



NGH

**LIVERPOOL
CITY
COUNCIL**



REVIEW OF ENVIRONMENTAL FACTORS

**Upgrade of Governor Macquarie Drive between
Hume Highway and Shore Street, Warwick Farm**

December 2021

Project Number: 20-521



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ACRONYMS AND ABBREVIATIONS

AHD	Australian Height Datum
ASL	Above sea level
AHIMS	Aboriginal Heritage Information Management System
AWS	Automatic weather station
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BOM	Australian Bureau of Meteorology
CEMP	Construction Environmental Management Plan
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment (Cwth)
DECCW	Department of Environment, Climate Change and Water (NSW) now EES
DoEE	Department of the Environment and Energy (Cwth)
DPIE	Department of Planning, Industry and Environment (NSW)
EES	Department of Environment, Energy and Science (NSW) (formerly OEH, and, prior, DECCW)
EIA	Environmental impact assessment
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
ESD	Ecologically Sustainable Development
ha	hectares
IBRA	Interim Biogeographic Regionalism for Australia
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
MNES	Matters of National Environmental Significance under the EPBC Act
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW), now EES
REF	Review of Environmental Factors

1. INTRODUCTION

1.1. Overview

Liverpool City Council (the Council) proposes to upgrade approximately 350 metres of Governor Macquarie Drive (GMD) between Hume Highway and east of Hope Street underpass in the suburb of Warwick Farm.

The upgrades are part of Stage 1 of a proposal to upgrade GMD from a two-lane to a four-lane carriageway from Hume Highway to the existing four-lane arrangement on GMD near the Australian Turf Club (ATC) access road. The upgrades subject to this Environmental Assessment are limited to Stage 1 of the intended GMD upgrades. A separate Environmental Assessment would be required for the proposed Stage 2 works. Refer to Figure 1-1 for the location context of Stage 1.

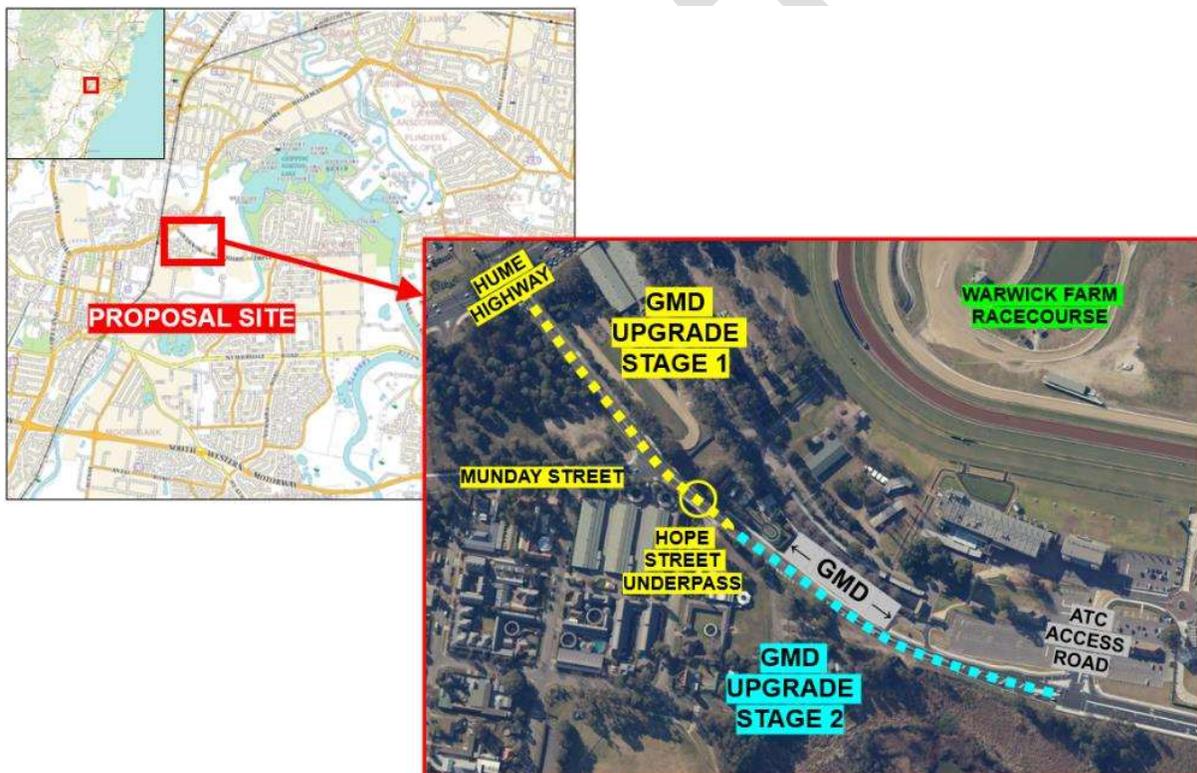


Figure 1-1 Project locality and Stage 1 context

Stage 1 works would also include upgrades of two signalised intersections being the intersection of GMD and Hume Highway and GMD and Munday Street intersection.

Proposed works for Stage 1, collectively known as ‘the proposal’, and would include the following key activities:

- Widening GMD to provide:
 - Dedicated dual right turn lanes from GMD to Hume Highway
 - A dedicated through lane to Todman Road
 - A left turn slip lane from GMD to Hume Highway
- Widening the Hume Highway to provide a left turn slip lane from Hume Highway into GMD

- Modification to the intersection of GMD and Munday Street maintaining all existing turn manoeuvres.
- Extension of the existing right turn bay eastbound on GMD to Munday Street
- Provision of shared paths on the northern and southern side of GMD to existing shared paths at Hume Highway intersection with GMD.
- Construct a raised concrete median to separate eastbound and westbound GMD lanes
- Install new pavement, stormwater pipes and pits along GMD
- Widening the dual culvert underpass on the northern side of Hope Street Underpass to accommodate widening of GMD
- Providing footbridge structures on GMD over the Hope Street Underpass
- Adjust / relocate existing utilities as required
- Adjust / install road furniture and line-marking as required
- Private property adjustments
- Construction of low-level retaining walls.

