 250 meters from the construction boundary, Colebee Neighbourhood Park is not expected to be substantially impacted by the proposal. Some noise impacts may occur at some times which may impact the amenity of the park.

Access to social infrastructure is unlikely to be impacted beyond potential for increased travel times of users accessing them.

Economy, employment and business

The combination of potential for traffic delays and compromised amenity (vibration and noise) near the construction boundary due to construction activities, may result in a decline in customer patronage for some businesses. The operation of most businesses in close proximity to the proposal are indoor focused meaning they are less likely to be negatively affected. There are however businesses with outdoor areas where reduced amenity would have greater impacts.

The construction phase would bring increased construction employment creating a number of direct and indirect employment opportunities. However, given the small scale of the proposal (around 60 workers at any given time), labour demand is likely to be indiscernible from the existing market.

The proposal is also anticipated to provide a number of positive impacts on local businesses with an increased opportunity for local businesses to supply goods and services to construction activities. For example, construction contractors may procure materials (i.e., concrete, asphalt, gravel, and steel) and specialised construction services from local suppliers or the construction workforce would likely increase the local demand for food and beverage and other retails services close to the proposal. Overall, increased opportunities for local businesses are considered to be a low positive impact.

Summary

A summary of the construction socio-economic impacts along with the sensitivity, magnitude and level of impacts are outlined in Table 6-69.

Table 6-69 Summary of socio-economic impact of the proposal's construction

Category	Change as a result of the proposal	Sensitivity[1]	Magnitude[2]	Level of significance[3]
Property and land use	Property acquisition	Low	Low	Low
	Property adjustments and changes to property access	Low	Negligible	Negligible
	Impact on private properties as a result of the proposal's temporary land lease requirements for ancillary sites.	Negligible	Negligible	Negligible
Access and connectivity	Impacts on traffic and travel time along the Richmond Road project corridor and surrounding local roads	Low	Low	Low
	Increased construction traffic and changes in the types of vehicles on local roads	Moderate	Low	Moderate-low
	Changes to traffic on local roads	Moderate	Low	Moderate-low
	Emergency services access or responsiveness may potentially be affected during construction	Low	Low	Low

Category	Change as a result of the proposal	Sensitivity[1]	Magnitude[2]	Level of significance[3]
	Changes to public transport service accessibility or transport times	Low	Low	Low
	Impacts on active transport users	Low	Low	Low
	Impacts on availability of parking	Negligible	Negligible	Negligible
Local amenity	Changes to visual amenity and landscape character nearby the construction boundary due to construction activities (excluding the Blacktown Native Institution site)	Moderate	Moderate	Moderate
	Increased noise and vibration levels due to construction activities	Moderate	Moderate	Moderate
	Dust generated from construction activities may impact air quality on nearby residential and commercial areas	Low	Low	Low
	Impact arising from the operation of temporary ancillary construction facilities	Moderate	Low	Moderate-low
Cultural heritage and community values	Construction impacts on Blacktown Native Institution (SHR No. 01866)	High	High	High
	Impacts on Aboriginal archaeological sites	Moderate	Negligible	Negligible
	Construction impacts on Colebee and Nurragingy Land Grant (SHR No. 01877)	Moderate	Negligible	Negligible
Population and demographics	Changes to population and demographics - culturally and linguistically diverse	Low	Moderate	Moderate-low
Social infrastructure	Impacts on social infrastructure amenity, access or use	High	Moderate	High-moderate
Economy, employment, and business	Disruption to businesses due to changes in amenity, or from altered access arrangements or traffic management measures.	Moderate	Low	Moderate-low
	Increased construction employment	Low	Low	Low (positive)
	Increased opportunities for local businesses to supply goods and services to construction activities.	Low	Low	Low (positive)

[1] Sensitivity categorised as: Negligible; Low; Moderate; High

[2] Magnitude categorised as: Negligible; Low; Moderate; High

[3] Significance categorised as: High; High-Moderate; Moderate; Moderate-Low; Low; Negligible (refer Table 6-68).

Operation

Property (land use)

The majority of widening for the proposal would be undertaken within SP2 – Infrastructure zoning. This includes areas that were previously vacant or vegetated land that would become road infrastructure. As most land use changes would occur close to the proposal, impacts are not expected to be substantial. Refer section 6.6 for further information. The proposal would support the ongoing planned future population and economic growth in the sub-region / NWGA.

Access and connectivity

The proposal would result in low to moderate positive impacts through improved travels times, reduced congestion, maintenance of the dedicated bus lanes at the intersections and improvement to pedestrian crossings and shared paths along the proposal improving safety and user amenity.

Community values and local amenity

The proposal is considered to have a high-moderate (positive) impact on the community providing improved access to amenity, services and social infrastructure facilities such as parks, recreational areas and educational facilities.

The proposal also provides opportunities to enhance community relations and community understanding of Aboriginal culture and history, and assist with healing and friendship. Co-design would consider how Transport can maximise the proposal's benefit to the Blacktown Native Institution site.

Overall, the proposal is not predicted to increase operational traffic noise levels by more than 2 dBA at the assessed receiver locations, however, 109 residential receiver locations and two non-residential receiver locations qualify for the consideration of noise mitigation due to the existing acute criteria or exceedances of cumulative criteria as outlined in section 6.7. Retail outlets fronting/backing onto Richmond Road and their customers would experience a similar noise environment to what would occur if the proposal did not proceed. Overall, the proposal is considered to have a low-moderate impact based on operational traffic noise.

Economy, employment, and business

With improved transport accessibility and connectivity, the proposal would be able to handle increased traffic demands and accommodate a growing number of residents, visitors, and businesses, generating more opportunities for nearby businesses. Businesses, commercial entities, and freight operators would also benefit from the increased road capacity which would reduce pressure on the local road network and make it easier for people and cargo to move around. Overall, the proposal is considered to have a positive impact during operation on economic employment and business.

Summary

A summary of the operational socio-economic impacts along with the sensitivity, magnitude and level of impacts are outlined in Table 6-70.

Table 6-70 Summary of socio-economic impact of the proposal operation

Category	Change as a result of the proposal	Sensitivity[1]	Magnitude[2]	Level of significance[3]
Property	Impacts of land use changes	Negligible	Low	Negligible
Access and connectivity	Upgrade to Richmond Road, leading to improved travel times, reduced congestion, and improvements to the freight network	Moderate	Moderate	Moderate (positive)
	Maintenance of dedicated bus lanes at the intersections for public transport improvements	Low	Moderate	Moderate-low (positive)
	Improvements to pedestrian crossings, shared paths, and footpaths along the construction boundary, improving safety and user amenity	Moderate	Low	Moderate-Low (positive)
Community values and local amenity	Improved access to amenity, services and social infrastructure facilities	High	Moderate	High-moderate (positive)
	Opportunities to enhance community relations and community understanding of Aboriginal culture and history	High	Moderate	High-moderate (positive)
	Operational road traffic noise impacts on adjacent residents and businesses	Low	Moderate	Moderate-low
	Community values	Low	Low	Low
Economy, employment, and business	Increased patronage and opportunities for local businesses	Moderate	High	High-moderate (positive)

[1] Sensitivity categorised as: Negligible; Low; Moderate; High

[2] Magnitude categorised as: Negligible; Low; Moderate; High

[3] Significance categorised as: High; High-Moderate; Moderate; Moderate-Low; Low; Negligible (refer Table 6-68).

6.10.4 Safeguards and management measures

Table 6-71 outlines the socio-economic safeguards and management measures to be implemented by the proposal.

Other safeguards and management measures that would address socio-economic impacts are identified in the following sections:

- Section 6.1- Traffic and transport
- Section 6.4 – Aboriginal cultural heritage
- Section 6.5 – Non-Aboriginal heritage
- Section 6.6 – Property and land use
- Section 6.7 – Noise and vibration
- Section 6.9 – Landscape character and visual impacts
- Section 6.12 – Air quality.

Table 6-71 Socio economic safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
SE1	General socio-economic impacts	A Communications and Stakeholder Engagement Plan would be developed prior to the commencement of construction and would be implemented during construction to provide timely and accurate information to stakeholders and to ensure that: • All stakeholders are identified through detailed stakeholder mapping which is updated regularly as needed. This would include identification of vulnerable groups or persons that may be affected by the proposal. • Accurate and accessible information about the proposal is made available to keep the community and stakeholder aware of and up to date with the proposal. Proposal information in languages other than English (i.e., Tagalog, Punjabi, and Hindi, etc.) would be made available subject to consultation results. • Opportunities for community and stakeholder feedback and inputs are provided. • Prior to potential impacts occurring, the affected community members and stakeholders are provided with details such as timing, likely extent, duration and nature of impacts, of proposed activities that may impact them. • Continued consultation, follow up with community notifications/ letter-box drops, would be set up to notify the broader community, recreational groups, businesses and other stakeholders.	Transport / Contractor	Pre-construction
SE2	General socio-economic impacts	A complaints handling procedure would be developed which would ensure: • A webpage, email and free-call number would be established for enquiries and complaints regarding the proposal and would remain active prior to and for the duration of construction. • Contact details would be clearly displayed at the entrances to the ancillary facilities. • All enquiries and complaints would be tracked through a tracking system and acknowledged within 24 hours of being received.	Transport / Contractor	Pre-construction

ID	Impact	Environmental safeguards	Responsibility	Timing
SE3	Impacts to Blacktown Native Institution site	Consultation would continue with DSMG throughout detailed design and construction. DSMG input would be sought on: • the location and design of the interim and potential permanent driveway relocation • the opportunity to include cultural interpretations or design into the proposed road infrastructure (i.e. the flyover bridge or abutments) • the opportunity for culturally sensitive and locally indigenous plantings within the road corridor • the opportunity for the proposal to support the proposed development of the Blacktown Native Institution site in accordance with the Vision for Country (COLA, 2024) • the ongoing development of the Connecting with Country assessment.	Transport	Detailed design
SE4	Impacts to Blacktown Native Institution site	The temporary access to the Blacktown Native Institution site would be constructed and opened prior to the closure of the existing access in order to maintain ongoing vehicle access to the site throughout construction.	Contractor	Construction
SE5	Impacts to Blacktown Native Institution site	The Blacktown Native Institution would be consulted during construction planning to consider how potential impacts can be minimised as far as possible, such as possible scheduling the timing and duration of noisy works outside of community event times.	Contractor	Pre-construction
SE6	Business impacts	• Access to business properties would be maintained throughout construction. • On-going consultation would be undertaken with local business owners that may be impacted by altered access arrangements during construction. • Consultation would be carried out with any businesses directly impacted during construction to identify approaches to reduce impact upon these businesses, particularly in terms of access and signage visibility.	Transport / Contractor	Detailed design / Pre-construction
SE7	Parking	• The proposal would provide adequate on-site parking arrangements to accommodate all workers and anticipated visitors. • Site inductions for all workers would include the need for workers to park in the designated parking areas.	Contractor	Pre-construction / Construction
SE8	Impacts on public transport	• Existing and any temporary bus stops accesses would be accessible during construction such as for wheelchair users and parents with prams. • Wayfinding signs would be provided to advise users of changed bus stop locations and to direct users to relocated bus stops. • Any changes to bus timetables or routes would be communicated prior to their occurrence such as via signage at bus stops and the regular proposal communications.	Contractor	Pre-construction / Construction
SE9	Impacts on active transport	• Active transport movement throughout the proposal corridor would be maintained during the construction stage, using detours and alternative route arrangements if necessary. The TMP would include measures to manage pedestrian access.	Contractor	Pre-construction / Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• Signage would be installed to direct users to bus stops as required, and the Contractor is to ensure that access remains compliant with the *Disability Discrimination Act 1992*. • Prior to changes being implemented, they would be communicated to the community via methods to be set out in the Community and Stakeholder Engagement Plan and signage and wayfinding would be provided on site. Signage is not to obstruct travel paths.		
SE10	Emergency services	• Connectivity and access for emergency services is to be maintained during construction. • Ongoing consultation would occur with emergency services (including the SES) to ensure their needs are respected in construction management plans. Information would be provided to emergency services in relation to the location of ancillary facilities, gates and access routes.	Contractor	Construction
SE11	Impact on social infrastructure	Representatives of affected social infrastructure would be consulted to identify potential impacts with planned construction staging and access arrangements and how they may be mitigated, including: • Baitul Huda Mosque • St. Francis of Assisi Primary School • Blacktown Native Institution • and affected childcare centres.	Contractor	Pre-construction / Construction
SE12	Economy, employment, and business impacts	• Strategies to increase local procurement, local employment and local training opportunities (particularly with groups such as Aboriginal people, women, young people, the unemployed, and the neurodiverse) would be developed to maximise local benefits. • In line with Transport's *Aboriginal Procurement Policy* Transport would source construction workforce from the Aboriginal community and procuring from Aboriginal owned businesses or social enterprises.	Transport / Contractor	Detailed design / Pre-construction

6.11 Waste management

Transport is committed to ensuring the responsible management, avoidance, recovery and reuse of waste within the construction boundary in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). The WARR Act aims to encourage the most efficient use of resources and reduce environmental harm in accordance with the principles of ecologically sustainable development and to adhere to the following resource management hierarchy:

- avoidance of unnecessary resource consumption
- resource recovery (including reuse, reprocessing, recycling and energy recovery)
- disposal.

By adopting the above principles, Transport would aim to efficiently reduce resource use, reduce costs and reduce environmental harm in accordance with the principles of ecologically sustainable development, as outlined in section 8.1.1.

6.11.1 Legislative framework and guidelines

Legislative framework

The key waste related legislation that is relevant to the proposal include:

- *Protection of the Environment Operations Act 1997* (POEO Act): Specifies requirements for licences and the regulation of various activities that have the potential to pollute or harm the environment.
- *Protection of the Environment Operations (Waste) Regulation 2014* (POEO Waste Regulation): Sets out provisions related to the storage and transportation of waste, special requirements for the management of certain special wastes including asbestos and the exemption of certain occupiers or types of waste from paying waste contributions.
- WARR Act: Promotes waste avoidance and resource recovery and establishes a waste management hierarchy which includes reduction, recovery and disposal.

A detailed description of these legislative items and relevance to the proposal is presented in section 4.

Waste classification guidelines

The *NSW Waste Classification Guidelines* (EPA, 2014) provides guidance on the assessment, classification, management and disposal of all waste generated by the proposal. The EPA waste classification process involves four parts, this includes:

- Part 1 – Classifying the waste: Describes the six basic steps to classify waste.
- Part 2 – Immobilising waste: Wastes with level of contamination may not be suitable for disposal to landfill in NSW.
- Part 3 – Waste containing radioactive material.
- Part 4 – Acid sulfate soils (ASS).

Resource recovery exemptions

Resource recovery exemptions are granted by the EPA where the land application or use of a waste material is a bona-fide, fit for purpose, reuse opportunity that causes no harm to the environment or human health, rather than a means of waste disposal. An exemption facilitates the use of these waste materials outside of certain requirements of the waste regulatory framework.

The POEO Waste Regulation provides exemptions for some of the requirements under the POEO Act or certain wastes and resource recovery activities where it can be demonstrated that waste reuse would not cause harm to human or environmental health. Under these provisions, an application to the EPA is not required but, the proponent must demonstrate that all conditions are followed prior to applying any exemption or order. The two provisions which may be applicable to the reuse of materials as part of the proposal include:

- Resource Recovery Exemptions made under Part 9, clause 91 and 92 the POEO Waste Regulation which relates to the consumption of any material for reuse.
- Resource Recovery Order made under Part 9, clause 93 of the POEO Waste Regulation which covers the requirements for the generation, supply and / or processing of material for reuse.

The following general resource recovery exemptions have been issued by the EPA and are of most relevance to road construction activities:

- excavated natural material
- excavated public road material
- mulch
- reclaimed asphalt pavement
- recovered aggregate
- stormwater.

Use of these exemptions would facilitate the re-use of the waste generated by the proposal, particularly excavated soils. Where no specific Resource Recovery Order or Exemption is available for the intended reuse of a waste material, an application to the EPA can be made for a resource recovery exemption.

6.11.2 Existing environment

Various users currently contribute to waste within the existing road reserve including roadside litter and food waste from road users, and waste from maintenance activities including green waste (trees and other removed vegetation), excavated road material (concrete, asphalt, aggregate) and surplus building material (aggregate, fencing, scrap material).

6.11.3 Potential impacts

Construction

Potential impacts from waste are related to contamination of the surrounding environment (such as pollution of waterways, attracting pest fauna) through improper waste handling, storage and transport practices. The significance of these impacts is predicted to be low, as proposed safeguards and management measures would manage potential directs to the surrounding environment.

The proposal has the potential to generate waste from the following activities:

- vegetation (native, exotic and noxious) removal
- earthworks for constructing the bridges, retaining walls, flood channel, road widening and new shared paths
- construction of road pavements, bridges, water quality measures and installation of road furniture
- utility adjustments.

Waste streams likely to be generated during construction of the proposal include:

- excess spoil (indicative cut and fill volumes are outlined in section 3.3.7)
- potential for contaminated material during earthworks and hazardous material (refer section 6.2)
- green waste as a result of vegetation clearing
- roadside materials (fencing, guide posts, guard rails etc)
- removed road material (concrete, asphalt, aggregate) from adjustments to the existing road, kerbs and footpaths
- demolition waste (pipes, fencing, guideposts, guard rails) from adjustment to the existing road, fencing, kerbs, footpaths and utilities
- packaging materials from items delivered to site (pallets, crates, cartons, plastics and wrapping materials)
- packaging and general waste from staff (lunch packaging, portable toilets etc)
- chemicals, oils and other liquid wastes from the maintenance of construction plant and equipment
- waste water from wash-down and bunded areas
- redundant erosion and sediment controls.

The potential to reuse materials would be investigated during detailed design.

Excess cut material that cannot be used on-site and unsuitable material would be classified in accordance with the *NSW Waste Classification Guidelines* (EPA, 2014) and disposed of at an approved materials recycling or waste disposal facility. Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed.

Operation

Waste generation during the operation of the proposal would be minimal and would be similar to waste production from the existing road corridor, for example roadside litter and food waste. It is not expected that the proposal would result in a substantial increase in this waste production.

6.11.4 Safeguards and management measures

Table 6-72 lists the waste management safeguards and management measures that would be implemented by the proposal.

Table 6-72 Waste management safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
W1	Waste	A Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP. The WMP would include (but not be limited to): • measures to avoid and minimise waste associated with the proposal • classification of wastes and management options (re-use, recycle, stockpile, disposal) • statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, transport and disposal • monitoring, record keeping and reporting. The WMP would align with Transports *Waste Management Guideline* (EMF-WM-GD-0055) and relevant other Transport waste fact sheets, guidelines and policies.	Contractor	Detailed design / Pre-construction
W2	Waste Management general	All wastes would be managed and disposed of in accordance with the POEO Act, POEO Waste Regulation and *NSW Waste Classification Guidelines* (EPA, 2014). All wastes and excess material would be disposed of at an appropriately licensed facility.	Contractor	Construction
W3	Waste Management general	Excavated material would be reused on site where feasible and suitable for the intended reuse. Where excavated material cannot be used on site, opportunities for reuse on nearby projects would be investigated.	Contractor	Construction
W5	Waste	Site induction would include waste management and disposal requirements and facilities.	Contractor	Construction
W6	Waste	Any additional fill material required would be sourced from appropriately licensed facilities and/or other construction projects wherever possible. Additional fill material would be sourced and verified as suitable for use in accordance with relevant EPA and Transport guidelines.	Contractor	Construction
W7	Waste	Resource management hierarchy principles would be followed: • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • disposal is undertaken as a last resort.	Contractor	Construction
W8	Waste	If vegetation is to be mulched and transported off site for beneficial reuse, it would be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the NSW EPA Mulch Order and Exemption.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
W9	Waste	There is to be no disposal or re-use of construction waste on to other land.	Contractor	Construction
W10	Waste	Waste is not to be burnt on site.	Contractor	Construction
W11	Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction
W12	Waste	A review would be undertaken during detailed design to determine if an Environmental Protection Licence under the POEO Act is required for the proposal.	Transport	Detailed design

6.12 Air quality

An air quality assessment was carried out to assess the potential air quality impact during construction and operation of the proposal. The summary of the assessment is presented in the following sections and the full report is provided in Appendix J.