Refer to Figure 1-2 for key Stage 1 design features. Refer to Appendix A for all detailed design drawings.

This Review of Environmental Factors (REF) has been prepared by NGH Pty Ltd (NGH) based on the draft 100% detailed design by MU Group Consulting (MU Group; October 2021).

The purpose of the REF is to review the potential environmental impacts on behalf of MU Group and Council based on the proposal. The REF documents the likely impact of the proposal on the environment, and details if mitigation and management measures will need to be implemented.

The description of the proposal and assessment of associated environmental impact has been undertaken in the context of Clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979 (DUAP, 1995/1996), the *Biodiversity Conservation Act 2016* (BC Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

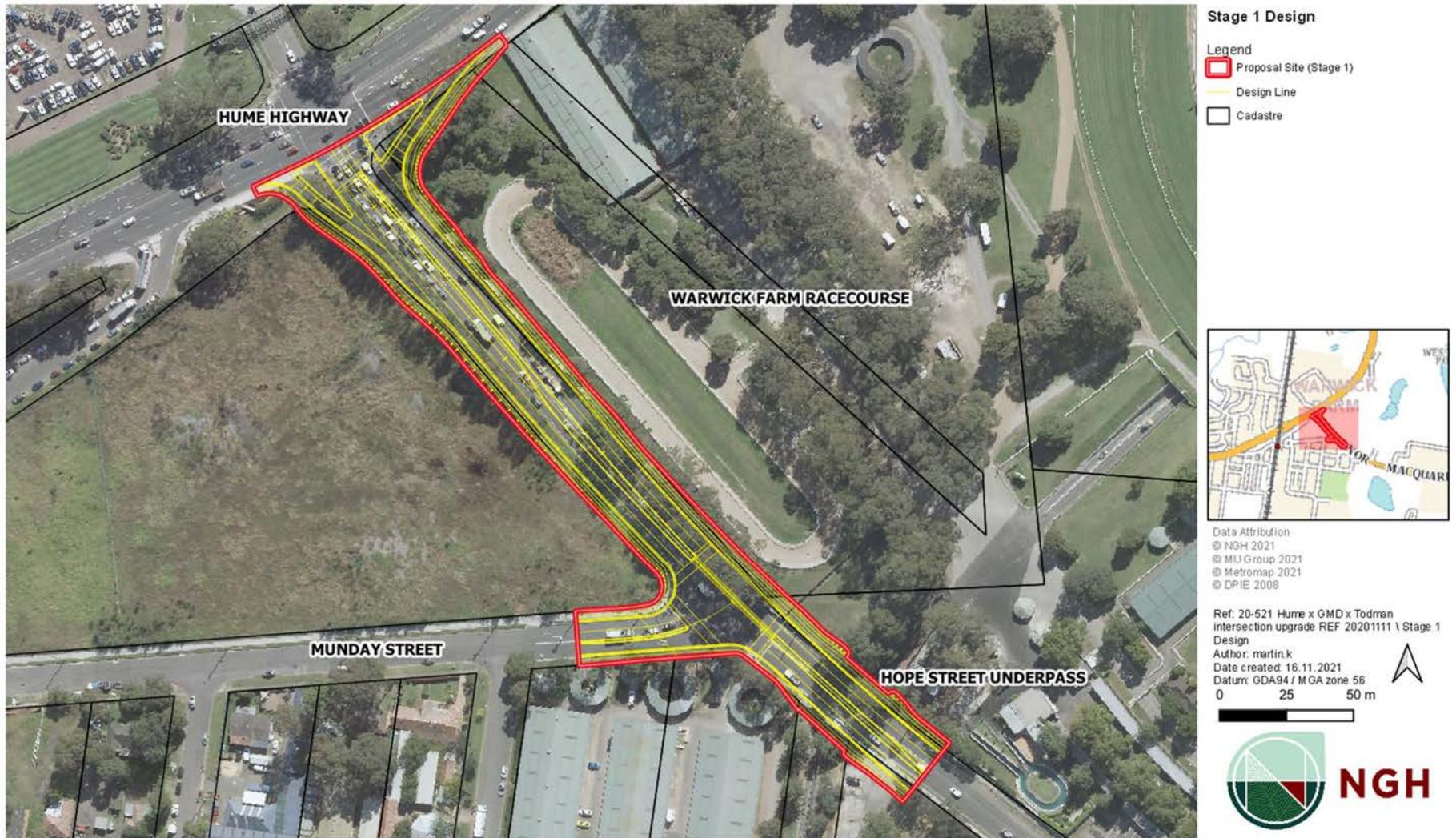


Figure 1-2 Stage 1 design features

1.2. Confirmation of Assessment Process

The proposal comprises of development for the purpose of a road or road infrastructure facilities. Under Division 17 of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP), the development may be carried out by or on behalf of a council without consent on any land for the purpose of “alterations or additions to an existing road” (Clause 94(2)(c)).

The proposal is not State Significant Infrastructure (SSI) nor State Significant Development (SSD), it would be carried out and determined by a council and would therefore be assessed under Division 5.1 of the EP&A Act. Consequently, development consent is not required. Refer to Chapter 4.1 of the REF for details.