6.12.1 Methodology

Assessment

The primary tasks for the air quality assessment were:

- Identification of air quality criteria in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022) and the *National Environment Protection Measure for Ambient Air Quality* (NEPC, 2021).
- Review air quality monitoring data from nearby or representative air quality monitoring stations and pollutant concentration in line with their respective air quality criteria averaging periods:
    - Total suspended particulate (TSP)
    - Particulate matter less than 10 microns diameter (PM_{10})
    - Particulate matter less than 2.5 microns diameter ($PM_{2.5}$)
    - Nitrogen dioxide (NO_2).
- Summary of relevant climate data (temperature, rainfall, wind direction and speed).
- Characterisation of the existing environment in terms of land use and location of sensitive receptors.
- Assessment of potential impacts on air quality during the construction of the proposal, in accordance with the Institute of Air Quality Management (IAQM) *Guidance on the assessment of dust from demolition and construction* V1.1 (Holman et al, 2014) (IAQM Guidance). The steps to perform dust assessment as per IAQM are:
    - Step 1: screen the need for a detailed assessment
    - Step 2: assess the risk of dust impact separately for demolition, earthworks, construction and trackout. For each of these aspects, the scale and nature of the emissions are defined and assessed against the sensitivity of the area
    - Step 3: site specific mitigation
    - Step 4: determine significant effects
    - Step 5: dust assessment report.
- A high-level review of potential greenhouse gas emissions (GHG) emissions and relative impacts to State and national GHG emission inventories and reduction targets.
- Assessment of potential impacts during the operation of the proposal, using Transport's Roadside Air Quality Screening Tool (RAQST). The predicted pollutant concentrations of the existing road and traffic conditions (i.e., Do-Nothing case) were compared against those predicted with the proposal in 2033. The cumulative impact is

assessed by adding the background ambient air quality concentrations and compared against the respective air quality criteria.

- Detail safeguards and management measures to mitigate impacts.

Study area

The study area for the air quality assessment is a buffer spanning up to 350 metres from the construction boundary as shown in Figure 6-44. This is the recommended study area from the IAQM Guidance for the construction-phase impact assessment. The operations-phase impact assessment, as per the RAQST Guidance, assesses up to 200 metres from the road.

Criteria

Air quality standards are contained within the *National Environment Protection Measure for Ambient Air Quality* (NEPC, 2021) and the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2022). In the absence of criteria limits for TSP, the PM_{10} criteria limit has been adopted. Criteria relevant to the proposal are summarised in Table 6-73.

Table 6-73 Criteria for relevant air pollutants (NEPC, 2021)

Pollutant	Averaging period	Maximum concentration standard
Nitrogen dioxide (NO_2)	1 hour	164 micrograms per cubic meter (µg/m^3)
	1 year	30.75 µg/m^3
Particulate matter (PM_{10})	1 day	50 µg/m^3
	1 year	25 µg/m^3
Particulate matter ($PM_{2.5}$)	1 day	25 µg/m^3
	1 year	8 µg/m^3
Total Suspended Particulates (TSP)	1 year	25 µg/m^3

Relevant guidelines

The assessment has been prepared in consideration of the following guidelines:

- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2022).
- *National Environment Protection Measure (NEPM) for Ambient Air Quality* (NEPC, 2021).
- *Good Practice Guide for the Assessment and Management of Air Pollution* from Road Transport Projects (Clean Air Society of Australian & New Zealand, CASANZ, 2023) (CASNZ Guidance).
- *Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction* (Holman et al, 2014)(IAQM Guidance).
- *Greenhouse Gas Assessment Workbook for Road Projects* (TAGG ,2013).
- *Australian National Greenhouse Accounts Factors* (DCCEEW, 2023).

Figure 6-44: Air quality study area map

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Marsden Park to Glendenning, NSW

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Rev: - 3 | Date: 2024-11-15

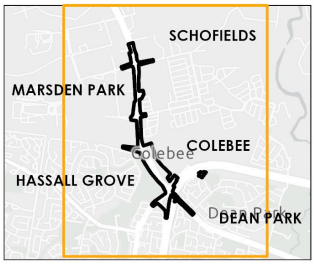
Legend

- 350m buffer
- Primary School
- High School

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Data Source: ESRI World Imagery Service

0 100 200 300 400 500 Metres
Scale at A3: 1:10,000



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6.12.2 Existing environment

Meteorological conditions

The existing climatic conditions for the proposal were identified using data published by the Bureau of Meteorology (BoM, 2024) collected from the Seven Hills (Collins Street) Weather Station (station number 067026), located about eight kilometres south-east of the proposal. The existing climatic conditions are summarised in Table 6-74 and Table 6-75.

The existing climatic conditions are warm and temperate with generally consistent periods of rainfall but higher rainfall in January through March. It is unlikely that extended dry periods would have a considerable impact on dust generation on-site.

Table 6-74 Existing climatic conditions (Seven Hills (Collins Street) weather station, BOM, 2024)

Statistic	Existing conditions	Recorded period (start year-end year)
Annual mean maximum temperature (°C)	23.4	1950-1975
Annual mean minimum temperature (°C)	11.2	1950-1975
Hottest month on average	December (28.4°C)	1950-1975
Coldest month on average	July (4.5°C)	1950-1975
Mean annual rainfall (mm)	934.1	1950-1975
Wettest month on average	February (117.9 mm)	1950-1975
Mean 9am wind speed (km/h)	5.3	1965-1975
General wind direction am	Southwest	1965-1975

Table 6-75 Median monthly rainfall

Month	Median rainfall (mm)	Recorded period (start year-end year)
January	104.6	1950-2024
February	117.9	1950-2024
March	115.6	1950-2024
April	76.4	1950-2024
May	64.9	1950-2024
June	78.9	1950-2024
July	46.7	1950-2024
August	53.8	1950-2024
September	47	1950-2024
October	71.1	1950-2024
November	81.3	1950-2024
December	72.3	1950-2024

Existing air quality

The Prospect monitoring station is the nearest NSW government funded and operated air quality monitoring station (AQMS) from the proposal. The AQMS is located approximately 9.4 kilometres south-east from the proposal. Data from the Prospect AQMS was used to define existing concentrations of NO_2, PM_{10}, and $PM_{2.5}$. The existing maximum and average concentration for each relevant air quality pollutant over their respective averaging periods is summarised in Table 6-76.

Table 6-76 Existing air quality monitoring data (Prospect AQMS)(DPIE, 2021b)

Year	NO_2 (µg/m³)		PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	
	Maximum 1-hour average	Annual average	Maximum 24-hour average	Annual average	Maximum 24-hour average	Annual average
2017	113	19	**61**	19	**30**	7.7
2018	96	17	**113**	22	**48**	**8.5**
2019	92	17	**183**	**26**	**134**	**12**
2020	81	13	**246**	20	**71**	**8.6**
2021	81	13	45	17	**37**	6.9
Average	93	16	130	21	64	8.7
Maximum concentration standard	164	30	50	25	25	8

Note: Bolded concentrations are above the NEPM standards

The existing air quality is mainly influenced by local road traffic and seasonal bushfires. The effects of agriculture and commercial activities surrounding the study area on air quality are considered to be relatively small and localised. The air quality is expected to be similar to that near the proposal and generally comprised of typical urban air quality.

The following conclusions were made in relation to the existing air quality conditions:

- PM_{10} annual averages for the years 2017 through 2021 are below the maximum concentration standard except for 2019, which exceeded the standard as a result of a major bushfire.
- The annual $PM_{2.5}$ averages for 2017 and 2021 are below the standard, while those for 2018, 2019, and 2020, exceed the maximum concentration standard.
- The NO_2 maximum 1-hour average and annual average for the years 2017 to 2021 are below the maximum concentration standard.

Based on the air quality categories on the NSW air quality website, the existing air quality in the study area is generally considered to be 'fair' or 'poor' due to elevated PM_{10} and $PM_{2.5}$.

Human receptors

A human receptor, as defined in the CASANZ Guidance, is a discrete, fixed location where a person (or persons) can be exposed to air pollution from the proposal, with their health potentially suffering as a consequence. Sensitive receptors are typically those at locations where people spend long periods of time (e.g., residences) or are used by people with higher susceptivity to air pollution (e.g., hospitals, schools). The IAQM Guidance refers to receptors at any location where a person or property may experience the adverse effects of airborne dust or dust settlement, or exposure to PM_{10} over the averaging time period as per the criteria limits.

Residential and commercial properties within 350 metres of the construction boundary are shown in Figure 6-45 (a) and 6-45 (b). There are around 92 residential and commercial properties within 20 metres, 149 within 50 metres, 345 within 100 metres and 1452 within 350 metres of the proposal that are considered to be sensitive human receptors.

Figure 6-45 (a): Sensitive human receptors in the air quality study area

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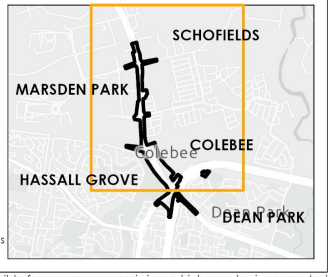
Legend

- 20m buffer
- 350m buffer
- REF construction boundary
- Sensitive human receptor (Geoscape, 2020)

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Data Source: ESRI World Imagery Service



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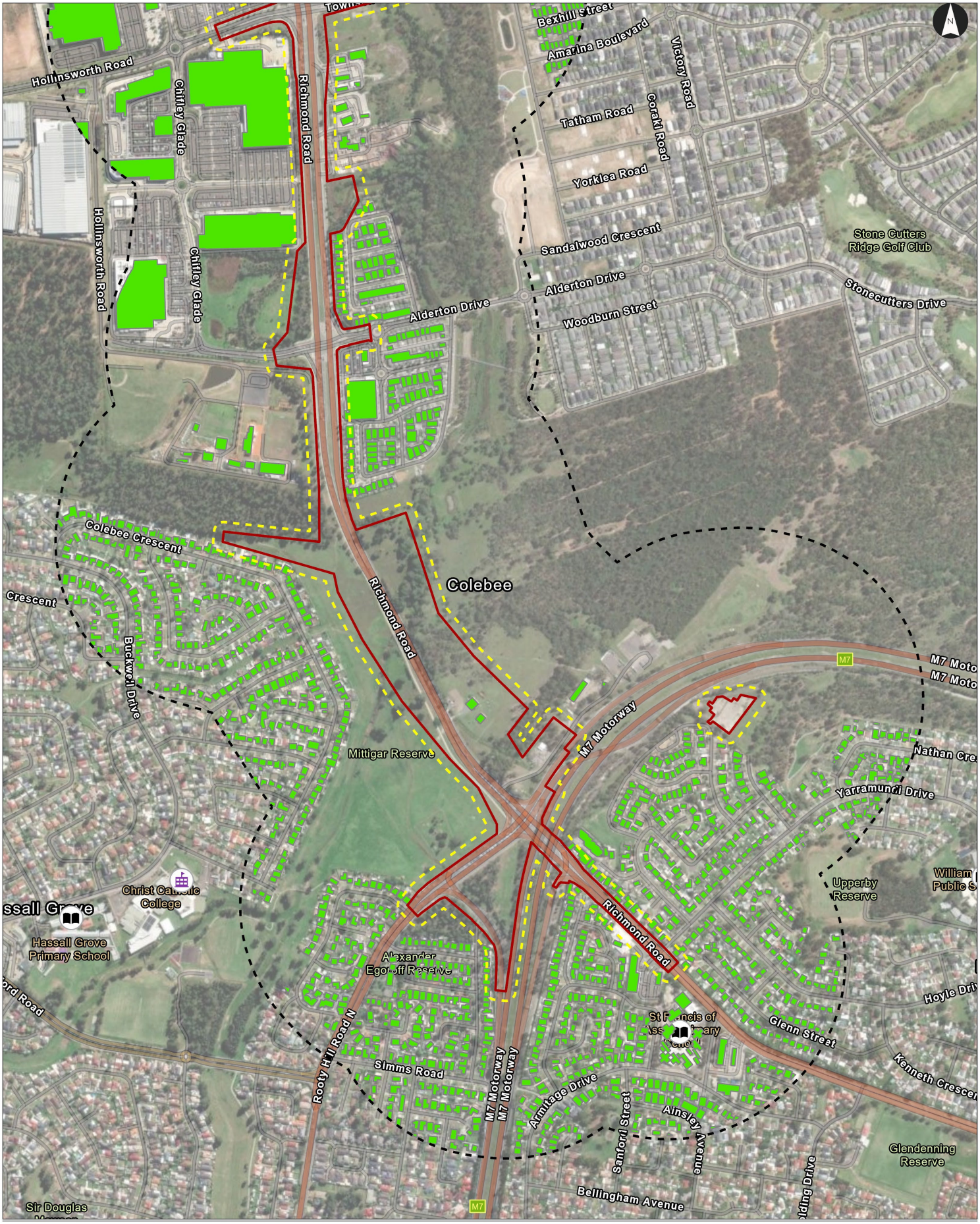

Figure 6-45 (b): Sensitive human receptors in the air quality study area

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Marsden Park to Glendenning, NSW

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Legend

- 20m buffer
- 350m buffer
- REF construction boundary
- Sensitive human receptor (Geoscape, 2020)
- Primary School
- High School

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Data Source: ESRI World Imagery Service

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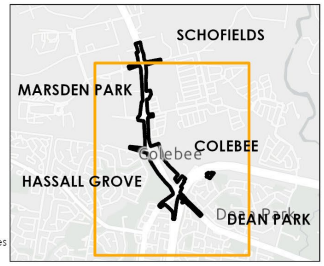

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Ecological receptors

An 'ecological receptor' refers to any sensitive habitat affected by dust settlement. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition and the indirect impacts on fauna.

The IAQM guidance requires identification of ecological receptors within 50 metres of the proposal. The sensitivities of ecological receptors have been defined and are shown in Figure 6-46. The sensitivity of ecological receptors was determined based on section 7.3 of the IAQM Guidance.

Plant community types (PCTs) that are listed as endangered under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) namely Cumberland Red Gum Riverflat Forest (PCT 4025), Cumberland Shale Plains Woodland (PCT 3320) were considered to have a medium sensitivity, as they are important plant species but their dust sensitivity is uncertain. All other PCTs such as exotic, landscaped natives and typha were considered to have a low sensitivity on the basis that they are not listed species which may be affected by dust deposition.

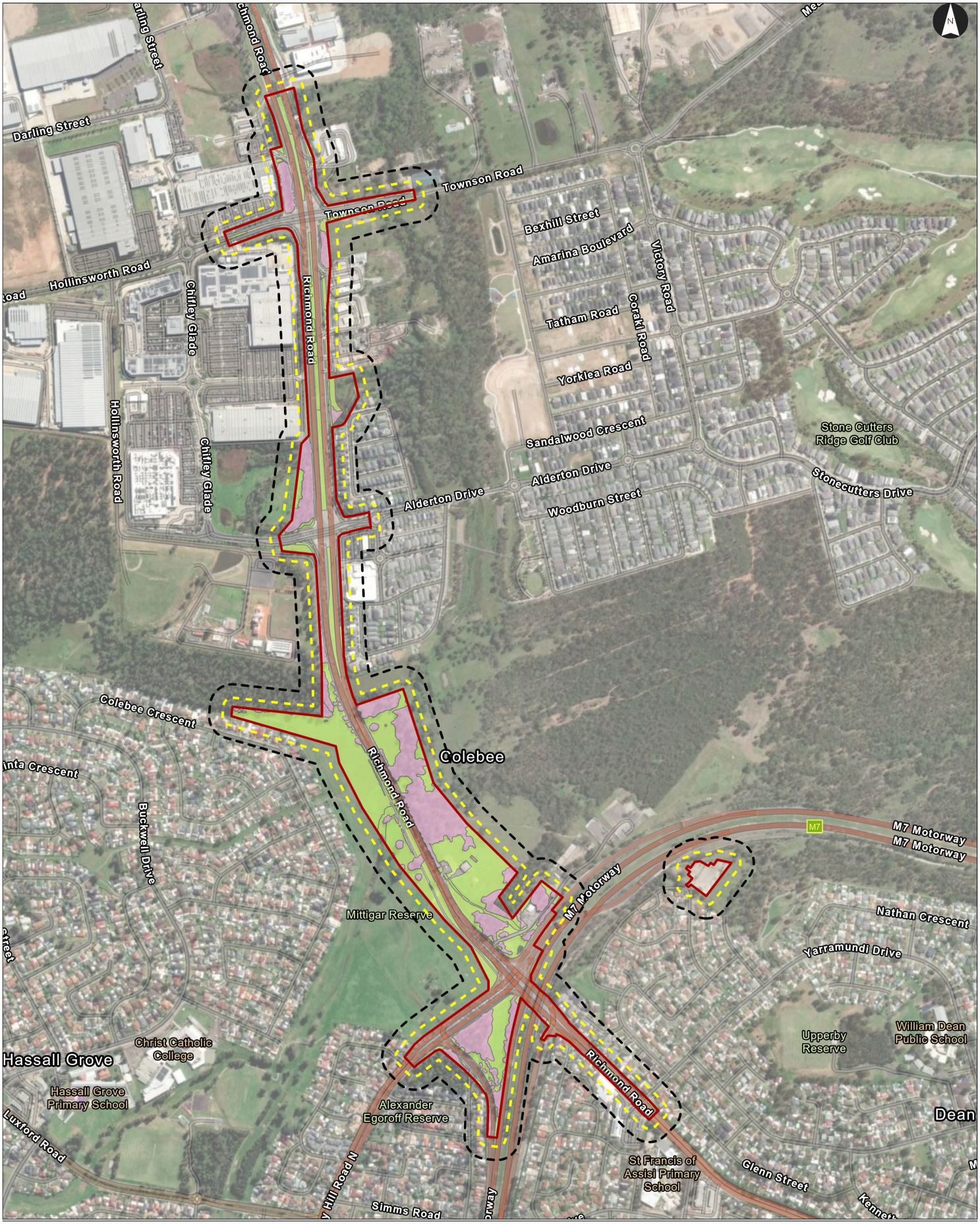

Figure 6-46: Ecological receptors in the air quality study area

Richmond Road Widening (RRM7)
Marsden Park to Glendenning, NSW

Project Code: 305001173-GN-GS-001
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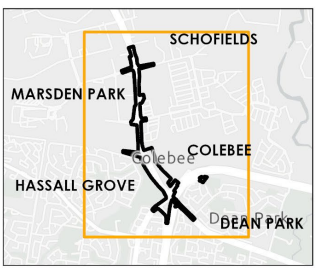
Legend

Ecological receptor sensitivity

- 20m buffer
- 50m buffer
- REF construction boundary
- Medium sensitivity
- Low sensitivity

Notes:
1. Map displayed in GDA2020 MGA Zone 56

References:
1. Data Source: ESRI World Imagery Service



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6.12.3 Potential impacts

Construction

Air quality impacts

The air quality assessment has followed the IAQM Guidance, which includes four steps, to assess the potential impacts of the proposal construction phase and identify appropriate mitigation measures. This section summarises each of these steps.