This REF fulfils Council’s obligation under Section 5.5 of the EP&A Act including to examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

1.3. Definitions of the Proposal

The following definitions apply to this report:

Proposal site – the footprint of the proposed work including the extent of construction works and ancillary facilities.

Proposal area – land within 20 metres of the proposal site.

Locality – land within 1 km of the proposal site.

2. SITE ANALYSIS

2.1. Site Description and Context

The proposal is located along GMD from Hume Highway to east of Hope Street underpass. Both Hume Highway and GMD are classified B-double routes, as well as Munday Street. The posted speed limit along GMD is 60km/h.

GMD at the approach to the intersection with Hume Highway includes dual right turn lanes from GMD to Hume Highway and a shared through and left turn lane from GMD to Hume Highway.

Northbound Hume Highway includes a shared through and left turn lane to Todman Road, two dedicated through lanes on Hume Highway and a dedicated eastbound right turn lane to GMD. Southbound Hume Highway includes a shared through and left turn lane to GMD, two dedicated through lanes on Hume Highway and a dedicated right turn lane to Todman Road.

Todman Road eastbound includes a shared through and left turn lane and a dedicated right turn lane to Hume Highway. Todman Road westbound include a single through lane. Transport for NSW (TfNSW) plan to install a short concrete median on Todman Road intersection with Hume Highway to separate eastbound and northbound traffic on Todman Road.

The existing signalised intersection of Munday Street and GMD includes a dedicated right turn lane from GMD to Munday Street and dedicated right turn and left turn lanes from Munday Street to GMD. GMD westbound on approach to Munday Street includes a share through and left turn lane to Munday Street and a through lane continuing towards Hume Highway.

GMD is a single lane eastbound prior to transitioning into two lanes at the ATC access road. GMD westbound transitions from a single lane west of the ATC access road prior to developing into dual lanes on approach to the Munday Street intersection.

The adjacent land use consists of an ATC racecourse and carpark on the northern side of GMD. The southern side of GMD includes horse stables, a large empty parcel of land on the south east corner of the intersection of GMD and Hume Highway and a Lagoon connecting to the Georges River (Horse Shoe Lagoon). The proximity to Georges River, flat grades and tendency for flooding were considered as part of the development of the design.

2.2. Land Ownership

Currently, the proposal traverses land under ownership of Council (GMD and Munday Street), ATC (Warwick Farm Racecourse) and TfNSW (Hume Highway). The vacant land west of GMD is currently owned by commercial real estate enterprises.

The proposal is located on land traditionally inhabited by the Darug and Tharawal people of the southern Sydney and east coast region. The proposal is within land overseen by the Gandangara Local Aboriginal Land Council (LALC). The nearest relevant LALC office is located approximately 1.4 km southwest of the proposal site.

2.3. Surrounding Environment

The proposal is in the suburb of Warwick Farm within the Liverpool LGA approximately 25 km west of the Sydney CBD. The proposal is within a highly developed urban region of Greater Sydney.

Surrounding features in relation to the proposal site including the following:

- Directly east of Hume Highway A22
- Directly south of Warwick Farm Racecourse and directly north of associated stables
- 300 metres east of Warwick Farm railway station
- 1 km north of Liverpool General Hospital
- 1 km west and 1 km south of Georges River and Cabramatta Creek, respectively.

Refer to Figure 2-1 for a map summarising the above.

The proposal traverses land zoned SP2 Infrastructure and RE2 Private Recreation as per the Liverpool LEP. Adjoining land zoning includes IN1 General Industrial, R2 Low Density Residential and B5 Business Development. Refer to Figure 2-2 for the surrounding land zoning map.

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm



Figure 2-1 Surrounding features of the proposal

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

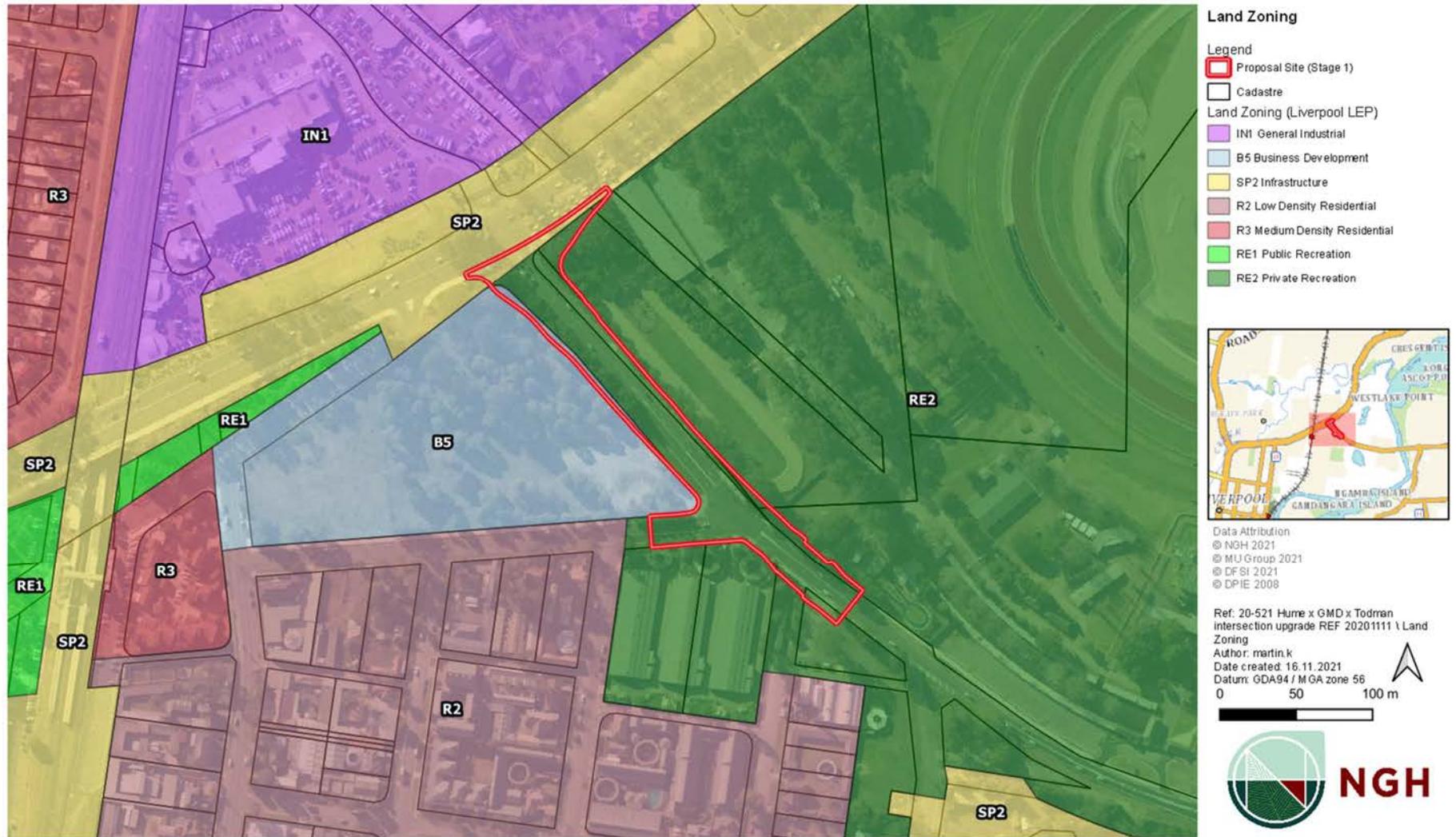


Figure 2-2 Land zoning surrounding the proposal

3. THE PROPOSAL

3.1. Proposal Elements

3.1.1. Objectives

The objectives of the proposal are to provide:

- Improved road safety, level of service, and geometry where possible, by providing a widened carriageway and improved intersections to cater for:
 - Additional traffic demand, including improving the flow of traffic to provide reliable journeys while supporting public transport use as well as heavy vehicle movement
- Improved cyclist and pedestrian amenity by providing paved shared paths
- Improved transport connections between surrounding suburbs.

3.1.2. Consideration of Alternatives

The proposal has undergone several iterations throughout the concept and detailed design phases. These design factors have primarily focussed on the following:

- Road safety
- Horizontal and vertical alignments
- Existing utilities
- Drainage design
- Pavement design
- Traffic signals
- Property acquisition area.

The latest design has been developed given consideration to road safety, health and safety in design, constructability and minimising impacts on the environment, where possible, such as limiting excavation required and minimising property acquisition.

Concept Design Option

The concept design of the proposal previously included a high-angle entry left-turn slip lane from Hume Highway to GMD to avoid impact to existing communications utilities. Upon confirmation of permission to adjust these utilities, the design of this slip lane has been reconfigured to provide additional storage capacity for a B-Double vehicle turning left from Hume Highway to GMD. The extension of the left turn slip lane has been incorporated in the draft 100% detailed design.

As depicted in the design, the design will retain the signalised intersection at Munday Street with minor changes in order to minimise abortive work. Traffic signal structures are retained in its current positions, subject to TfNSW acceptance, with changes in line marking, kerb and gutter and kerb ramps. Two eastbound lanes are provided along GMD from the intersection of Hume Highway. To ensure that the works tie into the existing alignment west of the underpass, the inside lane transitions into a trapped turning lane to Munday Street, whilst the outside lane continues as the through lane on GMD. The trapped turning lane will become a through lane under the ultimate

arrangement when Council implement the Manning Street Bypass and Munday Street and Munday Street amended to a left in/left out control.

The concept design included widening of the dual culverts at Hope Street underpass to the north and south. These works would have impacted the underpass head room and required re-grading of the pathway to the north and south to ensure that the pathway ties into the base of the widened culvert. ATC raised concerns relating to the change in grades and potential risks to horses and riders.

The current design incorporates two pedestrian footbridges on both the southern and northern side of GMD. This significantly reduces the impact on culvert widening and grades at Hope Street underpass. Minor widening of the dual culvert on the northern side of GMD will still be required however the extent has significantly reduced compared to the extent of widening shown in the concept design.

The previous extent of Stage 1 works was also limited to east of Munday Street. Following a constructability session, it was determined that Stage 1 extents should be increased to east of Hope Street underpass for the following reasons:

- Construct GMD and Munday Street intersection to final levels to enable drainage installation
- Reduce rework associated with Stage 2 works
- Consideration of the vertical alignment of the proposed ultimate design for GMD and most practical location for tie-in to existing GMD road levels
- Providing continuation of existing shared paths eastbound and westbound on GMD.

Confirmation of Design Option

The current detailed design is a result of minimising negative trade-offs for drainage and pavement design in accordance with overarching design specifications by TfNSW, AustRoads, Council, utilities, and environmental constraints. Both the concept and detailed design, retain the same proposal area.

Council has deemed this option as the preferred option where this REF considers potential environmental impacts as per the current detailed design (MU Group, October 2021).

3.1.3. Proposed Activities

The proposal involves road widening of GMD approach to Hume Highway to provide a left turn slip lane into the Hume Highway and a slip lane out of the Highway and associated footpaths and civil works construction.