Step 1 Screen the need for a detailed assessment

The screening criteria for the need for a detailed assessment as per the IAQM Guidance is as follows:

'A 'human receptor' within:

- 350 metres of the boundary of the site; or
- 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s).

An 'ecological receptor' within:

- 50 metres of the boundary of the site; or
- 50 metres of the route(s) used by construction vehicles on the public highway, up to 500 metres from the site entrance(s).'

As there are PCTs within 50 metres of the proposal that have been considered ecological receptors and there are sensitive human receptors within 350 metres of the proposal a detailed assessment is required as per the IAQM Guidance (refer section 6.12.2).

Step 2 Assess the risk of dust impacts

Step 2 of the IAQM Guidance is to assess the risk of dust impacts separately for demolition, earthworks, construction and trackout (material tracking). This step requires the potential dust emission magnitude and the sensitivity of the area to be defined.

The potential dust emission magnitude for each activity type has been categorised for the proposal as shown in Table 6-77. The dust emission magnitude has been calculated as per the section 7.2 of the IAQM Guidance as outlined in Appendix J.

Table 6-77 Dust emissions magnitude for the proposal assuming no mitigation

Activity	Dust emission magnitude	IAQM criteria considered	Proposal justification
Demolition	Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.	Total demolition volume is approximately 40,000 m^3. Demolition activity at ground level.
Earthworks	Large	Total site area greater than 10,000 m^2, potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size), more than 10 heavy earth moving vehicles active at any one time, formation of bunds over 8 m in height, total material moved over 100,000 t.	Total site area is 188,620 m^2. Soil type mostly silty clay. Total volume of material moved 113,998 t. Average 5-10 heavy earth moving vehicles at a time.
Construction	Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g., concrete), on-site concrete batching.	36,500 m^3 of construction works. Potentially dusty construction materials including earthworks materials, cement, bitumen and aggregates.

Activity	Dust emission magnitude	IAQM criteria considered	Proposal justification
Track-out	Small	<10 Heavy Duty Vehicle (HDV, >3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.	5 HDV per day and unpaved road length < 1 km.

Material tracking (track-out) is likely to result in small dust emissions, while demolition and construction activities associated with the proposal are expected to produce medium dust emissions. Earthworks, however, have the potential for a large magnitude of dust emissions; however, this assumes no mitigation measures are in place. The sensitivity of the area is used to evaluate the potential risk of dust impacts on nearby receptors.

The receptor sensitivity for dust settlement is determined based on whether the 'people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land'. The human receptors identified, have all been considered to have a high sensitivity, given that they are mostly residential properties. There are 92 receptors located within 20 metres.

The sensitivity of the area is calculated separately for its sensitivities to potential dust settlement, human health and ecological impacts. The proposal has the following sensitivities (which are based on individual sensitivity matrices provided in Appendix J):

- dust soiling sensitivity is 'high' based on a high receptor sensitivity and there is between 10-100 receptors within 20 metres of the proposal
- human health sensitivity is 'low' based on high receptor sensitivity, <24 µg/m3 annual mean concentration, and there between 10-100 receptors within 20 metres of the proposal
- ecological receptor sensitivity is 'medium' as there are ecological receptors with a medium sensitivity located within 20 metres of the proposal.

A summary of the sensitivity of the study area to dust soiling, human health and ecological impacts is presented in Table 6-78. The sensitivity related to demolition, earthworks, construction, and track-out are all considered the same due to respective activities occurring within similar distances to the receptors.

Table 6-78 Sensitivity of the study area to dust settlement, human health and ecological impacts

Activity	Sensitivity of the study area			
	Demolition	Earthworks	Construction	Track-out
Dust soiling	High	High	High	High
Human health	Low	Low	Low	Low
Ecological	Medium	Medium	Medium	Medium

The risk assessment ratings for each of the dust generating activities are presented in Table 6-79. This has been calculated based on the IAQM risk impact tables, the respective sensitivities of the area from Table 6-78, and the potential dust emission magnitudes from Table 6-77.

Table 6-79 Summary of risk assessment ratings assuming no mitigation

Potential impact	Risk rating			
	Demolition	Earthworks	Construction	Track-out
Dust soiling	Medium risk	High risk	Medium risk	Low risk
Human health	Low risk	Low risk	Low risk	Negligible
Ecological	Medium risk	Medium risk	Medium risk	Negligible

Table 6-79 shows the potential dust soiling impacts for most construction activities have a medium risk rating, except for earthwork with high risk rating and track out which has a low risk rating. Potential human health and ecological impact have a low and medium risk rating respectively for most construction activities, except track out activities which has a negligible rating for potential human health and ecological impact. The risk ratings assume no mitigation measures are adopted during construction activities. The risk ratings calculated in this step are used to inform the mitigation measures to be recommended in Step 3 of the IAQM Guidance.

Step 3 Site-specific mitigation

Step 3 of the IAQM guidance is to use the risk ratings calculated in Step 2 to inform the dust and air emissions mitigation measures to be adopted during the construction phase. The recommended and desirable mitigation measures provided in section 8.2 of the IAQM Guidance were used to develop the mitigation measures listed in section 6.12.4.

Step 4 Determine significant effects

The risk of dust impacts was determined in Step 2, and appropriate mitigation measures for the specific risk of the dust impact were recommended in Step 3 and would be implemented through the site's Construction Environmental Management Plan (CEMP). It is considered likely that mitigation measures would reduce the potential impacts to acceptable levels during the construction phase.

Greenhouse gas assessment

The construction of the proposal would result in the generation of greenhouse gas (GHG) emissions through:

- direct emissions of carbon dioxide, methane and nitrous oxide from the use of plant and equipment emitting exhaust fumes
- direct emissions from the operation of site vehicles and offices
- vegetation removal along the proposal reducing the carbon sequestration capacity of the local environment
- decomposition of green waste and mulch, releasing carbon dioxide
- usage of electricity from fossil fuels
- production and use of materials that have high embodied energy content such as concrete.

The GHG emissions assessment for construction of the proposal includes Scope 1 emissions attributed to plant, equipment and vehicle use and vegetation clearing. Scope 1 emissions are direct GHG emissions that are produced by activities that are controlled by the proponent. The GHG emission inventory for construction of the proposal is shown in Table 6-80.

Table 6-80 GHG emissions during construction

Activity	Quantity		Emission Factor		Emission	
Scope 1						
Site office	111.6	Kl	2.68	t CO_2e per KL	299	t CO2e
Mobilisation and site establishment	105.48	Kl	2.68	t CO_2e per KL	283	t CO2e
Installation of Erosion and sediment control	127.24	Kl	2.68	t CO_2e per KL	341	t CO2e
Relocation and protection of existing services	292.7	Kl	2.68	t CO_2e per KL	784	t CO2e
Bulk earthworks and materials haulage	1324	Kl	2.68	t CO_2e per KL	3548	t CO2e
Road pavement construction	1143	Kl	2.68	t CO_2e per KL	3063	t CO2e
Bridge construction	766.72	Kl	2.68	t CO_2e per KL	2055	t CO2e
Signposting, lighting and roadside furniture installation	100.68	Kl	2.68	t CO_2e per KL	270	t CO2e

Activity	Quantity		Emission Factor		Emission	
Vegetation removal - Moderately sensitive	2.1	ha	307	t CO_2e per ha	645	t CO2e
Vegetation removal - Low sensitive	5.84	ha	110	t CO_2e per ha	642	t CO2e
Total Scope 1					*11930*	*t CO2e*

The Scope 1 emission during construction stage is estimated to be 11,930 t CO_2 e. The majority of construction related emissions result from the use of plant and equipment which accounts for 89 percent of the proposals construction emissions. The remaining 11 percent of emissions are the result of vegetation clearing.

Operation

The RAQST was used to simulate 'Do-Nothing' and 'The Proposal' scenarios to estimate the operational-phase impact of the proposal on air quality. The RASQT model utilises various road characteristics, traffic data and background pollutant concentrations as outlined in Appendix J.

The results of the RAQST simulation are presented in Table 6-81. The results present the concentration of pollutants at 10 metres from the kerb being the nearest location with sensitive receptors.

Table 6-81 Predicted pollutions concentrations 10 metres from the kerb in 2033

Scenario (Year 2033)	NO_2 (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	Maximum 1-hour average	Annual average	Maximum 24-hour average	Annual average	Maximum 24-hour average	Annual average
'Do-Nothing' alone	-	13	10.5	4.2	6.5	2.6
'Do-Nothing' cumulative (including background)	141.5	29.3	38.4	21.4	18.3	9.5
'The Proposal' alone	-	11.7	9	3.6	5.5	2.2
'The Proposal' cumulative (including background)	139.3	28	36.8	20.8	17.3	9.1
Maximum concentration standard	164	30.75	50	25	25	8

The 'Do-Nothing' and the 'The Proposal' scenarios predicted similar results, with minor variations due to the increased lane number and lane width due to the road upgrade modelled in the 'The Proposal' scenario. 'The Proposal' scenario resulted in lower predictions for PM_{10}, $PM_{2.5}$ and NO_2 due to the proposals operation. This reduction in predicted concentrations could be attributed to the increase in the number of lanes lane as well as road width leading to reduced urban congestion and better traffic flow for the peak traffic volume (vehicles/hour).

In addition, the cumulative predicted pollutants for both scenarios are below the maximum concentration standards except for $PM_{2.5}$. The annual average $PM_{2.5}$ concentration exceeds the maximum standard, but the contribution from traffic on the road is minimal. The results of $PM_{2.5}$ shows 15 percent decrease in predicted annual average concentration due to the road upgrade. The background pollutant concentrations are likely overly conservative, possibly influenced by natural events such as bushfires and dust storms. The reduction in the overall emission from the proposal would have a positive impact on air quality by a slight improvement in the existing air quality.

The results for 'The Proposal' alone are simulated in RAQST module for various receptor locations at distances from the lane kerb, ranging from 10 to 100 metres to analyse the dispersion trends of pollutants of PM_{10} and $PM_{2.5}$. These results were also overlaid on the aerial images to provide a visual context to the predicted concentrations relative to the geographic locations and receptors (refer Appendix J). Based on the results it can inferred that at a distance of 350 meters from the

lane's kerb, the concentration of PM_{10} is expected to be 0.9 µg/m^3, and the concentration of $PM_{2.5}$ is expected to be 0.6 µg/m^3.

Greenhouse gas assessment

During the operation of the proposal, GHG emission sources would include:

- maintenance of the proposal which includes infrastructure and pavement repairs, and fuel use for the operation of the plant and equipment to perform the maintenance activities
- use of the proposal by vehicles
- electricity usage for street furniture including lighting, electronic signage and variable message signs.

The GHG emissions assessment for operation of the proposal includes estimates for Scope 2 emissions associated with the consumption of electricity from streetlights and has been estimated for 50 years. Scope 2 emissions are indirect GHG emissions from the consumption of electricity, heating, cooling or steam that is produced offsite. The GHG emission inventory for operation of the proposal is shown in Table 6-82.

Table 6-82 GHG emissions during operation

Activity	Quantity		Emission Factor		Emission	
Scope 2						
Street lighting electricity consumption	2746260	kWh	0.00088	t CO2-e per kWh	2417	t CO2e
Total Scope 2 Emission					*2417*	*t CO2e*

The operation stage GHG emission calculated for street lighting calculated for a period of 50 years is 2417 t CO_2 e Scope 2 emission. Total GHG emission estimated from the proposal (construction and operation) is about 14,347 t CO_2 e.

The potential impact of the proposal in terms of GHG emission for the entire project lifecycle when compared with the total annual Australia emission of 498,112,400 t CO_2 e is only 0.0028 per cent, and when compared with total annual NSW emissions of 132,407,600 t CO_2 e is about 0.01 per cent. This provides a context of the magnitude of the proposal emission, which is insignificant in larger context (Total Australia emission and NSW emissions sourced from Australia's 2020 National Greenhouse Accounts as reported under UNFCC with GWP to AR5).

6.12.4 Safeguards and management measures

Table 6-83 outlines the air quality safeguards and management measures to be implemented by the proposal.

Table 6-83 Air quality safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
AQ1	Construction air quality management	A Construction Air Quality Management Plan (AQMP) would be prepared and implemented as part of the CEMP. The AQMP would include, but not be limited to: • Potential sources of air pollution. • Air quality management objectives consistent with any relevant published EPA guidelines. • Roles and responsibilities for carrying out the AQMP. • A stakeholder communications plan that includes community engagement before work commences on site. • Name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the	Contractor	Pre-construction / Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		environment manager/engineer or the site manager. • A process of recording all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Regular liaison meetings with other high risk construction sites within 500 metres of the proposal, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. • Dust monitoring and inspection plan with different levels of monitoring/inspection in response to the potential impact of the planned activity, dry/windy conditions, or in response to community complaints. This may include visual assessments of dust plumes, dust deposition measurement, and/or continuous PM_{10} ambient air monitoring. • Specific mitigation measures (in addition to those listed as baseline measures as listed in AQ2, AQ3, and AQ4) with proposed action trigger levels for implementation of the mitigation measures. • A process for altering management measures as required and reprogramming construction activities if the safeguards and management measures do not adequately restrict dust generation. • A progressive rehabilitation strategy for exposed surfaces.		
AQ2	Construction and demolition	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Only use cutting, grinding or sawing equipment fitted with or used in conjunction with suitable dust suppression techniques. • Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation, using non-potable water where possible and appropriate. • No bonfires and burning of waste materials. • Ensure effective water suppression is used during demolition operations. • Erect barriers that are higher than the activity or stockpiles where dusty activities are planned near receptors. • Employ sediment and erosion management measures.	Contractor	Construction
AQ3	Earthworks	• Cover, seed or fence stockpiles to prevent wind whipping. • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Contractor	Construction

ID	Impact	Environmental safeguards	Responsibility	Timing
		• Use hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. • Only remove the cover in small areas during the work and not all at once.		
AQ4	Track-out	• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Contractor	Construction

6.13 Climate change

6.13.1 Methodology

A Climate Risk Pre-screening Assessment (CRPA) was prepared for the proposal (Stantec, 2024d). The CPRA details the climate risk pre-screening carried out to screen and identify the climate events and risks of the proposal design. The climate risk pre-screening was undertaken based on a review of proposal documentation, local hazard mapping, historic climate data and in consideration of future climate projections.

Several Australian National and State sustainability frameworks and policies create obligations for Transport to assess, disclose and manage climate risks through its works. Some of the applicable frameworks include:

- *NSW Climate Change Policy Framework* (OEH, 2016)
- *NSW Critical Infrastructure Resilience Strategy* (DoJ, 2018)
- *NSW Climate Change Adaptation Strategy* (NSW Government, 2022)
- *Environment and Sustainability Policy* (TfNSW, 2020c)
- *Transport Sustainability Plan 2021* (TfNSW, 2021a)
- *Sustainable Design Guidelines* (TfNSW, 2017)
- *Transport Climate Risk Assessment (CRA) Guidelines* (TfNSW, 2021b)
- *Net Zero and Climate Change Policy* (TfNSW, 2023n).

6.13.2 Existing environment

Increasing global mean temperatures and changes to global climate systems, are being driven primarily by higher atmospheric greenhouse gases emissions (e.g., carbon dioxide, methane, nitrous oxide, fluorinated gases) due to human activities (IPCC, 2014). These emissions are resulting in a higher frequency and intensity of extreme weather events globally and in Australia.

Weather records from Prospect Reservoir, Bureau of Meteorology site 067019 (BoM, 2024) (located about 9.4 kilometres south-east of the proposal) highlight the increasing frequency of hot days over the last two decades for the region that includes the proposal. This is evident when comparing average days per year above 30°C, 35°C and 40°C from period 1971-2000 against 1991-2020, as shown in Table 6-84.

Table 6-84 Historical hot days and rainfall trends for the periods 1971-2000 and 1991-2020

Attribute	Prospect Reservoir BoM site	
	1971-2000	1991-2020
Mean number of days ≥ 30 °C	42.7	52.4
Mean number of days ≥ 35 °C	10.1	13.5
Mean number of days ≥ 40 °C	0.8	2
Mean Annual Rainfall (mm)	913.9	845
Highest Annual Rainfall (mm)	1443.7	1282
Lowest Annual Rainfall (mm)	521	584.1

Average rainfall across the study area has been decreasing from 1971 to 2020. This decrease is evident when comparing average totals from 1971-2000 against 1991-2020 for Prospect Reservoir BoM site (BoM, 2024) as shown in Table 6-84. Despite this overall drying trend, the severity of extreme rainfall events and storms has increased. This means that it rains less frequently overall, but when it does rain, far more rain is delivered in a single event than the historical averages for the location.

Under climate change, the future climate experienced in the proposal area is likely to be substantially different to the observed historical climate. Major climate hazards identified as likely to impact the proposal are:

- extreme heat events (bushfire, extreme temperatures etc.)
- extreme rainfall events (flooding)
- storm/ extreme winds
- drought.

The climate risk pre-screening assessed the relevance of climate variables within these climate event groups by identifying impacts that may be relevant to the proposal and physical assets. The screening criteria is developed based on guidance from Transport CRA guidelines and other transport authorities' guidelines. The pre-screening assessment is presented in Table 6-85.

Table 6-85 Climate risk pre-screening assessment

Climate event	Hazard	Screening criteria	Response	Is the hazard relevant?
Extreme heat and heatwaves	Bushfire	Proximity and extent of the proposal area i.e. within or adjacent (<10 km) to a bushfire prone land mapping.	The proposal is mapped within Bushfire Prone Land. The surrounding land use is predominantly residential and open space.	It is considered that direct impact from this hazard to the proposal physical assets is likely, and it may pose a risk to the proposal. The indirect impact from this hazard is relevant for visibility and air quality risks arising from bushfire in nearby areas and it may affect the network more widely. From a network operations perspective, the proposal would improve traffic flow in an emergency, so improves usability in advent of emergency or
		Is there a history of bushfires in the proposal area (0-10 km radius)?	There are no specific bushfire incidents within the proposal area.	