Details of the scope of works involves the following activities:

- Widen GMD at its intersection with westbound Hume Highway to facilitate the following vehicle lane configuration:
 - Two dedicated right-turn lanes into Hume Highway
 - One through-lane to Todman Road
 - One dedicated left-turn slip lane into Hume Highway
 - One dedicated left-turn slip lane from Hume Highway to merge into the existing eastbound GMD lane
- Extension of the existing right-turn bay eastbound on GMD into Munday Street

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

- Construct two raised concrete islands on GMD to facilitate the new slip lane configurations
- Construct 2.5-metre-wide shared paths along eastbound and westbound GMD to tie back to the existing shared path along westbound Hume Highway
- Construct a raised concrete median to separate eastbound and westbound GMD lanes between Hume Highway and Munday Street
- Widening a dual culvert underpass eastbound on GMD
- Provision of footbridge structures eastbound and westbound on GMD over the Hope Street underpass.
- Utility adjustments/relocation were applicable.

Installation of stormwater infrastructure during the construction of the proposal would involve the following activities:

- Inlay subsurface drainage pipes within widened road
- Install stormwater pits at nominated locations
- Connect completed system to the existing pit on Hume Highway.

Approximately 1,000 m² of ATC land acquisition would be required to facilitate the proposal; about 200 m² of this would be with individual horse stable owners. Approximately 600 m² of land is proposed to be acquired from owners of the vacant lot north of Munday Street. Refer to Appendix A for details.

The proposal would also involve adjustment / installation of road furniture and line-marking as required. Landscaping works to reinstate ground cover and visual amenity would be undertaken in the final stages of construction.

Refer to Appendix A for the complete detailed design layout.

Work Methodology

Activity	Associated work
Pre-construction	<ul style="list-style-type: none"> • Notify the public, businesses and other stakeholders before work commences • Carry out geotechnical investigations and other investigation work including utilities (e.g. Dial Before You Dig) • Install safety barriers and environmental controls (e.g. erosion and sedimentation controls, temporary drainage controls). • Set out, demarcate and fence the site to establish routes, accesses, and no-go zones including tree protection zones • Establish construction compound.
Construction	<ul style="list-style-type: none"> • Remove vegetation within road corridor as shown in designs • Box-out existing pavement to align with GMD's new road formation between Hume Highway and Shore Street <ul style="list-style-type: none"> ○ Cut and fill to facilitate new pavement ○ Mill and repave where applicable

Activity	Associated work
	<ul style="list-style-type: none"> ○ Reconstruct kerbs to interface new road formation • Construct low retaining walls along westbound GMD between Munday Street and Hope Street • Install drainage infrastructure as shown in designs • Adjust / install associated road furniture • Line-mark to delineate new lane configurations.
Post-construction	<ul style="list-style-type: none"> • Rehabilitate surfaces and other areas affected by construction works • Apply landscaping where applicable to reinstate groundcover and visual amenity • Decommission temporary compound site • Demobilise site by removing the following: <ul style="list-style-type: none"> ○ Environmental and safety controls ○ Footpath restrictions/closures.

Construction Equipment

Plant and equipment to be utilised during construction would include:

- Excavators
- Power generator
- Concrete pump
- Concrete truck
- Concrete saw
- Rollers
- Delivery trucks
- Light vehicles
- Generator
- Compressor
- Pneumatic hammer
- Hand tools
- Chainsaws
- Woodchipper
- Spoil and fill trucks (truck and dog).

Earthworks

The proposal would involve earthworks to facilitate new road and pavement formation. This activity would box-out existing pavement and cut-and-fill minor quantities to level the road surface for new kerbs and shared paths.

Class 5 acid sulfate soils (ASS) are mapped to occur within the proposal area as per the Liverpool LEP (refer to Appendix B). Refer to Chapter 6.2 for safeguards when working within Class 5 ASS.

Likely waste streams that would be generated by the proposal include:

- Excavated sediment/spoil
- Concrete
- Building materials
- Landscape waste.

Vegetation clearing would include:

- Removal of approximately 0.6 ha of vegetation including approximately 50 trees
- Chipping/mulching of plant matter before being transported offsite by trucks.

Ancillary Facilities

The location and dimensions of the site compound would be determined during the detailed design phase. Final location for construction site compounds would be determined with the successful contractor, however, small stockpiles may be possible where areas on the side of the proposed works would be used to hold materials during the construction phase of the project. The size and specific location of stockpiles would be confirmed pending development of the final design and determination of the materials required to undertake the proposal. It is expected that minimal stockpiling within the construction footprint would be required. It is Council's preference for materials to be delivered as required wherever possible.

The location of stockpiles and storage areas would consider the following issues:

- Minimal clearing and excavation for site establishment (choosing the area of lowest ecological significance and environmental impacts)
- Slope and elevation and proposed drainage treatments.

Once the contractor has a preferred location for the stockpile and storage areas, consultation with Council would be required before work starts in those locations to determine if any additional environmental assessments are needed. Strict erosion and sediment control measures would be required to minimise pollution, particularly regarding stockpiles. Refer to Chapter 6.2.4 for relevant safeguards.

The stockpiles would be managed, in accordance with the most current stockpile site management procedure and QA specification for earthworks.

Traffic Management

The proposal would be accessed via GMD depending on the construction activity. Construction staff vehicles may use a portion of the unrestricted spaces along surrounding streets to minimise traffic impacts along GMD.