Climate event	Hazard	Screening criteria	Response	Is the hazard relevant?
				evacuation due to a nearby bushfire.
	Extreme temperature	Asset components of proposal whose function/design life may be compromised by exposure to extreme temperature.	At Prospect Reservoir (BoM station 067019), the highest temperature recorded was 45.3°C on 07 January 2018. The heat vulnerability index mapping ranges from 1 to 5 with 1 representing low exposure, low sensitivity and/or high adaptive capacity and 5 representing the highest. The construction boundary index ranges from 1 to 5.	Extreme heat and heatwaves have the potential to directly impact the proposal and may result in damage to the structure and its components. The effects of heat may also impact the operation of electrical infrastructure and systems.
	Urban heat	Reduction of the extent of natural surfaces (soil, vegetation, trees etc.) currently present in the local area due to proposal.	Transport network expansion usually need additional green space (typically grassed area / trees etc.).	This hazard is relevant as the proposal would necessitate increased areas of road pavement, shared user path and footpaths which can contribute to the urban heat island effect.
Extreme rainfall and flooding	Increased flooding	Proposal is within or adjacent to a flood zone/area with a flooding overlay.	The construction boundary is within the Bells Creek Floodplain of Hawkesbury-Nepean Valley.	It is considered that impact from this hazard to the proposal assets is relevant as the proposal area is mapped within Flood Prone Land. Extreme precipitation and floods have the potential to cause localised flooding, scouring of infrastructure, impacts to reliability of services, and reduced access and egress. Also, increase in rainfall intensity has the potential for negative impacts on drainage performance.
		History of flooding/inundation in the proposal area.	Historic flood events that occurred in the Hawkesbury-Nepean Valley include the 5% Annual Exceedance Probability (AEP) flood that occurred in August 1990 (SES, 2023).	
		Waterways within or adjacent to the proposal area.	Richmond Road crosses Bells Creek which is a tributary of Eastern Creek.	
Storms and extreme winds	Strong winds	History of extreme storms/strong winds in the proposal area.	Prospect Reservoir (BoM station 067019), the annual mean 9am and 3pm wind speeds are 8.3 and 13.1km/hr. respectively. In the last 30 years, the maximum gust recorded was 106 km/hr. on 05 Dec 2013.	This hazard is relevant as storms (including associated lightning strikes) and strong winds could impact the asset. These have the potential to cause disruptions to service, impacts to electrical systems and damage to assets.
		Asset components in the proposal whose function may be compromised by exposure to strong winds/storms.	The proposal includes assets such as street lighting, power poles, trees and signage which can be affected by storm and strong winds.	

Climate event	Hazard	Screening criteria	Response	Is the hazard relevant?
Drought	Changes in soil moisture	History of drought in the proposal area.	The history of drought in the metropolitan Sydney area and regional NSW over the last 30 years has been marked by several dry spells including more recently, from 2017 to 2020. However, there is no specific information available on experience of drought condition in the proposal area.	This hazard is relevant as changes in soil moisture may result in increased subsurface movement, leading to structural damage.
		Asset components in the proposal whose function may be compromised by changes in soil moisture.	The proposal includes assets such as pavement, bridge, drainage which can be affected by soil condition.	

6.13.3 Potential impacts

These climatic effects may affect the road's operation if not considered in the design. The climate effects and associated impacts may include:

- Extreme precipitation and floods have the potential to cause localised flooding, scouring of infrastructure, impacts to reliability of services, and reduced access and egress.
- Extreme heat and bushfire have the potential to directly impact and may result in damage to the physical structure and its components.
- Storm and strong winds have the potential to cause disruptions to services due to damage to physical assets and electrical systems.
- The indirect impact to visibility and air quality can arise from bushfire in nearby areas and it may affect the wider transportation network.

Following the risk assessment extreme rainfall events and associated flooding impacts were considered high risk:

- The capacity of existing drainage infrastructure being exceeded leading to inundation of surrounding infrastructure (e.g. properties, bus stations, interchanges).
- Increased rainfall intensity along the road resulting in increased road incidents (e.g. aquaplaning) and safety risks to motorists.
- An increased safety risk and disruption to the users of the cycle / pedestrian network due to inundation of infrastructure.
- Increased stormwater flow from surrounding developed areas contributing to additional water volumes in drainage lines and other stormwater infrastructure resulting in additional localised flooding impacts.

6.13.4 Safeguards and management measures

Table 6-86 lists the climate change safeguards and management measures that would be implemented by the proposal.

Table 6-86 Climate change safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
CC1	Climate Change	A detailed climate change risk assessment would be carried out by reviewing and investigating the preliminary risks and adaptation options in accordance with latest Transport *Climate Risk Assessment Guidelines* (TfNSW, 2021b) and other applicable NSW and national guidelines. This would include a sensitivity analysis check and consideration of climate change for flooding as per *Australian Rainfall and Runoff V4.2* (Australian Government, 2019).	Contractor	Detailed design / Pre-Construction

6.14 Sustainability

A Sustainability Plan (SP) has been developed (Stantec, 2024c) to provide a framework for identifying and managing sustainability risks, impacts and opportunities associated with the proposal. It was developed to enable the relevant sustainability obligations associated with environmental, social and economic outcomes of any investment to be met, managed and tracked across the relevant phases of the proposal's lifecycle.

The SP acts as a reference document for all personnel involved in future development phases of the proposal and aims to:

- Align with Transport's strategic direction, *Environment and Sustainability Policy* (TfNSW, 2020c), and *Sustainability Plan* (TfNSW, 2021a), *Future Transport Strategy* (TfNSW, 2022a) and *Net Zero and Climate Change Policy* (TfNSW, 2023n).
- Create a clear platform to drive, monitor and report on sustainability performance.
- Identify key sustainability opportunities and initiatives.
- Comply with legislative and management commitments.

6.14.1 Relevant sustainability plans

Transport is committed to delivering sustainability (social, economic and environmental) outcomes for the NSW community through a series of actions and objectives as set forth in various government acts, frameworks, strategies and policies.

Environment and Sustainability Policy

The *Future Transport Strategy* (TfNSW, 2022a) (The Strategy) outlines Transport's direction for the continual improvement of the transport system for the benefit of their customers, the community, and the economy. The Strategy is amongst a set of strategies, policies and plans that integrate and guide long-term land use, transport planning, and the design, delivery, and management of transport. Sustainability is identified as one of the key outcomes of The Strategy.

The *Environment and Sustainability Policy* (TfNSW, 2020c) informs and supports The Strategy and ensures a coordinated approach to delivering the NSW Government's environmental and sustainability agenda across the Transport cluster.

The Transport asset life cycle principles would be applied to the proposal to ensure sustainability is considered for all stages of the proposal asset life cycle from needs requirement to disposal.

Sustainability Plan 2021

Transport is committed to delivering transport services, projects, operations and programs in a manner that balances economic, environmental and social issues to ensure a sustainable transport system in NSW.

The *Sustainability Plan 2021* (TfNSW, 2021a) provides an implementation framework to deliver on eight sustainability focus areas to meet the vision of The Strategy. The focus areas are:

- respond to climate change
- protect and enhance biodiversity
- improve environmental outcomes
- procure responsibly
- partner with communities
- respect culture and heritage
- align spend and impact
- empower customers to make sustainable choices.

Transport has positively contributed to these eight focus areas through identification of sustainability objectives and initiatives presented in the SP. Transport would report on actions delivered through this proposal that contributed to these focus areas.

Net Zero and Climate Change Policy

The *Net Zero and Climate Change Policy* (TfNSW, 2023n) outlines the NSW government's commitment to achieving net zero emissions by 2050 in the transport sector. The policy applies to NSW transport sector including Transport. It details a number of key principles and requirements to reduce greenhouse gas emissions and increase resilience to climate change.

6.14.2 Proposal sustainability objectives, opportunities and initiatives

The SP seeks to maximise sustainability outcomes through the identification of sustainability objectives and initiatives that can be implemented and make a cumulative contribution to Transport sustainability policies.

In reviewing the proposals scope as well as eight sustainability focus areas and respective goals of the Transport *Sustainability Plan* (TfNSW, 2021a), the following sustainability objectives were identified for the proposal:

- Plan and design infrastructure and operations to cope, adapt and improve in response to forecast climate conditions.
- Reduce energy use and greenhouse gas emissions through design and during construction and operation.
- Protect and create biodiversity and habitat connectivity whilst ensuring appropriate land use development and enhancement of land.
- Reduce materials consumption and minimise waste generation and disposal throughout the asset lifecycle.
- Minimise use of potable water and maximise opportunities for reuse of rainwater, stormwater, wastewater and groundwater.
- Influence contractors, subcontractors and material suppliers to minimise adverse environmental, social and economic impacts of purchased goods and services across the project life cycle.
- Encourage and incentivise for stimulating market demand for sustainable products and services.
- Support Aboriginal employment and investment in Aboriginal businesses.
- Advocate best practice approaches to community participation in corridor-wide decision making.
- Protect and promote cultural and natural heritage through appropriate design, planning, and management controls.
- Demonstrate leadership in sustainability by integrating sustainability objectives into decision making and actions for value creation.
- Tracking and evaluating the sustainability performance and monitor progress towards targets.
- Provide sustainable transport choices through alignment with outcomes sought by the community for their future.

Fifty six sustainability performance opportunities and initiatives have been developed to align with the sustainability objectives identified for the proposal. The opportunities and initiatives ranged from design considerations, to procurement, construction and operation/maintenance.

These sustainability opportunities and initiatives would be further reviewed, investigated, and refined, as the proposal progresses through future stages.

6.14.3 Sustainability outcomes

The key mechanism for embedding sustainability and achieving the sustainability outcomes across this proposal is through the application of Transport's Baseline Sustainability Requirements (BSRs).

The Transport BSRs are the minimum sustainability performance expectations across all transport projects and include sustainability requirements which are in alignment with the sustainability focus areas. The BSRs comprise both quantifiable targets and process requirements which are applied where they are 'fit-for-purpose' in relation to the scope of the contract or application.

6.14.4 Safeguards and management measures

Table 6-87 lists the sustainability safeguards and management measures that would be implemented for the proposal.

Table 6-87 Sustainability safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
S1	Sustainability	Integrate sustainability requirements/ initiatives/ opportunities identified in the Sustainability Plan (Stantec, 2024c) into future design.	Contractor	Detailed design
S2	Sustainability	Preparation and implementation of the detailed project Sustainability Management Plan including a sustainability workshop to investigate proposal specific risks and opportunities.	Transport	Detailed design

6.15 Cumulative impacts

Cumulative environmental impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of other external projects.

6.15.1 Study area

The cumulative impact assessment has considered projects within the following suburbs surrounding the proposal:

- Dean Park
- Glendenning
- Hassall Grove
- Marsden Park
- Colebee.

Cumulative impacts have been determined by those projects which may interact with this proposal.

6.15.2 Broader program of work

The proposal is part of the broader program of road network upgrades for the NWGA. The *North West Growth Centre Road Network Strategy* (TfNSW, 2015) proposes a road network to support the forecast growth in the NWGA. The Richmond Road upgrade is one of a number of projects in planning that form part of the Strategy. Road projects surrounding the proposal include (refer Figure 6-47):

- Bandon Road corridor connects Richmond Road, Marsden Park and Windsor Road, Vineyard (project status: planning and development of priority sections).
- Garfield Road East corridor extends 3.2 kilometres between Piccadilly Street, Riverstone and Windsor Road, Grantham Farm (project status: preceding to detailed design).
- Garfield Road West corridor extends 3.2 kilometres between Richmond Road, Marsden Park and Denmark Road, Riverstone (project status: finalise detail design once funding becomes available).
- Garfield Road Central extends 800 metres between Piccadilly Street and Denmark Road, Riverstone (project status: optioneering).
- Upgrade of Richmond Road from north of Elara Boulevard to Heritage Road, Marsden Park (project status: finalising submissions report following REF display).
- Townson-Burdekin Road Upgrade would have two stages and together would provide an east-west link of about 3.6 kilometres, between Richmond Road and Walker Street (project status: finalising submissions report following REF display of Stage 2).

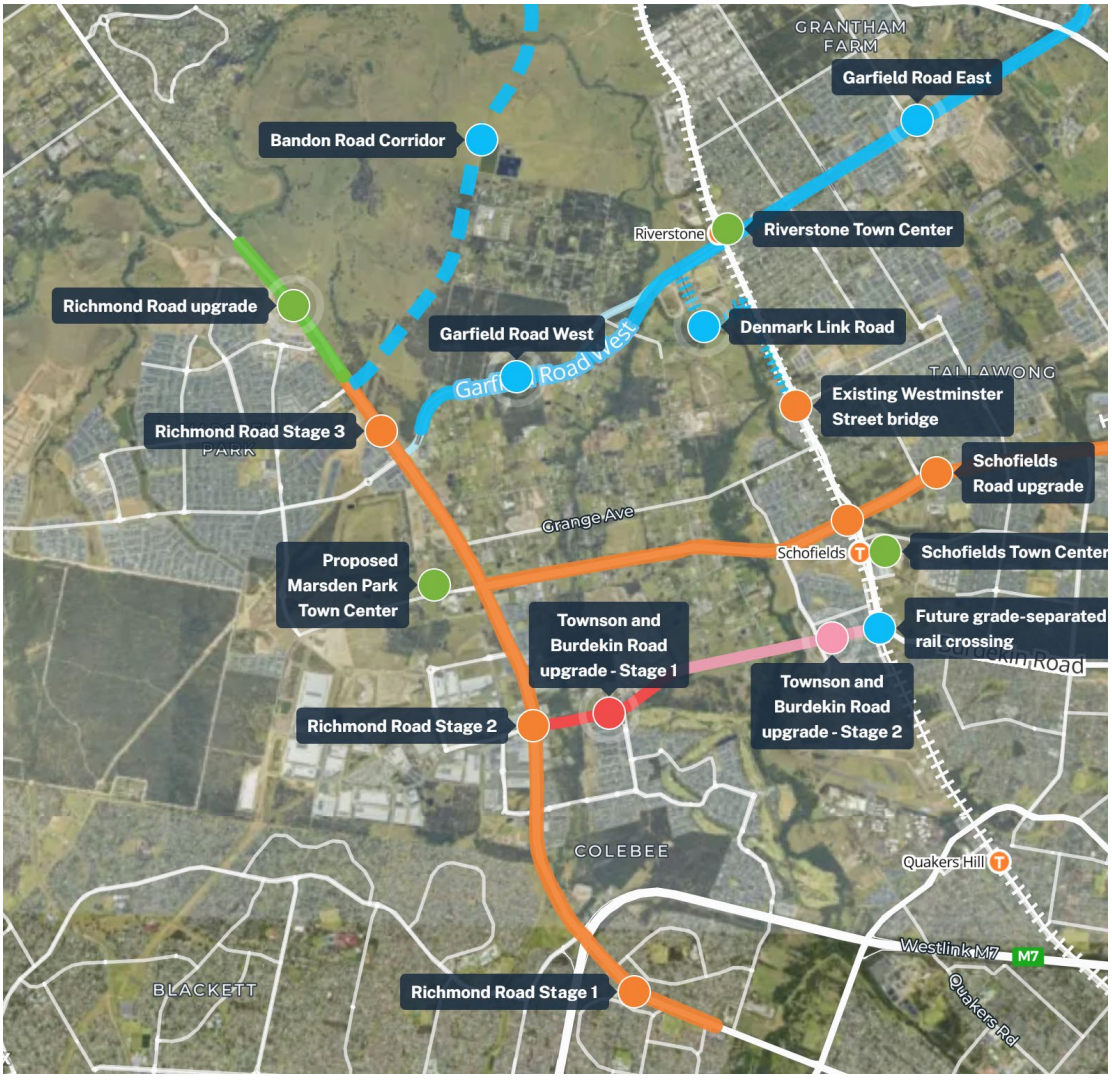

Figure 6-47 North West Growth Area map (source: Transport for NSW https://caportal.com.au/rms/nwgc)

In addition to the outlined road network plans, the *North West Priority Growth Area Land Use and Infrastructure Implementation Plan* (The Implementation Plan) (DPE, 2017) outlines plans for the growing NWGA and the infrastructure needed to support this growth. The Implementation Plan identifies the vision, priorities and actions which includes:

- Plan for an additional 20,000 dwellings than originally anticipated in Sydney's north-west in vibrant and liveable neighbourhoods, and facilitate the supply of 18,000 new homes by 2021 and 33,000 new homes by 2026. The NWGA provides substantial land release areas for homes and jobs in Sydney's north-west and is forecasted to contribute approximately 12 per cent of the homes needed to meet demand over the next 20 years.
- Balance the needs of a growing population with opportunities for employment and recreation by establishing minimum and maximum residential densities as a priority, in line with infrastructure provision.
- Identify and coordinate the delivery of infrastructure that will support housing and employment growth to ensure there is an ongoing supply of development-ready land in Sydney's north-west.
- Improve transport accessibility and connectivity throughout the area to reduce car reliance and connect people to other parts of Sydney by providing opportunities for the integration of travel modes through detailed precinct planning.
- Identify and enhance key biodiversity areas, open spaces, riparian corridors and culturally sensitive areas and identify additional open space to support a high growth housing capacity scenario, as well as improved links to regional open space.

The NWGA precincts in close proximity to the proposal which have been zoned include Colebee, Marsden Park, and Marsden Park Industrial, providing more homes close to amenities and more local jobs for the growing communities. The West Schofields Precinct planning is currently underway and has not yet been zoned. Recent flood modelling demonstrated that flood related risk to life and property may be greater than previously identified. As a result, a full rezoning of the West Schofields Precinct, as envisaged by the draft Precinct Plan, will not proceed. Investigations for a partial rezoning of the Precinct for up to 2300 dwellings above the current Probable Maximum Flood (PMF) level will occur, for development in the southern part of the Precinct which is less impacted by flooding.

Projects which have the potential to interact with the proposal during the construction phase are described in Table 6-88.

6.15.3 Projects and developments with potential to be of cumulative impact

The projects outlined in Table 6-88 have been identified to be of potential cumulative impact to this proposal, based location and potential timing of construction programs.

Table 6-88 Past, present and future projects

Project	Expected timing	Construction impacts	Operational impacts
Townson-Burdekin Road Upgrade (GHD, 2021a and 2022a) Transport is proposing a four-lane divided road along the Townson Road/Burdekin Road corridor linking Richmond Road, Marsden Park in the west with Burdekin Road, Schofields in the east. The length of the overall program of work is about 3.6 kilometres. The program of work consists of two stages, each subject to a separate planning approval: • Stage 1 involves an upgrade of about 1.6 kilometres of Townson Road and Meadow Road, extending from Richmond Road to the end of Durham Road. • Stage 2 is about two kilometres in length involving the construction of a new four-lane road between the end of Stage 1 tie-in and the intersection of Pelican Road and Burdekin Road. It is anticipated that the interim phase (Stage 1) would be operational for a period of up to five years before the ultimate phase work (Stage 2) is completed.	The Submissions report for Stage 1 (GHD, 2021b) notes that the start of construction is dependent on the re-zoning of West Schofields Precinct and approval and agreement between the (former) Department of Planning Industry and Environment, Blacktown City Council and the Developer. There is potential for the Stage 1 work and the proposals construction phases to overlap. The Submissions report for Stage 2 (GHD, 2024b) notes the proposal was estimated to start in 2026, opening to traffic in 2028 with a construction period of 18 months. However, there is currently no funding allocated for future development of the proposal so the timing of construction commencement may be later than estimated. Transport has completed the Final Business Case for the proposal which will be used to assist in requesting funding for construction of Stage 2. As there is no timeline as to when the funding for Stage 2 may become available cumulative impacts have not been considered.	The construction impacts from the Stage 1 works would likely include: • Traffic – increased movement of light vehicles, heavy vehicles, and personnel on site during construction. Traffic diversion, closure of Townsend Road between Richmond Road and Victory Road for the construction of the Bells Creek Bridge. Diversion of public transport. • Noise – short-term increase in localised noise levels, particularly for residences close to the construction footprint. • Hydrology - local changes to overland flow regimes and the obstruction of drainage paths resulting in temporary localised flooding. This could result in minor increases in surface flows along existing overland flow paths to the nearest drainage line. • Surface water - soil disturbance which represents a risk to surface water quality due to sediment laden run-off. Pollutants such as sediment, soil nutrients and construction waste have the potential to mobilise and enter drainage lines, particularly during high rainfall events. • Biodiversity - the proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act, FM Act or EPBC Act. • Aboriginal heritage - potential impact to three Aboriginal archaeological sites. An AHIP is required for impacts to these sites/objects prior to the commencement of pre-construction or construction activities. • Landscape and visual character - the greatest visual impact of the proposal would occur along Townson Road at the interface of the new residential development as well as at the interface of the quarry site. This is due to the removal of roadside trees which could result in greater exposure of the adjacent land uses. • Air quality – impacts would predominantly be associated with the generation of dust.	The project would contribute to the overall program benefits to facilitate growth and development in the NWGA. Stage 1 of the project would result in a cumulative loss of flood plain storage across Bells Creek floodplain as a result of widening of the road formation within land that currently contributes to flood storage during major floods. The project would incorporate design measures to mitigate potential changes to flooding conditions and manage the conveyance of stormwater through the project site. During operation, increased pollutant generation and changes in groundwater recharge as a result of increased in hardstand areas.

Project	Expected timing	Construction impacts	Operational impacts
Richmond Road upgrade between Elara Boulevard and Heritage Road, Marsden Park (Jacobs, 2020) This project is the next stage following the completion of the four-lane upgrade of Richmond Road between M7 Motorway and Garfield Road West in 2016. This project aims to continue upgrading the Richmond Road for about 1.5 km, from north Elara Boulevard to Heritage Road, Marsden Park.	The timing of the commencement of this project is not confirmed. Transport is finalising the Submission report following the display of the REF. Investigations work is being carried out in September / November 2024 to collect information to assist with the planning and design of the project. There is potential for this project and the proposals construction phases to overlap.	The construction impacts would likely include: • Traffic - travel delays such as increased travel times, and temporary lane closures that would affect commuter, bus and heavy vehicles traffic. • Noise - noise impacts at some sensitive receivers near the proposal where noise management levels (NMLs) are predicted to be exceeded. • Non-Aboriginal heritage - encroachment into the curtilage of the State listed Clydesdale – House, Barn, Cottage and Farm Landscape heritage item. • Biodiversity - The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act, FM Act or EPBC Act. • Landscape character and visual amenity - visual changes would be due to the widened road resulting in the overall increase in scale. The proposal area would be landscaped after construction to help integrate the proposal with the surrounding environment and landform.	The proposal would improve road safety and road network performance by providing dedicated acceleration/turning lanes at all intersections and widened and sealed shoulders and safe overtaking opportunities. The proposal would substantially improve traffic efficiency during peak traffic periods.
Marsden Park Data Centre (Mecone, 2024). Construction and operation of a 504MW data centre facility comprising six data centre buildings (each containing 24 data halls and associated generators, chiller units and office space), a substation, site access, internal access roads and parking, stormwater and fire management infrastructure, utilities, signage, security systems, fencing/walls and landscaping.	The EIS is currently in preparation for this project. Based on the project's webpage, construction is expected to commence early 2025, however construction timeframes are unknown. There is potential for this project and the proposals construction phases to overlap.	The construction impacts would likely include: • Aboriginal cultural heritage - one associated area of Potential Archaeological Deposit (PAD) (AHIMS site ID #45-5-4619), within the study area. • Biodiversity - removal of native vegetation, removal of threatened fauna species habitat and habitat features and injury and mortality of fauna. The entire site except one small portion is biodiversity certified. A small section has areas of biodiversity values. Trees in this section are to be retained.	Operation impacts from this project may include: • visual impacts of the new buildings • an increase in traffic on Richmond Road, local roads and associated road traffic noise • invasion of weeds, pests and pathogens • increased noise and light.
Sydney Business Park (DPIE, 2021c) and associated modifications Construction and operation of four warehouse and distribution centres in an area described as 'Stage 3' within the Sydney Business Park, which forms part of the Marsden Park Industrial Precinct in Sydney's NWGA.	The timing of this stage is unknown. The Stage 3 works are being undertaken across 5 stages. Stages 1 to 4 are competed, and Stage 5 is yet to be constructed. There is potential for this project and the proposals construction phases to overlap.	The construction impacts would likely include: • Traffic - The number of truck movements during the construction phase would vary depending on the stage of construction, predicting up to 25-50 movements a day, equating to peak flows of up to five vehicles an hour based on a 10-hour workday. • Noise - The development would generate noise during construction and from 24 hour operations. Primary operational noise sources include heavy vehicle movements to, from and within the site, the use	Operation impacts from this project may include: • Visual impacts of the new buildings • An increase in traffic on Richmond Road, local roads and associated road traffic noise

Project	Expected timing	Construction impacts	Operational impacts
		of external mechanical plant and forklifts and staff vehicle trips. The predicted exceedances remain well below the 'highly affected' noise limits in the ICNG, and the assessment concluded the exceedances can be managed subject to implementation of standard best practice construction noise mitigation measures. • Biodiversity - clearing of an area of approximately 5 hectares of Cumberland Plain Woodland. There will be no impacts to biodiversity values in the non-certified land. • Aboriginal cultural heritage - These sites would be impacted during earthworks: MPIP 17 (AHIMS 45-5-3748) – comprising two stone artefacts - MPIP 18 (AHIMS 45-5-3749) – comprising a scatter of eight stone artefacts (partially impacted). An AHIP would be required.	• Invasion of weeds, pests and pathogens • increased noise and light.
Westlink M7 Widening (AECOM, 2022) This project will widen the Westlink M7 Motorway by adding one lane in each direction within the existing median. The widening will occur between the M5 interchange at Prestons and the M7 Motorway bridge at Richmond Road in Oakhurst/Glendenning. Once complete, there would be three lanes in each direction.	This project is currently under construction. As the work in proximity to the proposal would likely be completed before the construction this proposal cumulative impacts have not been considered.	The Modification Report has found that the widening would have impacts on the vegetation and biodiversity during construction and operation. About 7.48 hectares of native vegetation would be removed for the proposed widening, this includes threatened vegetation and habitat for the Southern Myotis (microbats). Biodiversity credits to offset these impacts would be secured. A Biodiversity Management Plan will be developed to manage potential impacts during our construction. During construction, there will be speed limit changes, temporary lane closures and detours to ensure the safety of road users and workers while the work is being carried out. Some residents near the Westlink M7 would experience increased noise levels during the construction and operation of the project. There would also be impacts on the Light Horse Interchange artwork. Transport is working closely with the NSW RSL and Office of Veteran Affairs to ensure the best outcome for the community.	The project would ease congestion, enable better and more reliable trips for people, businesses, and freight and improve journey times to planned growth areas and the new Western Sydney International Airport.

6.15.4 Potential impacts

Construction work associated with Stage 1 of the Townson-Burdekin Road Upgrade, the Richmond Road upgrade between Elara Boulevard and Heritage Road, the Marsden Park Data Centre and the Sydney Business Park may overlap with the expected construction timing of the proposal (end 2025 to end 2028). The potential cumulative impacts of the proposal are outlined in Table 6-89.

Table 6-89 Potential cumulative impacts

Environmental factor	Construction impacts	Operational impacts
Traffic and transport	There may be additional construction traffic within the surrounding road network as a result of combined construction work in the area from the identified projects and developments in the local area. Where construction is occurring at a similar time, additional road and/or lane closures may be required in the broader network. This would potentially contribute to slower and disrupted travel times along Richmond Road as the identified projects would use Richmond Road for access of construction vehicles, materials and workers. There is potential that the traffic management plans prepared for each project, to minimise impacts of construction traffic, would be undertaken separately and not consider the cumulative impacts on the surrounding road network.	The proposal aims to facilitate the anticipated growth in the NWGA and improve network efficiency across the area during operation. The combination of the proposal and other identified road projects in the NGWA, would provide further network benefits to the planned residential and commercial developments. The Marsden Park Data Centre, Sydney Business Park and other developments in the Marsden Park Industrial Precinct are creating an industrial, commercial and retail hub in the area. These developments would result in increased traffic movements within the local area.
Noise and vibration	Simultaneous construction of the identified projects could potentially generate noise levels higher than that assessed for the individual projects as a result of additional noise sources being present. Construction noise respite periods planned for one project may not coincide with noise respite periods on adjacent projects. This may result in no respite from construction noise for receivers near multiple projects. The construction of the identified projects occurring consecutively may also cause prolonged noise impacts. This may constitute construction fatigue within the local community during this time, particularly for receivers near multiple projects from ongoing noise impact.	Once construction of the identified projects are complete, there is potential for increased noise levels and exceedance of noise criteria due to the expected increase in traffic along Richmond Road.
Biodiversity	The proposal in combination with other identified projects would impact biodiversity through removal of native vegetation, and habitat features. The proposal is subject to multiple biocertification processes including the NWGA and CPCP (refer section 4.1). Cumulative biodiversity impacts in certified lands are expected to be consistent with the objectives of the strategic assessment of the NWGA and CPCP. A number of identified projects including the Richmond Road upgrade – Elara Boulevard to Heritage Road, Marsden Park Data Centre and Sydney Business Park and portions of the Townson and Burdekin Road Upgrades occur within certified lands and biodiversity related	The cumulative indirect impacts from the operation of projects in region would include a general increase in traffic, light spill and noise. This could increase disturbance to, and potentially increase mortality rates of fauna species.

Environmental factor	Construction impacts	Operational impacts
	impacts within these areas have been previously assessed and determined. There are areas to which biodiversity impacts occur outside of certified areas within the Blacktown LGA including the Westlink M7 widening and areas on the Townson and Burdekin Road Upgrades. Collectively, including the proposal, the following total impacts to sensitive biodiversity in uncertified lands include: • Loss of 1.74 ha of TEC Cumberland Plain Woodland. • Loss of 2.55 ha of TEC Riverflat Eucalypt Forest. • Loss of 29 Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*). • Disturbance to Southern Myotis (*Myotis macropus*) maternity roost on Townson Road.	
Visual amenity and landscape character	Given the nature of the NWGA the existing environment is currently undergoing a process of continuous development with vegetation clearing and construction works area. The proposal, in conjunction with the identified projects would have a cumulative impact on visual amenity and landscape character. However, the impacts from the construction works areas would be of a temporary nature, limited to the construction period and would not have a long-term visual impact.	The landscape in this part of the NWGA is undergoing a process of continuous development with areas of bushland and rural properties changing to residential and commercial areas. During operation of the proposal and the identified project construction of new built features (e.g. roads, bridges, buildings), would permanently alter the characteristics of the existing landscape environment.
Flooding, water quality and hydrology	The proposal and the other identified projects would be undertaken within the Bells Creek and South Creek sub-catchments which are part of the broader Hawkesbury-Nepean Catchment. In combination, the projects would lead to increased temporary construction activities within the Bells Creek and South Creek sub-catchments, and their associated floodplains. This increased activity may increase sediment laden run-off ultimately reaching the receiving waters of the Hawkesbury River.	Operation of the proposal and identified projects in the area may further exacerbate impacts to hydrological flows and flooding with the broader Hawkesbury-Nepean Catchment. This proposal would include mitigation measures to address flooding impacts of the proposal.

6.15.5 Safeguards and management measures

Table 6-90 lists the cumulative safeguards and management measures that would be implemented for the proposal.

Table 6-90 Cumulative safeguards and management measures

ID	Impact	Environmental safeguards	Responsibility	Timing
C1	Cumulative construction impacts	The Construction Environmental Management Plan (CEMP) and associated sub-plans would consider potential cumulative impacts from surrounding development activities as they become known. This would include, but not limited to: • consultation with the proponent and/or lead contractor of adjacent construction projects • preparation of traffic management plans in consultation with adjacent construction projects • schedule noisy work to avoid cumulative noise with adjacent construction projects, where possible • development of respite periods in consultation with adjacent construction projects, where possible • minimise clearing, especially outside the NWGA and CPCP and prioritise use of areas of prior disturbance • implementation of appropriate sediment and erosion control measures.	Contractor	Pre-construction / Construction

Minimising cumulative impacts during operation have been considered in the design of the proposal. Mitigation measures outlined throughout section 6 would also address and minimise cumulative impacts associated with the proposal.

7. Environmental management

This chapter describes how the proposal would be managed to reduce potential environmental impacts during detailed design, construction and operation. A framework for managing potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are listed.

7.1 Environmental management plans (or system)

Safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) would be prepared to describe the safeguards and management measures identified. The CEMP would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The CEMP would be prepared prior to construction of the proposal and must be reviewed and certified by the Transport for NSW Environment and Sustainability Officer prior to the commencement of any on-site works. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the *QA Specification G36 - Environmental Protection (Management System)*, *QA Specification G38 - Soil and Water Management (Soil and Water Plan)*, *QA Specification G40 - Clearing and Grubbing, QA Specification G10 - Traffic Management*.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

Table 7-1 Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing
GEN1	General - minimise environmental impacts during construction	A CEMP would be prepared and submitted for review and endorsement of the Transport for NSW Senior Manager Environment and Sustainability prior to commencement of the activity. As a minimum, the CEMP would address the following: • any requirements associated with statutory approvals • details of how the project would implement the identified safeguards outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. The endorsed CEMP would be implemented during the undertaking of the activity.	Transport / Contractor	Detailed design / Pre-construction
GEN2	General - notification	All businesses, residential properties and other key stakeholders (schools, local councils) affected by the activity would be notified at least seven days prior to commencement of the activity.	Transport / Contractor	Pre-construction
GEN3	General - environmental awareness	All personnel working on site would receive training to ensure awareness of environment protection requirements to be implemented during the project. This would include up-front site induction and regular "toolbox" style briefings. Site-specific training would be provided to personnel engaged in activities or areas of higher risk. These include: • Threatened species habitat • Areas of Aboriginal heritage sensitivities including the Blacktown Native Institution • Adjoining residential areas requiring particular noise management measures.	Transport / Contractor	Detailed design / Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
TT1	Traffic and transport	A Traffic Management Plan (TMP) would be prepared and implemented as part of the CEMP. The TMP would be prepared in accordance with the Transport *Traffic Control at Work Sites Manual* (TfNSW, 2022c) and *QA Specification G10 Control of Traffic* (TfNSW, 2020a). The TMP would include: • confirmation of haulage routes • confirmation of workforce parking areas • 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 ancillary facilities including entry and exit locations and measures to prevent construction vehicles queuing on public roads • vehicle management / movement plan for ancillary facilities due to the proximity of these facilities to high speed, major movement corridors • a response plan for any construction road 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 • traffic assessments to support any works which may temporarily reduce capacity, change the intended schedule of works or any other interruptions to general operation • monitoring, review and amendment mechanisms. Road safety audits (RSA) of the TMP would be undertaken before construction.	Contractor	Detailed design / Pre-construction
TT2	Traffic and transport	Preparation of a Traffic Guidance Scheme (TGS). The TGSs would be prepared by suitably qualified personnel for the construction area and progressively updated as the works progress.	Contractor	Pre-construction
TT3	Traffic and transport	A Road Occupancy License (ROL) would be obtained before road or lane closures.	Contractor	Pre-construction
TT4	Motorists and public transport	• Minimise road space occupied by the works in terms of time, width and length; road capacity would not be reduced unnecessarily, and sufficient capacity would be provided to accommodate expected traffic volumes. • Detailed site investigations would be undertaken to avoid any unforeseen problems that may increase traffic delays. • All work activities would be sufficiently planned to ensure road occupancies are not implemented at times of peak traffic volumes. • Road occupancies would be coordinated with transport operators regarding schedules and dimension loads. • The ability to stop work and clear travel lanes to allow traffic flows to return to normal free-flow conditions would be maintained.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• Road users including public transport, local communities and the freight industry would be provided with timely, accurate, relevant and accessible information about changed traffic arrangements and delays resulting from construction activities. • Road occupancies would allow for and accommodate all road users ranging in size from oversized heavy vehicles, buses, pedestrians and cyclists. • Ensure that free flow traffic is not delayed in any direction at any single road occupancy for longer than five minutes. • Queues caused by road occupancies measured along a single lane in any direction should not exceed 250 metres in length. • Road occupancies involving the closure of any shoulder or auxiliary lane should always provide a minimum of one travel lane in each direction through period of occupancy. • Detour signage would be installed at appropriate locations to inform drivers of road closures. • Undertake daily travel time surveys through the project to monitor and verify delays caused by project works and ensure traffic delay criteria is satisfied. • Conduct a Road Safety Audit (RSA) after the implementation of any traffic switches, with the intention to address any identified issues and regularly monitor the implemented arrangements. This would involve consultation with all relevant stakeholders to identify issues.		
TT5	Pedestrians	• All footpaths for construction workers within the works areas would be clearly delineated, signed and fenced to prevent access to work areas and sufficiently separated from vehicular traffic. • Pedestrians would be segregated from live traffic by safety barriers where required. • Appropriate pedestrian detour signage would be provided to guide / direct pedestrians where detours are available.	Contractor	Construction
TT6	Cyclists	A road shoulder would be maintained for cyclists. If this is not possible during certain construction tasks, the speed limit would be reduced to maintain cyclist safety.	Contractor	Construction
TT7	Heavy vehicles	Heavy vehicle access, including for oversized vehicles, would be maintained at all times during construction.	Contractor	Construction
TT8	Traffic control	Development of temporary signposting schemes associated with the traffic staging arrangements. Traffic control devices may include safety barriers, pavement markings, portable variable message signs and temporary traffic signals.	Contractor	Construction
TT9	Construction access points	• Minimise the number of access points. • New construction access points would not adversely impact on any existing intersections, traffic facilities or traffic generation developments. • Security fences and gates at access points would be indented to enable vehicles to park clear of the adjacent travel lanes. • Access points would be constructed of a suitable all-weather surface that prevents debris from being tracked onto the adjacent travel lanes. • Access points would be clearly visible to approaching traffic and signposted accordingly. • Use of temporary traffic control would be considered to facilitate short-term major haulage operations and the movement of oversized vehicles where required.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing

H1	Erosion and sedimentation	A Soil and Water Management Plan (SWMP) would be prepared and implemented as part of the CEMP during construction. The SWMP would include (but not limited to):
		• objectives and targets for soil and water quality management
		• approvals, licence requirements and relevant legislation
		• overview of the existing environment and potential impacts of construction works
		• identification of high-risk activities (such as the bridge construction around Bells Creek) and sensitive areas and the need for an Environmental Work Method Statement (EWMS)
		• environmental control measures in relation to:
		  ○ erosion and sedimentation including the preparation and updating of Erosion and Sediment Control Plans (ESCPs) throughout construction
		  ○ stockpile management
		  ○ spoil and fill management
		  ○ surface water quality
		  ○ refuelling of vehicles and equipment and accidental spills
		  ○ storage or hydrocarbons
		  ○ wet weather events
		  ○ groundwater dewatering and management of groundwater in-flow during construction
		• a surface water monitoring program including regular monitoring of Bells Creek within the mixing zone (100 m downstream) as well as an upstream reference point for each discharge point
		• auditing and reporting requirements
		• site inductions and training for construction personnel.
		The SWMP would be prepared in accordance with the following specifications and guidelines:
		• Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
		• Transport's Soil and Water Management Specification (G38)
		• Transport Erosion and Sedimentation procedure.
			Contractor	Pre-construction