Lane closures may be required for construction activities along GMD. Alternate-lane traffic control at this location would be temporarily required, particularly during road milling and repaving. A detailed Traffic Management Plan (TMP) would be prepared to ensure impacts to vehicle flow at the proposal location are minimised during construction.

Throughout the construction phase, pedestrian access along accessible areas of GMD would be diverted in order to maintain public safety. This is not expected to result in more than a minor impact and would be managed as per the TMP.

Refer to Chapter 6.8 of the REF for details.

Construction Timing

The Proposal is expected to require a construction duration of approximately 52 weeks.

Construction activities would predominantly be undertaken during standard working hours as per the Council's general restrictions on offensive noise

(<https://www.liverpool.nsw.gov.au/council/Fees-Forms-Policies-and-Enforcement/enforcement/noise>):

- Monday to Saturday: 7am – 8pm

- Sundays and public holidays: 8am – 8pm.

Work outside these hours will be required, particularly at existing intersections, to limit impact on traffic. Where possible, works would be undertaken during standard working hours to minimise noise impacts to nearby sensitive receivers. Refer to Chapter 6.6 of the REF for details.

4. LEGISLATIVE AND PLANNING FRAMEWORK

4.1. Planning and State Legislation

Environmental Planning and Assessment Act 1979

The EP&A Act provides for a co-ordinated development approach ensuring the proper management, development and conservation of natural and cultural resources and promoting social and economic welfare and a better environment.

Proposals which do not require development consent under a planning instrument may be approved by relevant government agencies under Division 5.1 of the Act.

Subsection 5.7 of the EP&A Act requires an Environmental Impact Statement (EIS) to be prepared (instead of or in addition to a REF) if an activity is likely to significantly affect the environment. However, subsection 5.7 also provides that if the activity is only likely to significantly affect the environment in respect of (1) land that is, or is part of, critical habitat OR (2) threatened species, populations or ecological communities, or their habitats; then an EIS is not required, provided a Species Impact Statement (SIS) has been furnished.

Subsection 5.7 also requires the concurrence of the Director-General of OEHL if there is likely to be significant impact to the above listed entities. This proposal is not likely to significantly affect the environment, and no EIS is required.

This REF has been completed under Division 5.1 of the EP&A Act and aims to address Council's duty in respect to considering the environmental impact of the proposed activities under Section 5.5 of the EP&A Act. The Proposal is not likely to significantly affect the environment, and no EIS is required.

State Environmental Planning Policy (Infrastructure) 2007

ISEPP aims to facilitate the effective delivery of infrastructure across the state, including for roads and road infrastructure facilities. Clause 94 of the ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

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

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974*, nor does it require development consent or approval under *State Environmental Planning Policy (Coastal Management) 2018*, *State Environmental Planning Policy (State Significant Precincts) 2005* nor *State Environmental Planning Policy (State and Regional Development) 2011*.

Liverpool Local Environmental Plan 2008

The proposal is located within the Liverpool LGA in an area covered by the Liverpool LEP, where the proposed work would take place within land zoned SP2 Infrastructure and RE2 Private Recreation (refer to Figure 2-2).

The provisions of ISEPP override development consent requirements of the Liverpool LEP and development consent from Council would not be required.

4.2. Other Relevant NSW Legislation

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) aims to conserve and protect certain classes of threatened, endangered and vulnerable species, populations and ecological communities. Together with the Biodiversity Conservation Regulation 2017, it establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offset Scheme (BOS). The BOS creates a transparent, consistent and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity.

Section 7.3 of the BC Act lists a number of factors to be considered when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is potential for impact, a Test of Significance (ToS) would be required to determine the significance of the impact. If there is likelihood for a significant impact on threatened species, populations and their habitat or on ecological communities then a Species Impact Statement (SIS) is required. Alternatively, biodiversity stewardship agreements under the BOS may be established. These are voluntary, in-perpetuity agreements entered into by landholders to secure offset sites in lieu of an SIS.

Potential impacts on biodiversity have been assessed by a Biodiversity Assessment (BA; refer to Appendix C) and summarised in Chapter 6.4 of the REF. There is unlikely to be any significant impacts on threatened species as a result of the proposed work.

Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for items of 'environmental heritage' in NSW. 'Environmental heritage' includes places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Under the Heritage Act, a person must not disturb or excavate land if they know or have reasonable cause to suspect that they might discover, expose, move or damage a relic unless they have an excavation permit.

Items considered to be significant to the State can be listed on the State Heritage Register (SHR) and cannot be demolished, altered, moved or damaged, or their significance altered, without approval from the Heritage Council of NSW. Other items may be listed on the National and Commonwealth Heritage Lists, State Heritage Inventory (SHI) or by local councils in LEPs. Additionally, under Section 170 of the Heritage Act, all government agencies are required to identify, conserve and manage heritage items in their ownership or control. Items are typically listed in a Heritage and Conservation Register and may also be included on the SHI.

A Statement of Heritage Impacts (SOHI) is to be completed for the proposal due to its physical impact on the curtilage of “Warwick Farm Racecourse Group, including grandstand, race track, stables, interiors and landscape” (Liverpool LEP item no. 66). Refer to Chapter 6.8 of this REF for details.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) promotes and regulates the management of national parks and historic sites or places of cultural value within the landscape and the conservation of certain fauna, native plants and Aboriginal objects and places.

The NPW Act provides for a register of sites of archaeological and Aboriginal cultural significance (Schedule 14). The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010) has been released to facilitate the protection of Aboriginal heritage under the NPW Act. An Aboriginal Heritage Impact Permit from OEH is required for works impacting on an Aboriginal object or place.

Assessment of potential impacts to Aboriginal cultural heritage has been undertaken within Chapter 6.7 of this REF.

Under the NPW Act, all native flora and fauna are protected, threatened or otherwise. The provisions of this protection have since been transferred to Part 11 of the BC Act upon its commencement. Impacts to biodiversity are discussed in the BA (Appendix C) and Chapter 6.4 of this REF.

Biosecurity Act 2015

The *Biosecurity Act 2015* repealed the *Noxious Weeds Act 1993* and provides a framework for the prevention, elimination and minimisation of biosecurity risks. The *Biosecurity Act 2015* and supporting *Biosecurity Regulation 2017* provide for the establishment and functions of Local Control Authorities for weeds (LGA or County Councils) and weed control obligations on public and private land.

Measures have been included within the BA (Appendix C) and Chapter 6.4 of the REF to ensure adequate weed hygiene during the proposed work.

Protection of the Environment Operations Act 1997

Under the *Protection of the Environment Operations Act 1997* (POEO Act), should an activity have the potential to pollute waters as any chemical, biological, physical change to existing water quality (i.e. turbidity, release of untreated wastewater) an Environment Protection Licence (EPL) may be required from DPIE. With consideration of the proposed earthworks quantities, Council may require an EPL for the proposal if extraction and processing material on site exceeds 150,000 tonnes.

In addition, the POEO Act relates to any pollution of the environment through noise, air, and waste. The POEO Act also obliges the Contractor to notify the Environment Protection Authority (EPA) when a “pollution incident” occurs that causes or threatens “material harm” to the environment. Safeguards would be in place to monitor and mitigate any potential pollution incidents, including EPA notification.

Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The Proposal's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development (refer to Chapter 6.11).

4.3. Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (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 (MNES) or the environment of Commonwealth land. These are considered in Chapter 7.2 of the REF.

A referral is not required for proposed road infrastructure that may affect nationally listed threatened species, populations, 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 the BA (Appendix C) and Chapter 6.4 of the REF.

Findings – Matters of National Environmental Significance (other than biodiversity matters)

The assessment of the proposal's impact on 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 under the EPBC Act.

Findings – nationally listed biodiversity matters

The assessment of the proposal's impact on nationally listed threatened species, populations, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant MNES.

5. CONSULTATION

5.1. ISEPP Consultation

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This assessment is provided in Table 5-1 below.

Table 5-1 Assessment of items of Clauses 13 to 16 of the ISEPP

Item	Response
Clause 13 – Developments with impacts on council-related infrastructure or services	
<i>Involves substantial impact on stormwater management services provided by a council?</i>	No
<i>Involves traffic generation to an extent that will strain the capacity of the road system in a local government area?</i>	No
<i>Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council?</i>	No
<i>Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council?</i>	No
<i>Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor?</i>	No
<i>Involves excavation of the surface of, or a footpath adjacent to, a road for which a council is the roads authority that is not minor or inconsequential?</i>	Yes
Clause 14 Consultation with councils—development with impacts on local heritage	
<i>Involves impacting the heritage significance of a local heritage item, or of a heritage conservation area, that is not also a State heritage item, in a way that is more than minor or inconsequential, and is development that this Policy provides may be carried out without consent?</i>	No
Clause 15 Consultation with councils—development with impacts on flood liable land	
<i>Involves development on flood liable land and will they alter flooding patterns more than to a minor extent?</i>	No
Clause 15AA Consultation with State Emergency Service—development with impacts on flood liable land	

Item	Response
<i>Involves development that does not require consent under the relevant provision located on flood liable land?</i>	Yes
Clause 15A Consultation with councils—development with impacts on certain land within the coastal zone	
<i>Involves development within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?</i>	No
Clause 16 Consultation with public authorities other than councils	
<i>Involves development adjacent to land reserves under the National Parks and Wildlife Act 1974 – The Office of Environment and Heritage (now EES)?</i>	No
<i>Involves development on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?</i>	No
<i>Involves development on land adjacent to an aquatic reserve or a marine park declared under the Marine Estate Management Act 2014?</i>	No
<i>Involves development adjacent to an aquatic reserve declared under the Fisheries Management Act 1994 - the Department of Environment and Climate Change (DPI Fisheries)?</i>	No
<i>Involves development comprising a fixed or floating structure in or over navigable waters—the Maritime Authority of NSW?</i>	No
<i>Involves development for the purpose of a health services facility, a correctional centre or group home, or for residential purposes, in an area that is bush fire prone land?</i>	No
<i>Involves development that would 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)</i>	No
<i>Involves development on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).</i>	No
<i>Involves development on land land in a mine subsidence district within the meaning of the Coal Mine Subsidence Compensation Act 2017?</i>	No

5.2. Stakeholder and Community Consultation

Consultation with stakeholders included the following:

Adjoining Landholders

The project requires land acquisition from the 2 adjoining landowners namely, Australian Turf Club (ATC) on the Northern side and Warwick Farm Central (WFC) on the Southern side.

ATC and WFC have therefore been consulted about the scope of work and the required land acquisition from them. ATC has requested that during construction the project should minimise impact on its scheduled autumn racing event. WFC has development proposal to develop its land parcel for Bulky Goods Retail Development. The project takes into consideration the interface with the proposed development.

Transport for NSW (TfNSW). Hume Highway as a classified state road is under the care and control of TfNSW. TfNSW's approval is also required for modification of the Hume Highway and Governor Macquarie Drive signalised approach modifications. Therefore, TfNSW has been consulted and has approved the strategic concept and concept designs. TfNSW has requested that the design of the intersection upgrade makes provision for dual right turn lanes from the Hume Highway into Governor Macquarie Drive. The required provision has been made and endorsed by TfNSW. The agency has been consulted and has also provided comments on the pavement design to ensure that the road sections into and out of Governor Macquarie Drive (at the Hume Highway) are constructed as pavement to be handed over to TfNSW.