H2	Erosion and sedimentation	A primary site-specific ESCP and progressive ESCPs would be prepared and implemented as part of the SWMP.	Contractor	Pre-construction
H3	Erosion and sediment control	A construction erosion and sedimentation assessment would be undertaken to determine specific location, sizing and effectiveness of erosion and sediment control measures during construction. This assessment would also consider construction flooding impacts as the staging plans are refined as the detailed design progresses.	Transport	Detailed design
H4	Water quality	Consult with Blacktown City Council about operational pollution reduction targets.	Transport	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
H5	Water quality	A water quality assessment would be undertaken prior to construction to determine the discharge criteria for the local waterways. Undertake water quality monitoring during construction of the proposal. The discharge rate of sediment basins (if required) is to be adjusted to ensure that turbidity within the mixing zone does not exceed discharge criteria.	Contractor	During construction
H6	Water resources	Detailed design of the open flooding channel is to consider the following: • A vegetation management plan to both stabilise banks and manage the groundwater table. • Geotechnical investigations to collect geotechnical information including soil type and groundwater levels along the proposed realignment. • Low flow channel requirements, a naturalised channel design, and scour protection.	Transport	Detailed design
H7	Groundwater resources and quality	Monitor the volume of groundwater that is dewatered during construction to ensure extraction does not exceed more than three mega litres a year. Test the quality of groundwater prior to discharge.	Contractor	Construction
SC1	Erosion and sedimentation	Refer H1		
SC2	Erosion and sediment control	Refer H2		
SC3	Erosion and sediment control	Refer H3		
SC4	Contaminated lands	Undertake additional contamination testing and assessment at locations identified in Figure 6-14 that would be disturbed by the proposal (in consideration of the identified AEC) to confirm the presence of contamination. If contamination is present and exceeds the adopted site criteria, a Remedial Action Plan (RAP) would be developed in line with the relevant guidelines to ensure appropriate management and mitigation measures are in place.	Transport	Detailed design
SC5	Contaminated lands	Unexpected Finds Protocol would be prepared and included within the CEMP to manage unexpected occurrences of contaminated materials.	Contractor	Pre-construction
SC6	ASS	Undertake further testing of soils during detailed design to allow for clearer delineation of ASS extents in relation to the proposed ground disturbance footprint. This testing would: • include screening of soils with the pHField / pHOxidation methodology • target areas of proposed cut or dewatering • determine whether an ASS Management Plan is necessary, in accordance with published guidance including ASSMAC (1998), National ASS Guidelines (Sullivan et al, 2018) and *Guidelines for the Management of Acid Sulfate Materials* (RTA, 2005).	Transport	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
SC7	Accidental spill	A site-specific emergency spill plan would be developed and include spill-management measures in accordance with the Transport *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The plan would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport EPA officers).	Contractor	Construction
AH1	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) would be prepared in accordance with the PACHCI (RMS, 2011) and the *Unexpected Heritage Items Procedure* (TfNSW, 2024b) and implemented as part of the CEMP. It would provide specific drafting guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP would be prepared in consultation with all relevant Aboriginal groups.	Contractor	Pre-construction
AH2	Unexpected finds	The *Unexpected Heritage Items Procedure* (TfNSW, 2024b) would be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work would only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction
AH3	AHIP	An application for an Aboriginal Heritage Impact Permit (AHIP) would be made under section 90A of the *National Parks and Wildlife Act 1974* for the land and associated objects within the boundaries of the study area, excluding the area within the boundary of AHIP 5224 and AHIP 5276. The AHIP would also be sought for the specified Aboriginal sites and Aboriginal objects contained within the following sites: • MPIP 12 (AHIMS # 45-5-3741) • Richmond Road Bells Creek AFT 1 (AHIMS # 45-5-5471) • Richmond Road Bells Creek AFT 2 (AHIMS # 45-5826) • Western Sydney PAD 3 (AHIMS # 45-5-3322).	Contractor	Detailed design
AH4	Existing AHIPs	Any works related to the current proposal undertaken within the boundary of AHIP 5224 and AHIP 5276 would be required to comply with the existing permit conditions.	Transport	All phases
AH5	Salvage excavation	The AHIP would include provision for impact mitigation through archaeological salvage excavation. Salvage excavation would be required at sites Richmond Road Bells Creek AFT 1 (AHIMS 45-5-5471), Richmond Road Bells Creek AFT 2 (AHIMS 45-5-5826) and Western Sydney PAD 3 (AHIMS 45-5-3322). Salvage excavation would be completed prior to any activities (including pre-construction activities) which may harm Aboriginal objects at these locations. Salvage excavation activities would be undertaken in accordance with the methodology provided in Appendix E.	Contractor	Pre-construction
AH6	Site protection	The boundary of the AHIP area adjacent to the non-impacted portion of sites Richmond Road Bells Creek AFT 2 (AHIMS 45-5-5826) and Western Sydney PAD 3 (AHIMS 45-5-3322) would be demarcated with protective fencing and listed in the CEMP. These areas would be identified as 'no-go zones' on the CEMP maps and workers inducted as to appropriate protection measures and requirements to comply with conditions in the adjacent AHIP.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AH7	Collected / salvaged Aboriginal objects	The short-term management of collected Aboriginal objects is as follows: • Any Aboriginal objects that are removed from the land by actions authorised by an AHIP, must be moved as soon as practicable to the temporary storage location (see below) pending any agreement reached about the long-term management of the Aboriginal objects. • The temporary storage location would be Kelleher Nightingale Consulting Pty Ltd, Suite 505-507, 155 King Street, Sydney NSW 2000. • Any Aboriginal objects stored at the temporary storage location must not be further harmed, except in accordance with the conditions of the AHIP. The long-term management of collected Aboriginal objects is as follows: • Recovered objects would be managed in accordance with Requirement 26 "Stone artefact deposition and storage" in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b).	Contractor	Construction
AH8	Blacktown Native Institution property access	The location and design of a permanent access to the Blacktown Native Institution would be subject to further assessment and is to be developed in consultation with the DSMG and Blacktown City Council with reference to their future plans for this site.	Transport	Detailed design
AH9	Aboriginal culture	Consultation would continue with DSMG throughout detailed design and construction. DSMG input would be sought on: • the location and design of the interim and potential permanent driveway relocation • the opportunity to include cultural interpretations or design into the proposed road infrastructure (i.e. the flyover bridge or abutments) • the opportunity for culturally sensitive and locally indigenous plantings within the road corridor • the opportunity for the proposal to support the proposed development of the Blacktown Native Institution site in accordance with the *Vision for Country* (COLA, 2024) • the ongoing development of the Connecting with Country assessment.	Transport	Detailed design
AH10	Māori community	Consultation with the Sydney Māori community would be undertaken as part of the REF exhibition and continue throughout detailed design as appropriate.	Transport	Detailed design
NAH1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) would be prepared and implemented as part of the CEMP. It would provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage during construction.	Contractor	Detailed design / Pre-construction
NAH2	Non-Aboriginal heritage	If unexpected heritage items are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the *Unexpected Heritage Items Procedure* (TfNSW, 2024b) must be followed.	Contractor	Construction
NAH3	Non-Aboriginal heritage	Consultation with relevant stakeholders, including relevant parties for the Colebee and Nurragingy Land Grant would be undertaken during detailed design.	Transport	Detailed design
NAH4	Non-Aboriginal heritage	Refer AH9		

No.	Impact	Environmental safeguards	Responsibility	Timing
NAH5	Non-Aboriginal heritage	Refer AH10		
NAH6	Non-Aboriginal heritage	An opportunity for inclusion of culturally sensitive design and interpretation would be considered throughout detailed design to minimise the visual impacts from the Blacktown Native Institution site in consultation with the DSMG. These opportunities would align with relevant Heritage Council guidelines and the CMP for the site (GML, 2023).	Transport	Detailed design
NAH7	Non-Aboriginal heritage	Further archaeological investigations would be undertaken during detailed design to minimise potential impacts on the archaeological resource on the eastern side of Richmond Road, south of the Colebee and Nurragingy Land Grant and within the Sylvanus Williams grant.	Transport	Detailed design
NAH8	Non-Aboriginal heritage	An application for an approval under section 60 of the *Heritage Act 1977* would be prepared. The section 60 application would include the Aboriginal archaeological salvage works being undertaken in accordance with an Aboriginal Heritage Impact Permit under section 90 of the *National Parks and Wildlife Act 1974*.	Transport	Detailed design
PL1	Property acquisition	All property acquisition would be carried out in accor*dance with the Land Acquisition Information Guide* (RMS, 2014) and the *Land Acquisition (Just Terms Compensation) Act 1991.*	Transport	Pre-construction
PL2	Property adjustment	Property access and adjustments for properties impacted by the proposal would be developed in consultation with affected property owners.	Transport	Detailed design
PL3	Property adjustment	Ongoing consultation with properties affected by fencing adjustment, access and other infrastructure would be undertaken.	Contractor	Pre-construction
PL4	Change in land use value during construction	Compound and ancillary facilities would be decommissioned, and the sites rehabilitated to their existing condition or as otherwise agreed with the landowner as soon as possible.	Contractor	Construction
PL5	Changes to property access	Undertake early consultation and regularly communicate with affected landowners and residents where temporary property access changes would be required.	Contractor	Pre-construction
PL6	Blacktown Native Institution property access	The temporary access to the Blacktown Native Institution site would be constructed and opened prior to the closure of the existing access in order to maintain ongoing vehicle access to the site throughout construction.	Contractor	Construction
PL7	Blacktown Native Institution property access	The design and location of the temporary access would be further developed in consultation with DSMG.	Transport	Detailed design
PL8	Blacktown Native Institution property access	No direct impacts to the Blacktown Native Institution curtilage for the construction of the access are permitted, without further assessment and consultation with the DSMG and the NSW Heritage Office.	Transport	Detailed design
PL9	Blacktown Native Institution property access	Refer AH8		

No.	Impact	Environmental safeguards	Responsibility	Timing
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the *Interim Construction Noise Guideline* (DECC, 2009) and identify: • all potential significant noise and vibration generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, procedures and principles* (TfNSW, 2023i) • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design / Pre-construction
NV2	Noise and vibration	All sensitive receivers (e.g., schools and local residents) likely to be affected would be notified at least seven days before commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification would provide details of: • the proposal • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information.	Contractor	Detailed design / Pre-construction
NV3	Construction hours	Where feasible carry out works within standard hours as follows: • 7am-6pm Monday to Friday • 8am-1pm Saturdays • no work on Sundays or public holidays.	Contractor	Construction
NV4	Construction hours	Where night works are essential, the use of high impact machinery such as pile-driving, vibratory rollers and impact devices (rock breakers and jackhammers) would be avoided in the vicinity of sensitive receivers, where possible.	Contractor	Construction
NV5	Construction traffic	Further assessment of traffic noise at the Newnham Street compound would be undertaken in accordance with the RNCG (TfNSW, 2023h).	Transport	Detailed design
NV6	Construction noise	Where feasible, implement standard mitigation measures in accordance with the CNVG-R (TfNSW, 2023e).	Contractor	Pre-construction / Construction
NV7	Construction noise	Where feasible, implement additional mitigation measures in accordance with the CNVG-R (TfNSW, 2023e) where noise levels are predicted to exceed the noise management levels. This may include notification, respite periods and alternative accommodation.	Contractor	Pre-construction / Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
NV8	Construction vibration	For high vibration sources, vibration monitoring would be undertaken to confirm the minimum working distances at specific site locations. Additionally, further detailed analysis based on the frequency dependent guideline vibration levels in BS7385-2:1993 and DIN4150-3:2016 may be utilised in conjunction with site-specific measurements to derive alternative cosmetic damage objectives and minimum working distances	Contractor	Pre-construction
NV9	Construction vibration on heritage structures	If works are proposed at less than the safe working distances for heritage listed items, specialist advice would be sought from an appropriately qualified structural engineer who is familiar with heritage structures.	Contractor	Pre-construction
NV10	Operational noise	Undertake an assessment to identify feasible and reasonable noise mitigation measures for properties where operational noise is predicted to exceed relevant criteria.	Transport	Detailed design
B1	General	A Flora and Fauna Management Plan (FFMP) would be prepared in accordance with Transport for NSW's *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) and implemented as part of the CEMP. The FFMP would include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the *Landscape Guideline* (TfNSW, 2023k) • pre-clearing survey requirements, including specific pre-clearance measures for Cumberland Plain Land Snail and Southern Myotis (i.e. roost searches of culverts and bridges prior to any impacts) • procedures for the management of resident Kangaroo populations during construction • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI *Policy and guidelines for fish habitat conservation and management* (DPI, 2013) • protocols to manage weeds and pathogens.	Contractor	Detailed design / Pre-construction
B2	Removal of native vegetation	Native vegetation removal would be minimised through detailed design and during construction.	Transport / Contractor	Detailed design / Construction
B3		Pre-clearing surveys would be undertaken in accordance with Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Pre-construction
B4		Vegetation removal would be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B5		Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Post construction
B6		The unexpected species find procedure is to be followed under the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B7		A Biodiversity Offset Strategy would be developed, in accordance with the guidelines, to detail obligations under the *Biodiversity Policy* (TfNSW, 2022f).	Contractor	Pre-construction
B8		A Tree and Hollow Replacement Plan would be developed, in accordance with the guidelines, to detail obligations under the *Biodiversity Policy* (TfNSW, 2022f).	Contractor	Pre-construction
B9	Removal of threatened fauna habitat	Threatened fauna habitat removal would be minimised through detailed design and during construction.	Transport / Contractor	Detailed design / Construction
B10		Fauna would be managed in accordance with Guide 9: Fauna handling of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d). Specific pre-clearance measures for Cumberland Plain Land Snail have been included in Appendix G of the BAR (Appendix H). Pre-clearance surveys for Cumberland Plain Land Snail would be undertaken in all areas of PCT 3320 and PCT 4025 prior to any vegetation clearing. Any individuals located during the pre-clearance surveys would be relocated directly into suitable vegetation outside of the proposal area.	Contractor	Pre-construction / Construction
B11		Habitat removal would be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B12		Habitat would be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: Artificial hollows of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B13		The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction
B14		Refer B3		
B15	Removal of threatened flora	Threatened flora removal would be minimised through detailed design and during construction.	Contractor	Detailed design / Construction
B16		Prior to the determination of the proposal, targeted flora surveys would be completed for all identified candidate species that have not yet been surveyed. Assessments of significance and calculations of offsetting obligations would be completed for any additional threatened species detected on site.	Contractor	Detailed design
B17		Pre-clearing surveys would be undertaken in accordance with Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B18		The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) if threatened flora species, not assessed in the biodiversity assessment, are identified in the proposal area.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
B19	Aquatic impacts	Impacts to aquatic habitat would be minimised through detailed design and during construction. Any instream/flow structures (e.g. the proposed bridge structure) would be designed and installed in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI, 2013), *Why do fish need to cross the road?: fish passage requirements for waterway crossings* (Fairfull and Witheridge, 2003).	Contractor	Detailed design / Construction
B20		Refer H2		
B21		Aquatic habitat would be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d) and section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI, 2013).	Contractor	Construction
B22		Refer SC7		
B23		Following construction affected aquatic habitat would be rehabilitated and removed aquatic habitat re-instated in accordance with Guide 10: Aquatic habitats and riparian zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Post construction
B24	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems would be minimised through detailed design.	Contractor	Detailed design
B25	Changes to hydrology	Changes to existing surface water flows would be minimised through detailed design.	Contractor	Detailed design
B26	Edge effects on adjacent native vegetation and habitat	Exclusion zones would be set up at the limit of clearing in accordance *with* Guide 2: Exclusion zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B27	Injury and mortality of fauna	Refer B10		
B28	Invasion and spread of weeds	Weed species would be managed in accordance *wi*th Guide 6: Weed management of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B29	Invasion and spread of pests	Pest species would be managed within the proposal area.	Contractor	Construction
B30	Invasion and spread of pathogens and disease	Pathogens would be managed in accordance with Guide 2: Exclusion zones of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024d).	Contractor	Construction
B31	Noise, light, dust and vibration	Shading and artificial light impacts would be minimised through detailed design.	Contractor	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
LC1	Urban Design Plan	The *Urban Design Concept Plan* (Design Inc (2024), Appendix I) would form the basis of future landscape and detailed design development, providing an integrated urban design for the proposal, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan would include design treatments for: • location and identification of existing vegetation and proposed landscaped areas, including species to be used • built elements including retaining walls, bridges and noise walls • pedestrian and cyclist elements including footpath location, paving types and pedestrian crossings • fixtures such as seating, lighting, fencing and signs • details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • procedures for monitoring and maintaining landscaped or rehabilitated areas.	Contractor	Detailed design / Pre-construction
LC2	Urban design	The urban design objectives and principles outlined in section 2.3.2 of this REF would be considered during subsequent design stages.	Transport	Detailed design
LC3	Visual impact of construction work	Work sites, including construction areas and supporting ancillary facilities would be managed to minimise visual impacts, including appropriate fencing or screening (e.g. use of shade cloth), storage of equipment, parking, stockpile screening and arrangements for the storage and removal of rubbish and waste materials.	Contractor	Construction
LC4	Visual impact of construction work	Refer PL4		
LC5	Light spill	The design of temporary lighting would be undertaken in accordance with the requirements in Australian Standard AS 4282-2019 *Control of the Obtrusive Effects of Outdoor Lighting* and would avoid unnecessary light spill on adjacent receivers.	Contractor	Construction
LC6	Vegetation removal	Refer B2		
LC7	Vegetation removal	Clearly define clearance limits and exclusion zones to protect existing vegetation cover.	Contractor	Construction
LC8	Vegetation removal	Undertake landscape planting on the basis of the Urban Design Concept Plan (Design Inc (2024), Appendix I) including: • Screening planting with local plant species that match the community and landscape character to minimise the impacts. • Median planting with native grasses to reduce the apparent extent of hard paving and mitigate visual impact of the widening.	Transport	Detailed design
LC9	Visual impact of flyover bridge	Design of the curvature of the bridge would include small enough segments to achieve a smooth curved profile rather than a faceted profile, to achieve the elegant form envisioned for the structure.	Transport	Detailed design
LC10	Visual impact of flyover bridge	High quality design and finish to the bridge abutment walls, particularly where they face the Blacktown Native Institution site, and ongoing engagement with Aboriginal stakeholders around the potential for cultural interpretation.	Transport	Detailed design
LC11	Visual impact of flyover bridge	Opportunities for artwork and/or design on the flyover bridge and retaining walls would be developed in consultation with local knowledge holders.	Transport	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
LC12	Visual impact of flyover bridge	Opportunities for landscape treatment in the south-east corner of the Blacktown Native Institution site would be developed in consultation with local knowledge holders.	Transport	Detailed design
SE1	General socio-economic impacts	A Communications and Stakeholder Engagement Plan would be developed prior to the commencement of construction and would be implemented during construction to provide timely and accurate information to stakeholders and to ensure that: • All stakeholders are identified through detailed stakeholder mapping which is updated regularly as needed. This would include identification of vulnerable groups or persons that may be affected by the proposal. • Accurate and accessible information about the proposal is made available to keep the community and stakeholder aware of and up to date with the proposal. Proposal information in languages other than English (i.e., Tagalog, Punjabi, and Hindi, etc.) would be made available subject to consultation results. • Opportunities for community and stakeholder feedback and inputs are provided. • Prior to potential impacts occurring, the affected community members and stakeholders are provided with details such as timing, likely extent, duration and nature of impacts, of proposed activities that may impact them. • Continued consultation, follow up with community notifications/ letter-box drops, would be set up to notify the broader community, recreational groups, businesses and other stakeholders.	Transport / Contractor	Pre-construction
SE2	General socio-economic impacts	A complaints handling procedure would be developed which would ensure: • A webpage, email and free-call number would be established for enquiries and complaints regarding the proposal and would remain active prior to and for the duration of construction. • Contact details would be clearly displayed at the entrances to the ancillary facilities. • All enquiries and complaints would be tracked through a tracking system and acknowledged within 24 hours of being received.	Transport / Contractor	Pre-construction
SE3	Impacts to Blacktown Native Institution site	Refer AH9		
SE4	Impacts to Blacktown Native Institution site	Refer PL6		
SE5	Impacts to Blacktown Native Institution site	The Blacktown Native Institution would be consulted during construction planning to consider how potential impacts can be minimised as far as possible, such as possible scheduling the timing and duration of noisy works outside of community event times.	Contractor	Pre-construction
SE6	Business impacts	• Access to business properties would be maintained throughout construction. • On-going consultation would be undertaken with local business owners that may be impacted by altered access arrangements during construction. • Consultation would be carried out with any businesses directly impacted during construction to identify approaches to reduce impact upon these businesses, particularly in terms of access and signage visibility.	Transport / Contractor	Detailed design / Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SE7	Parking	• The proposal would provide adequate on-site parking arrangements to accommodate all workers and anticipated visitors. • Site inductions for all workers would include the need for workers to park in the designated parking areas.	Contractor	Pre-construction / Construction
SE8	Impacts on public transport	• Existing and any temporary bus stops accesses would be accessible during construction such as for wheelchair users and parents with prams. • Wayfinding signs would be provided to advise users of changed bus stop locations and to direct users to relocated bus stops. • Any changes to bus timetables or routes would be communicated prior to their occurrence such as via signage at bus stops and the regular proposal communications.	Contractor	Pre-construction / Construction
SE9	Impacts on active transport	• Active transport movement throughout the proposal corridor would be maintained during the construction stage, using detours and alternative route arrangements if necessary. The TMP would include measures to manage pedestrian access. • Signage would be installed to direct users to bus stops as required, and the Contractor is to ensure that access remains compliant with the *Disability Discrimination Act 1992*. • Prior to changes being implemented, they would be communicated to the community via methods to be set out in the Community and Stakeholder Engagement Plan and signage and wayfinding would be provided on site. Signage is not to obstruct travel paths.	Contractor	Pre-construction / Construction
SE10	Emergency services	• Connectivity and access for emergency services is to be maintained during construction. • Ongoing consultation would occur with emergency services (including the SES) to ensure their needs are respected in construction management plans. Information would be provided to emergency services in relation to the location of ancillary facilities, gates and access routes.	Contractor	Construction
SE11	Impact on social infrastructure	Representatives of affected social infrastructure would be consulted to identify potential impacts with planned construction staging and access arrangements and how they may be mitigated, including: • Baitul Huda Mosque • St. Francis of Assisi Primary School • Blacktown Native Institution • and affected childcare centres.	Contractor	Pre-construction / Construction
SE12	Economy, employment, and business impacts	• Strategies to increase local procurement, local employment and local training opportunities (particularly with groups such as Aboriginal people, women, young people, the unemployed, and the neurodiverse) would be developed to maximise local benefits. • In line with Transport's *Aboriginal Procurement Policy* Transport would source construction workforce from the Aboriginal community and procuring from Aboriginal owned businesses or social enterprises.	Transport / Contractor	Detailed design / Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
W1	Waste	A Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP. The WMP would include (but not be limited to): • measures to avoid and minimise waste associated with the proposal • classification of wastes and management options (re-use, recycle, stockpile, disposal) • statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, transport and disposal • monitoring, record keeping and reporting. • The WMP would align with Transports *Waste Management Guideline* (EMF-WM-GD-0055) and relevant other Transport waste fact sheets, guidelines and policies.	Contractor	Detailed design / Pre-construction
W2	Waste Management general	All wastes would be managed and disposed of in accordance with the POEO Act, POEO Waste Regulation and *NSW Waste Classification Guidelines* (EPA, 2014). All wastes and excess material would be disposed of at an appropriately licensed facility.	Contractor	Construction
W3	Waste Management general	Excavated material would be reused on site where feasible and suitable for the intended reuse. Where excavated material cannot be used on site, opportunities for reuse on nearby projects would be investigated.	Contractor	Construction
W5	Waste	Site induction would include waste management and disposal requirements and facilities.	Contractor	Construction
W6	Waste	Any additional fill material required would be sourced from appropriately licensed facilities and/or other construction projects wherever possible. Additional fill material would be sourced and verified as suitable for use in accordance with relevant EPA and Transport guidelines.	Contractor	Construction
W7	Waste	Resource management hierarchy principles would be followed: • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • disposal is undertaken as a last resort.	Contractor	Construction
W8	Waste	If vegetation is to be mulched and transported off site for beneficial reuse, it would be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the NSW EPA Mulch Order and Exemption.	Contractor	Construction
W9	Waste	There is to be no disposal or re-use of construction waste on to other land.	Contractor	Construction
W10	Waste	Waste is not to be burnt on site.	Contractor	Construction
W11	Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction
W12	Waste	A review would be undertaken during detailed design to determine if an Environmental Protection Licence under the POEO Act is required for the proposal.	Transport	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ1	Construction air quality management	A Construction Air Quality Management Plan (AQMP) would be prepared and implemented as part of the CEMP. The AQMP would include, but not be limited to: • Potential sources of air pollution. • Air quality management objectives consistent with any relevant published EPA guidelines. • Roles and responsibilities for carrying out the AQMP. • A stakeholder communications plan that includes community engagement before work commences on site. • Name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. • A process of recording all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Regular liaison meetings with other high risk construction sites within 500 metres of the proposal, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. • Dust monitoring and inspection plan with different levels of monitoring/inspection in response to the potential impact of the planned activity, dry/windy conditions, or in response to community complaints. This may include visual assessments of dust plumes, dust deposition measurement, and/or continuous PM_{10} ambient air monitoring. • Specific mitigation measures (in addition to those listed as baseline measures as listed in AQ2, AQ3, and AQ4) with proposed action trigger levels for implementation of the mitigation measures. • A process for altering management measures as required and reprogramming construction activities if the safeguards and management measures do not adequately restrict dust generation. • A progressive rehabilitation strategy for exposed surfaces.	Contractor	Pre-construction / Construction
AQ2	Construction and demolition	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Only use cutting, grinding or sawing equipment fitted with or used in conjunction with suitable dust suppression techniques. • Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation, using non-potable water where possible and appropriate. • No bonfires and burning of waste materials. • Ensure effective water suppression is used during demolition operations. • Erect barriers that are higher than the activity or stockpiles where dusty activities are planned near receptors. • Employ sediment and erosion management measures.	Contractor	Construction
AQ3	Earthworks	• Cover, seed or fence stockpiles to prevent wind whipping. • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. • Only remove the cover in small areas during the work and not all at once.	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
AQ4	Track-out	• Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Contractor	Construction
CC1	Climate Change	A detailed climate change risk assessment would be carried out by reviewing and investigating the preliminary risks and adaptation options in accordance with latest Transport *Climate Risk Assessment Guideline*s (TfNSW, 2021b) and other applicable NSW and national guidelines. This would include a sensitivity analysis check and consideration of climate change for flooding as per *Australian Rainfall and Runoff V4.2* (Australian Government, 2019).	Contractor	Detailed design / Pre-Construction
S1	Sustainability	Integrate sustainability requirements/ initiatives/ opportunities identified in the Sustainability Plan (Stantec, 2024c) into future design.	Contractor	Detailed design
S2	Sustainability	Preparation and implementation of the detailed project Sustainability Management Plan including a sustainability workshop to investigate proposal specific risks and opportunities.	Transport	Detailed design
C1	Cumulative construction impacts	The Construction Environmental Management Plan (CEMP) and associated sub-plans would consider potential cumulative impacts from surrounding development activities as they become known. This would include, but not limited to: • consultation with the proponent and/or lead contractor of adjacent construction projects • preparation of traffic management plans in consultation with adjacent construction projects • schedule noisy work to avoid cumulative noise with adjacent construction projects, where possible • development of respite periods in consultation with adjacent construction projects, where possible • minimise clearing, especially outside the NWGA and CPCP and prioritise use of areas of prior disturbance • implementation of appropriate sediment and erosion control measures.	Contractor	Pre-construction / Construction

7.3 Licensing and approvals

The licences and approvals outlined in Table 7-2 would be required for the proposal.

Table 7-2 Summary of licensing and approvals required

Instrument	Requirement	Timing
Fisheries Management Act 1994 (s199)	Notification to the Minister for Lands and Water prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of work.
Heritage Act 1977 (s60)	Permit to carry out activities to an item listed on the State Heritage Register or to which an interim heritage order applies from the Heritage Council of NSW.	Prior to start of the activity.
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit.	Prior to start of the activity.

In addition, the need for the following licensing and approvals would be determined during detailed design:

- EPL under the *Protection of the Environment Operations Act 1997* (POEO Act).
- Permit under section 219 *Fisheries Management Act 1994* (FM Act).
- Approvals under the *Water Management Act 2000* (WM Act).

8. Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in section 193 of the Environmental Planning and Assessment Regulation 2021.

The proposal has been identified at the gateway to the NWGA. This is a key developmental area to support current and predicted urban growth in the greater Sydney region. The NWGA aims to provide approximately 90,000 homes accommodating 250,000 people. A key part of the identification of the NWGA was its proximity and connection to transport nodes including the M7 Motorway and ease of connection to the M4 Motorway, Sydney Metro and the new Western Sydney Airport.

To unlock the potential of the NWGA, upgrades to transport infrastructure must align with current and future needs, while considering forecasted population and economic growth. As identified, Richmond Road already experiences significant congestion, impacting travel times and hindering the potential for economic growth in the area.

As part of the *North West Growth Centre Road Network Strategy* (TfNSW, 2015) Transport is proposing to upgrade Richmond Road between the M7 Motorway and Townson Road. The proposal benefits include:

- ease congestion and improve the travel times for all road users
- improve traffic flow through the intersections
- improve safety for all road users
- improve connectivity for the communities in the north-west
- improve freight movements between the M7 Motorway and key precincts
- improve pedestrian safety with new staged crossings making it easier for pedestrians and bike riders to move safely in and around the area.

The proposal has been developed as an outcome of an option development and assessment process during the strategic and concept design stages. A range of options were considered to mitigate the identified impacts and increase the benefits of the proposal. The selection of the preferred option considered how each of the options meets the need for the proposal, as well as how it aligns with the proposal objectives.

The ‘Do-minimal’ option would result in traffic on existing Richmond Road and other connecting roads (including the M7 Motorway) continuing to experience congestion, leading to further delays in travel times and reduced intersection performance. This option did not meet strategic planning needs and would not support the predicted growth in the NWGA. The proposal was identified as the preferred option as it would provide a much better level of service as it allows a greater free-flowing arrangement (in particular around the M7 Motorway Rooty Hill Road off-ramp) that reduces delays and improves efficiencies.

Although the proposal would result in some environmental impacts, they have been avoided or minimised where possible through the design and site-specific safeguards and mitigation measures summarised in section 7. The positive benefits of the proposal are considered to outweigh any adverse impacts.

8.1 Objects of the EP&A Act

Consideration of the objects of the *Environmental Planning and Assessment Act* (EP&A Act) is provided in Table 8-1.

Table 8-1 Objects of the EP&A Act

Instrument	Requirement
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 proposal would ensure traffic efficiency for the future traffic generated from surrounding residential and commercial developments within the NWGA. Reduced travel time and advanced connectivity would promote the social and economic welfare of the community. The proposal design, impact, safeguards and management measures detailed in this REF allow for the proper management, development and conservation of 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 section 8.1.1.
1.3(c) To promote the orderly and economic use and development of land.	The proposal would maximise linkage with existing road corridors and improve traffic conditions and connectivity of Richmond Road. The upgraded road, intersections, bridges and shared path would benefit road users and active transport users. The proposal also minimises ongoing congestion and capacity issues which would support future growth of the area.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Construction of the proposal would require clearing of native vegetation, planted trees and habitat. The impacts on threatened species, populations and ecological communities are discussed in section 6.8. No threatened species, populations or ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were considered to have the potential to be significantly impacted by the proposal. Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed works are within the curtilage of the Blacktown Native Institution heritage item listed on the State Heritage Register (SHR No. 01866). This heritage item is divided into separate lands owned by DSMG, Blacktown Council and Transport. Transport owns the lot adjacent to the road corridor. The proposal would result in no physical impacts to the DSMG or Blacktown City Council owned portion of the heritage listing, however, would result in moderate adverse visual impacts to the Blacktown Native Institution item. Further, substantial road construction and permanent road widening would be undertaken within the Transport owned portion, which is exempt under the heritage listing. The proposed works are adjacent to the curtilage of the Colebee and Nurragingy Land Grant heritage item listed on the State Heritage Register (SHR No. 01877). There would be no physical and little to no visual impacts to this item as a result of the proposal. Further information is provided in section 6.5.

Instrument	Requirement
	Potential co-design opportunities in proximity to the Blacktown Native Institution and in the broader study area would be identified through the Connecting with Country process and in consultation with local knowledge holders. These opportunities may include artworks on the flyover bridge and/or retaining wall and landscaping with endemic species. Four Aboriginal archaeological sites of low to moderate significance would be at least partially impacted by the proposal. Impacts would be mitigated through archaeological salvage as outlined in section 6.4. A section 60 permit under the *Heritage Act 1977* and an Aboriginal Heritage Impact Permit (AHIP) under section 90A of the *National Parks and Wildlife Act 1974* would be required for the proposal.
1.3(g) To promote good design and amenity of the built environment.	The proposal includes additions to the built environment including a new fly-over bridge, new bridge over Bells Creek and widening of the road pavement. The design process has been extensive, with a number of options workshopped in order to promote the best outcomes for the social and cultural, economic, and environmental aspects of the surrounding area.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	The Australian Government and NSW Government are funding the proposal. Operational maintenance of the proposal would be shared between Transport and Blacktown City Council. It is understood that Transport would be responsible for the road from kerb to kerb, and Blacktown City Council would be responsible for everything outside of this such as but not limited to footpaths, landscaping, drainage and the open flooding channel.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	During development of the proposal, consultation with relevant government agencies, asset owners, Aboriginal groups and the community was undertaken. Details of the consultation is provided in section 5. Transport will continue to consult with residents, stakeholders and the community during the development of the proposal.

8.1.1 Ecologically sustainable development

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

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.

The precautionary principle

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

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

- The best-available technical information, environmental standards and measures have been used to minimise environmental risks. These safeguards would be implemented during construction and operation of the proposal.

- Proposed design was refined to avoid and minimise impacts on biodiversity. This included removal of the shared path on the eastern side of Richmond Road to avoid removal of 42 trees, steepening of the batters for the flyover bridge to minimise vegetation clearing and prioritising placement of the ancillary facilities in existing cleared areas.
- Proposed design was refined to avoid or minimise potential damage to known items or areas of cultural significance. The proposal avoids direct impacts to the heritage listed Blacktown Native Institution site that is outside the road corridor.
- Proposed design has minimised potential impacts on existing residential properties and other existing land uses, while also taking into consideration potential impacts on proposed future land use.
- Conservative 'worst-case' scenarios were considered while assessing environmental impact.
- Specialist studies were incorporated to gain a detailed understanding of the existing environment.
- A CEMP would be prepared before construction starts. This requirement would ensure the proposal maintains a high-level of environmental performance.

Intergenerational equity

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

The NWGA has been identified by the NSW Government as a key area to support urban growth in the greater Sydney region. When developed (2056 forecasts), the NWGA will provide approximately 90,000 homes accommodating 250,000 people. The proposal would assist in providing a road network for the projected population and traffic growth in the NWGA supporting this development for current and future generations.

The following intergenerational equity measures have been adopted:

- Aboriginal and non-Aboriginal heritage significance has been identified and considered. Consultation has been undertaken with the local Aboriginal community and would continue to be undertaken throughout the development of the proposal, and ideas and resolutions would be incorporated. Appropriate specialist assessments have been incorporated with associated mitigation measures prepared to minimise impacts.
- The design minimises vegetation clearance within sensitive ecological areas, to ensure that such areas are conserved for future generations.
- Water quality and hydrological measures were included in the design to ensure that the impacts on the Bells Creek and the aquatic environment are minimised both for the short and long term.
- Possible compensatory habitat or offsets were identified.
- Issues that have potential long-term implications were minimised or avoided, for example consumption of non-renewable resources, waste disposal, greenhouse emissions, removal of vegetation and impacts on water quality, through route/concept selection and application of management measures.
- Requirements to minimise the impact of climate change from greenhouse emissions were implemented, for example minimising vegetation clearance, optimising fuel economy of all construction machinery, use of green energy for on-site electrical energy requirements, and the use of recycled materials where feasible.
- Benefits that the proposal provides to current and future generations of local communities and the surrounding region, that would maintain or enhance the health, diversity and productivity of the environment, were identified.

While the proposal would have some adverse impacts, they were not considered to be of a nature or extent that would result in disadvantage to any specific section of the community or to future generations. If the proposal was not to proceed, the principle of intergenerational equity may not be met, as future generations would experience a lower performance standard for Richmond Road.

Conservation of biological diversity and ecological integrity

The proposal is located in an environment that has previously been modified, however, remnant areas of native vegetation and associated habitats remain.

A biodiversity assessment was undertaken to assess potential biodiversity impacts of the proposal. The proposal would require the removal of 2.11 hectares of native vegetation and 60 planted native trees. This includes 0.35 hectares of native vegetation within certified areas, which has previously been offset under the NWGA and CPCP biodiversity certification processes. The remaining 1.76 hectares of native vegetation and 60 planted native trees occur outside of certified lands. This includes 1.76

hectares of vegetation commensurate with TECs under the BC Act of which 1.07 hectares are commensurate with TECs listed under the EPBC Act.

Potential impacts have been avoided where possible and safeguards and management measures have been included where necessary:

- A landscape strategy has been developed to reflect the structure and species of locally-endemic flora to ensure that biological diversity in the local area is maintained.
- Site selection criteria were established for construction-phase facilities to minimise native vegetation clearance.
- The cultural significance of remaining areas of native vegetation and native fauna to the local Aboriginal community are being considered.
- Biodiversity offset package for unavoidable residual impacts would be implemented.

Improved valuation, pricing and incentive mechanisms

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

Environmental, economic and social issues were considered in the rationale for the proposal and design options. The REF has examined the environmental, economic and social consequences of the proposal and identified mitigation measures to manage the potential for adverse impacts.

Safeguards and management measures detailed in section 7, including avoiding, reusing, recycling, managing waste during construction and operation, would be implemented.

8.2 Conclusion

The proposed Richmond Road upgrade between the M7 Motorway and Townson Road, Marsden Park is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species 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 EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal, as described in the REF, best meets the project objectives but would still result in some impacts on traffic and transport, noise, biodiversity, Aboriginal and non-Aboriginal heritage, and landscape character and visual amenity. Safeguards and management measures detailed in this REF would ameliorate or minimise these expected impacts. The proposal would:

- ease congestion and improve the travel times for all road users
- improve traffic flow through the intersections
- improve safety for all road users
- improve connectivity for the communities in the north-west
- improve freight movements between the M7 Motorway and key precincts
- improve pedestrian safety with new staged crossings making it easier for pedestrians and bike riders to move safely in and around the area.

On balance, the proposal is considered justified, and the following conclusions are made.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared nor 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 proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination. Section 6.8 provides further details.

Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance nor the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). A referral to the Australian Department of Climate Change, Energy, the Environment and Water is not required.

Seasonal targeted surveys are currently being undertaken for an additional five threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination. Section 6.8 provides further details.

9. Certification

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

Name:	Belinda Crichton
Position:	Senior Principal Environmental Scientist
Company name:	Stantec
Date:	21 November 2024

I certify that I have reviewed and endorsed the contents of this REF and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under Section 170 of the EP&A Regulation, and the information is neither false nor misleading. I accept it on behalf of Transport for NSW.

Name:	Maddy Mukerjee
Position:	Project Development Manager
Transport region/program:	Infrastrucutre and Place
Date:	21 November 2024

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Terms and acronyms used in this REF

Table 10-1 Terms and acronyms used in this REF

Term / Acronym	Description
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment
AEC	areas of environmental concern
AEP	annual exceedance probability
AFG	Aboriginal Focus Group
AHD	Australian Height Datum
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal Heritage Management Plan
ALR Act	*Aboriginal Land Rights Act 1983* (ALR Act)
ANZECC	Australian and New Zealand Environment and Conservation Council
AOBV	Area of Outstanding Biodiversity Value
AoS	Assessment of Significance
AQMP	Air Quality Management Plan
AQMS	air quality monitoring station
ARI	average recurrence interval
AS	Australian Standard
ASS	acid sulfate soil
ATC	automatic tube count
AV:ATG	Assessing Vibration – A Technical Guideline (DECC, 2006)
BAM	Biodiversity Assessment Method
BAM-Calculator	Biodiversity Assessment Method calculator
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
BGL	below ground level
Blacktown LEP	*Blacktown Local Environmental Plan 2015*
BoM	Bureau of Meteorology
BOS	Biodiversity Offset Scheme
BSRs	Baseline Sustainability Requirements
CASANZ	Clean Air Society of Australian & New Zealand
CBA	cost benefit analysis
CBD	Central Business District
CC	Castlereagh Connection
CEMP	Construction environmental management plan
CLM Act	*Contaminated Land Management Act 1997* (NSW)

Term / Acronym	Description
CMP	Conservation Management Plan
CNVG-R	Construction Noise and Vibration Guideline (Roads) (TfNSW, 2023e)
CoPC	contaminants of potential concern
CPCP	Cumberland Plain Conservation Plan
CRA	Climate Risk Assessment
CRPA	Climate Risk Pre-screening Assessment
CSEP	Community and Stakeholder Engagement Plan
CSM	Conceptual Site Model
DCCEEW	Department of Climate, Change, Energy, the Environment and Water
DECCW	former Department of Environment, Climate Change and Water
DIPNR	Department of Infrastructure, Planning and Natural Resources
DLALC	Deerubbin Local Aboriginal Land Council
DO	Dissolved Oxygen
DoJ	NSW Department of Justice
DPE	former Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPI	former Department of Primary Industries
DPIE	former Department of Planning, Industry and Environment
DPIRH	Department of Primary Industries and Regional Development
DSMG	Dharug Strategic Management Group
DTV	Default trigger value
DUAP	former Department of Urban Affairs and Planning
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
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
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
EWMS	Environmental Work Method Statement
FFMP	Flora and Fauna Management Plan
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater Dependent Ecosystems
GHG	greenhouse gas
GPT	gross pollutant trap
GSW	General Solid Waste
HBT	Hollow Bearing Tree

Term / Acronym	Description
Heritage Act	*Heritage Act 1977* (NSW)
HGL	hydrogeological landscape
HTS	Household Travel Survey
HTW	High Threat Weed
IAQM	Institute of Air Quality Management
IAQM Guidance	*IAQM Guidance on the assessment of dust from demolition and construction* (Holman et al, 2014)
IBRA	Interim Biogeographically Regionalisation of Australia
ICNG	Interim Construction Noise Guideline (DECC, 2009)
ICOMOS	International Council on Monuments and Sites
ITS	Intelligent Transport System
IU	Inspection unit
LCVIA	Landscape Character and Visual Impact Assessment
LCZ	landscape character zones
IPCC	Intergovernmental Panel on Climate Change
IRSAD	Relative Socio-economic Advantage and Disadvantage
VP	Viewpoint
KFH	Key Fish Habitat
KNC	Kelleher Nightingale Consulting Pty Ltd
LALC	Local Aboriginal Land Council
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 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
MUSIC	model for urban stormwater improvement conceptualisation
mV	millivolt
NAHMP	Non-Aboriginal Heritage Management Plan
NCA	Noise Catchment Area
NEPC	National Environment Protection Measure for Ambient Air Quality
NEPM	National Environment Protection Measure
NGIS	National Groundwater Information System
NHL	National Heritage List
NML	Noise Management Level
NO_2	Nitrogen dioxide
NPfI	Noise Policy for Industry (EPA, 2017)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
NTU	Nephelometric Turbidity unit

Term / Acronym	Description
NVMP	Noise and Vibration Management Plan
NWGA	NorthWest Growth Area
OEH	former Office of Environment and Heritage
OOHW	Out of Hours Work
OOHW1	Out of Hours Works Period 1
OOHW2	Out of Hours Works Period 2
ORP	Oxygen Reduction Potential
PACHCI	Procedure for Aboriginal cultural heritage consultation and investigation
PAD	Potential Archaeological Deposit
PCT	Plant community type
pH	potential of hydrogen
PM_{10}	Particulate matter less than 10 microns diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns diameter
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
POEO Waste Regulation	*Protection of the Environment Operations (Waste) Regulation 2014*
ppt	parts per tonne
PSI	Preliminary site Investigation
PW	Priority Weed
QA Specifications	Specifications developed by Transport for use with road work and bridge work contracts let by Transport.
RAP	Registered Aboriginal Party
RAQST	Roadside Air Quality Screening Tool
RBL	Rating Background Level
REF	review of environmental factors
RL	relative level
RMS	former Roads and Maritime Services, now Transport for NSW
RNE	Register of the National Estate
RNCG	Road Noise Criteria Guideline (TfNSW, 2023h)
RNMG	Road Noise Mitigation Guideline (TfNSW, 2024c)
RNMVG	Road Noise Model Validation Guideline (TfNSW, 2022e)
RNP	NSW Road Noise Policy (DECCW, 2011)
Roads Act	*Roads Act 1993* (NSW)
ROL	Road Occupancy Licence
RSA	Road safety audit
SA3	statistical area level 3
SA2	statistical area Level 2
SCC	specific contaminant concentrations

Term / Acronym	Description
Scope 1	Scope 1 emissions are direct GHG emissions that are produced by activities that are controlled by the proponent.
Scope 2	Scope 2 emissions are indirect GHG emissions from the consumption of electricity, heating, cooling or steam that is produced offsite.
SEEC	Strategic Environmental and Engineering Consulting
SEIA	Socio-economic Impact Assessment
SEIFA	Socio-Economic Indexes for Areas is a product developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage. SEIFA consists of four indexes: • The Index of Relative Socio-Economic Disadvantage (IRSD) • The Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD) • The Index of Education and Occupation (IEO) • The Index of Economic Resources (IER).
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 (Precincts – Central River City)	*State Environmental Planning Policy (Precincts – Central River City) 2021*
SEPP (Transport and Infrastructure)	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
SES	State Emergency Services
SHR	State Heritage Register
SIS	Species Impact Statement
SoHI	Statement of Heritage Impact
SP	Sustainability Plan
S_{POS}	peroxide oxidisable sulfur
SWL	Sound power level
SWMP	Soil and Water Management Plan
TAGG	Transport Authorities Greenhouse Group
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
TGS	Traffic Guidance Scheme
TMP	Traffic Management Plan
TN	total nitrogen
TP	total phosphorus
Transport	Transport for NSW
TSC	*Threatened Species Conservation Act 1995* (NSW), now repealed
TSP	Total suspended particles
TSS	Total suspended solids
TTIA	Traffic and Transport Impact Assessment

Term / Acronym	Description
TUFLOW	Two-dimensional Unsteady Flow
VHT	Vehicle hours travelled
VKT	Vehicle kilometres travelled
WARR Act	*Waste Avoidance and Resource Recovery Act 2001* (NSW)
WM Act	*Water Management Act 2000* (NSW)
WMP	Waste Management Plan
WoNS	Weeds of National Significance
WQO	water quality objectives
WSUD	water sensitive urban design
μ S/cm	microsiemens per centimetre

Appendix A - Consideration of section 171 factors and matters of national environmental significance and Commonwealth land

Section 171 Factors

In addition to the requirements of the *Guideline for Division 5.1 assessments* (DPE 2022) and the *Roads and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in section 171 of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor		Impact
a	Any environmental impact on a community? Construction of the proposal would result in short-term negative impacts on the local community, as discussed in section 6. Potential impacts include traffic delays, noise and vibration, and changes to amenity and accessibility. These impacts would be temporary and managed through the implementation of mitigation measures outlined in section 7. The proposal would lead to permanent vegetation and habit removal, and the introduction of new built structures in the environment. Vegetation removal has been minimised as much as possible and offsetting and revegetation is proposed. Structures have been designed in keeping with the surrounding environment. Further opportunities for art interpretation would be explored. The proposal would have a positive benefit on the local and wider community by improving the efficiency of Richmond Road and associated intersections, providing support for growth in the NWGA.	Short-term, minor negative Moderate, long term negative Long-term, positive
b	Any transformation of a locality? Negative visual amenity impacts resulting from construction of the proposal would be temporary and managed through the implementation of mitigation measures outlined in section 7. In the long term, the proposal would not result in a substantial transformation of the locality as it comprises widening of the existing road corridor within an area currently exposed to growth and development, with further development planned.	Short-term negative Long-term positive
c	Any environmental impact on the ecosystems of the locality? The proposal would require the removal of 2.11 hectares of native vegetation and 60 planted native trees. This includes 0.35 hectares of native vegetation within certified areas, which has previously been offset under the NWGA and CPCP biodiversity certification processes. The remaining 1.76 hectares of native vegetation and 60 planted native trees occur outside of certified lands. This includes 1.76 hectares of vegetation commensurate with TECs under the BC Act, of which 1.07 hectares are commensurate with TECs listed under the EPBC Act. No threatened species, populations or ecological communities listed under the BC Act and EPBC Act were considered to have the potential to be significantly impacted by the proposal. Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination. Mitigation measures are proposed to reduce adverse impacts on biodiversity values as outlined in section 7. The requirements for the provision of biodiversity offsets, conservation measures and tree and hollow replacement for the proposal have been considered in accordance *No Net Loss Guidelines* (TfNSW, 2023) and the T*ree and Hollow Replacement Guidelines* (TfNSW 2023).	Long-term, minor negative
d	Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? During construction, the proposal would result in a short-term reduction in the aesthetic quality of the locality as a result of an increase in construction machinery within the area and associated construction fencing and barriers, dust generation, construction noise, visual impacts and traffic congestion. The implementation of mitigation measures outlined in section 7 would minimise these impacts. Across the seven landscape character zones the impact of the proposal varies from high to negligible, with more falling into the lower range. The highest impacts are	Short-term, negative Long-term, negative

Factor		Impact
	likely to occur in the open grassland areas in proximity to the new built form of the flyover bridge and associated retaining wall. The proposal would result in an overall rating of negligible/low from three viewpoints, moderate from four viewpoints and high-moderate from one viewpoint. The new flyover bridge would sit directly in view of a number of locations. No recreational or scientific qualities of the proposal area are anticipated to be impacted during the construction or operation of the proposal.	
e	Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? Four Aboriginal archaeological sites of low to moderate significance would be at least partially impacted by the proposal. Impacts would be mitigated through archaeological salvage as outlined in section 6.4. The proposed works are within the curtilage of the Blacktown Native Institution heritage item listed on the State Heritage Register (SHR No. 01866). The proposal would result in little to no physical impacts and moderate adverse visual impacts to the item. The proposed works are adjacent to the curtilage of the Colebee and Nurragingy Land Grant heritage item listed on the State Heritage Register (SHR No. 01877). There would be no physical and little to no visual impacts to this item as a result of the proposal. This archaeological assessment has identified nil to low potential for historical archaeological remains. Further information is provided in section 6.5. Potential co-design opportunities in proximity to the Blacktown Native Institution and in the broader study area would be identified through the Connecting with Country process and in consultation with local knowledge holders. These opportunities may include artworks on the flyover bridge and/or retaining wall and landscaping with endemic species. A section 60 permit under the *Heritage Act 1977* and an Aboriginal Heritage Impact Permit (AHIP) under section 90A of the *National Parks and Wildlife Act 1974* would be required for the proposal.	Long-term, negative
f	Any impact on the habitat of protected fauna (within the meaning of the *Biodiversity Conservation Act*)? Construction of the proposal would require clearing of native vegetation, planted trees and habitat of protected fauna. No threatened fauna species were considered to have the potential to be significantly impacted by the proposal. Further information is provided in section 6.8.	Long-term, minor negative
g	Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life. Biodiversity impacts associated with construction and operation of the proposal are considered in section 6.8	Nil
h	Any long-term effects on the environment? Minor negative long-term impacts on the existing environment are expected through the removal of 2.11 hectares of native vegetation. This includes 0.35 hectares of native vegetation within certified areas. This would be minimised through the implementation of the mitigation measures outlined in section 7. Long-term positive impacts would include an increase in the road operational efficiency and improved safety for all road users.	Long-term, minor negative Long-term, positive
i	Any degradation of the quality of the environment? Air quality, noise, traffic, visual impacts, accidental spills and erosion and sedimentation could potentially result from construction of the proposal. These impacts would be minimised through the implementation of mitigation measures outlined in section 7.	Short-term, minor

Factor		Impact
	In the long term, the proposal would improve the overall quality of the environment through regeneration, implementation of water quality measures and reduced flooding.	Long-term, positive
j	Any risk to the safety of the environment? There is potential for road safety impacts to motorists and pedestrians during construction due to changed traffic conditions. Traffic management safeguards outlined in section 7, including the preparation of a traffic management plan, would address safety risks. The proposal would improve safety for road users and pedestrians through improved traffic efficiency and provision of staged pedestrian crossings.	Short-term, negative Long-term, positive
k	Any reduction in the range of beneficial uses of the environment? The proposal would not result in a significant reduction in the range of beneficial uses of the environment.	Short-term negative
l	Any pollution of the environment? The proposal would result in minor air pollution for the duration of construction from plant and machinery, including the generation of dust. There is the potential for chemical and fuel spills to occur during construction. Pollution risks associated with the construction of the proposal would be managed through the implementation of the mitigation measures outlined in section 7.	Short-term negative
m	Any environmental problems associated with the disposal of waste? The proposal would result in the generation of wastes from demolition, excavation, and road construction. With the implementation of the mitigation measures outlined in section 7, environmental problems associated with the disposal of construction waste are not anticipated.	Short-term negative
n	Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal is unlikely to increase demands on resources that are, or are likely to become, in short supply.	Nil
o	Any cumulative environmental effect with other existing or likely future activities? Construction activities undertaken for the proposal may overlap with the construction activities associated with neighbouring commercial, residential and infrastructure developments. Local residents and motorists using the adjoining local roads could be exposed to additional noise, construction traffic, and other construction impacts from the cumulative impact of the projects. In combination with other developments, there would be an increase in removal of native vegetation, and habitat features. The proposal in combination with other projects may contribute to increased temporary activities within Bells Creek and its floodplain, and the broader Hawkesbury-Nepean Catchment. The combination of the proposal and other identified road projects in the NGWA, would provide further network benefits to the planned residential and commercial developments in the area. Refer to section 0 for further information.	Short-term, negative Long-term, minor negative Long-term positive
p	Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal is not located within a coastal area and therefore would not result in any impact on coastal processes and coastal hazards.	Nil
q	Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1. The applicability of the proposal against relevant local, regional and district strategic plans has been considered in section 2.1. Although the construction of the proposal would have short term negative impacts on the local environment such as traffic, amenity and noise impacts, once operational, the proposal aims to align with the	Short-term, negative Long-term, positive

Factor		Impact
	objectives of relevant strategic plans. The future growth of the NWGA and local areas is considered as part of these strategic plans, and the proposal would provide for the projected growth by upgrading Richmond Road to increase the capacity, and safety of the surrounding road network.	
r	Other relevant environmental factors. In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to section 6.	Nil

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 proposal should be referred to the Australian Department of Climate Change, Energy, the Environment and Water .

A referral is not required for proposed actions that may affect nationally-listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor		Impact
a	Any impact on a World Heritage property? There are no World Heritage properties within or in close proximity to the construction boundary.	Nil
b	Any impact on a National Heritage place? There are no National Heritage places within, or in close proximity to the construction boundary.	Nil
c	Any impact on a wetland of international importance? There are no wetlands of international importance within, or in close proximity to the construction boundary.	Nil
d	Any impact on a listed threatened species or communities? Based on the biodiversity assessment (refer Appendix H) the proposal is not expected to have a significant impact on threatened communities, or threatened species. Seasonal targeted surveys are currently being undertaken for an additional eight threatened flora species to confirm if present. Assessments of significance will be updated using these findings prior to the proposal being considered for determination.	Nil
e	Any impacts on listed migratory species? No migratory species were considered to have a moderate or higher likelihood of occurrence in the biodiversity study area. It is not expected that the proposal would have a significant impact on any migratory species.	Nil
f	Any impact on a Commonwealth marine area? There are no Commonwealth marine areas within or in close proximity to the construction boundary.	Nil
g	Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve any nuclear action.	Nil
h	Additionally, any impact (direct or indirect) on the environment of Commonwealth land? There is no Commonwealth land within or in close proximity to the construction boundary.	Nil

Appendix B - Statutory consultation checklists

Transport and Infrastructure SEPP

Certain development types

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

Development within the Coastal Zone

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

Note: See interactive map at ***Planning Portal NSW spatial viewer - find a property***. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program.

Council related infrastructure or services

Development type	Potential impact	Yes / No	If 'yes' consult with	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?	Yes	Blacktown City Council	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	Section 2.10
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will	No		Section 2.10

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
	this connection have a *substantial* impact on the capacity of any part of the system?			
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	No		Section 2.10
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	Yes	Blacktown City Council	Section 2.10
Road & 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	Section 2.10

Local heritage items

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

Flood liable land

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	Yes	Blacktown City Council	Section 2.12
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a	Yes	State Emergency Services	Section 2.13

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
	building, emergency works or routine maintenance?			

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the 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	SEPP (Transport and Infrastructure) section
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	No		Section 2.15
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No		Section 2.15
Navigable waters	Do the works include a fixed or floating structure in or over navigable waters?	No		Section 2.15
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No		Section 2.15
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No		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		Section 2.15
Willandra Lakes Region World Heritage Property	Are the works on or reasonably likely to have an impact on, a part of the Willandra Lakes Region World Heritage Property?	No		Section 2.15
Western City operational area	Are the works within a Western City operational area specified in the *Western Parkland City Authority Act 2018,* Schedule	No		Section 2.15

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) section
	2 with a capital investment value of $30 million or more.			
Bush fire prone land	Are the works for the purpose of heath service facilities, correctional centres or residential accommodation in bush fire prone land?	No		Section 2.16

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

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

Appendix C – Traffic and Transport Impact Assessment

Appendix D – Preliminary Site Investigation

Appendix E – Aboriginal Cultural Heritage Assessment Report

Appendix F – Statement of Heritage Impact

Appendix G – Noise and Vibration Assessment

Appendix H – Biodiversity Assessment Report

Appendix I – Urban Concept Design and Landscape Character and Visual Impact Assessment

Appendix J – Air Quality Assessment

NSW GOVERNMENT