Community Consultation

Community consultation has not been undertaken during design development. However, as indicated above, the two adjoining landowners have been consulted. In particular, ATC has been consulted throughout the design development and supports the project.

Council will carry out community consultation to seek community feedback before the project is approved for construction. This would involve public exhibition of the REF which would be available on Council's website (<https://www.liverpool.nsw.gov.au/council/have-your-say/public-exhibitions-and-notices>) for minimum of 28 days. In addition, the project information could be viewed at council's library and customer service. Adjoining local residents will receive a letter box drop.

6. ENVIRONMENTAL ASSESSMENT AND MITIGATION MEASURES

6.1. Air Quality and Climate

6.1.1. Existing Environment

Air Quality

The proposal is within an urban region of Liverpool LGA in Sydney's southwest region. A search of the NSW EPA air quality monitoring station database on 4 November 2022 identified the closest station was the Liverpool monitoring station, approximately 3.5 km southeast of the proposal site. A summary of daily averages of air quality parameters over a five-year period is shown below in Figure 6-1.

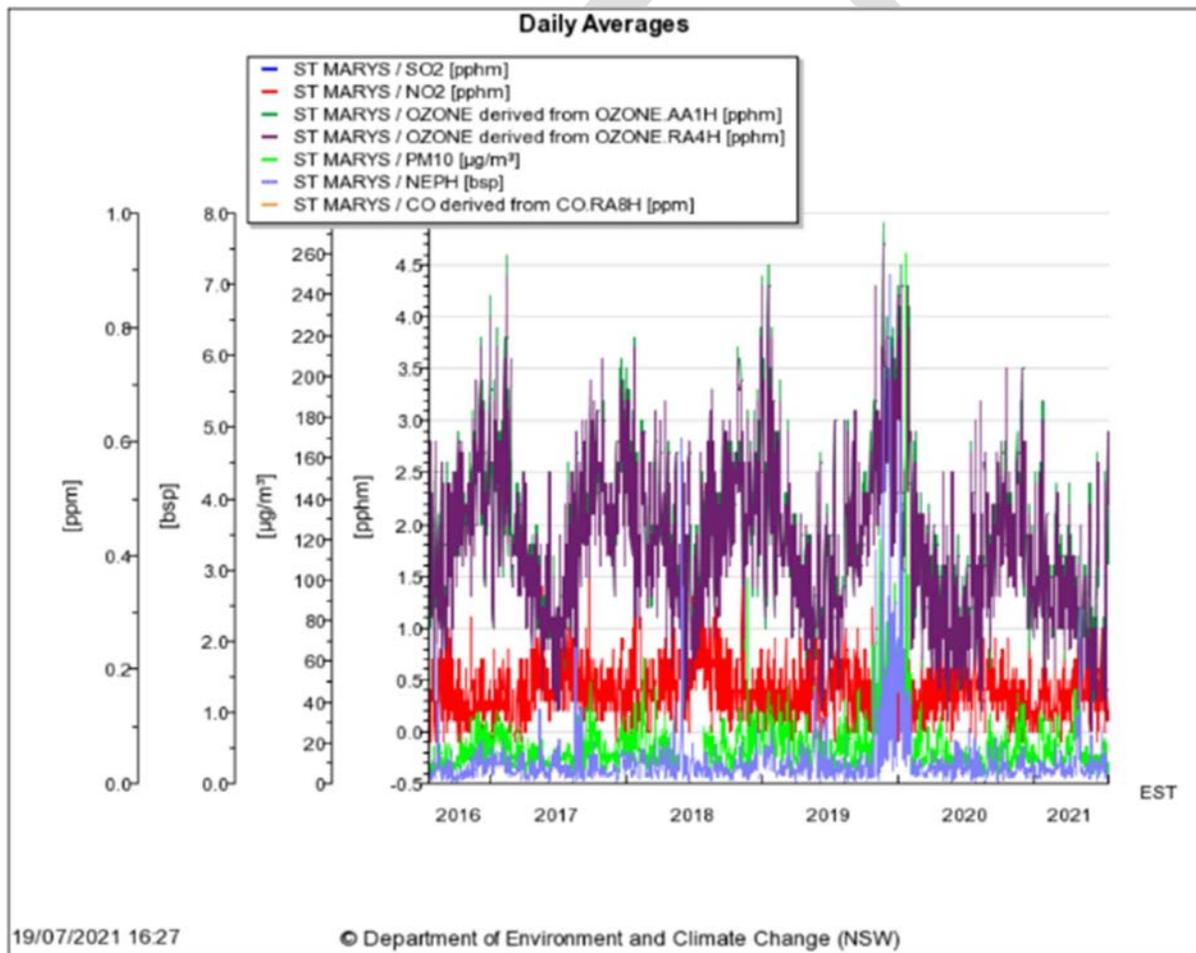


Figure 6-1 Five-year daily average air quality at St Mary's (NSW DPIE, 2021)

Air quality trends across the last five years is generally consistent with seasonal temperature changes, particularly distinctive between peak summer and peak winter months. High values of NEPH (i.e. low visibility) are shown to typically coincide with peak summer and winter months, suggesting increased particulate emission from seasonal bushfires (summer) and smoke from woodfires arising from residences (winter).

A particularly sharp rise in values can be seen during the summer of 2019/2020 which indicates the effect of the recent “Black Summer” bushfire season. This is also evident in Figure 6-2 below.

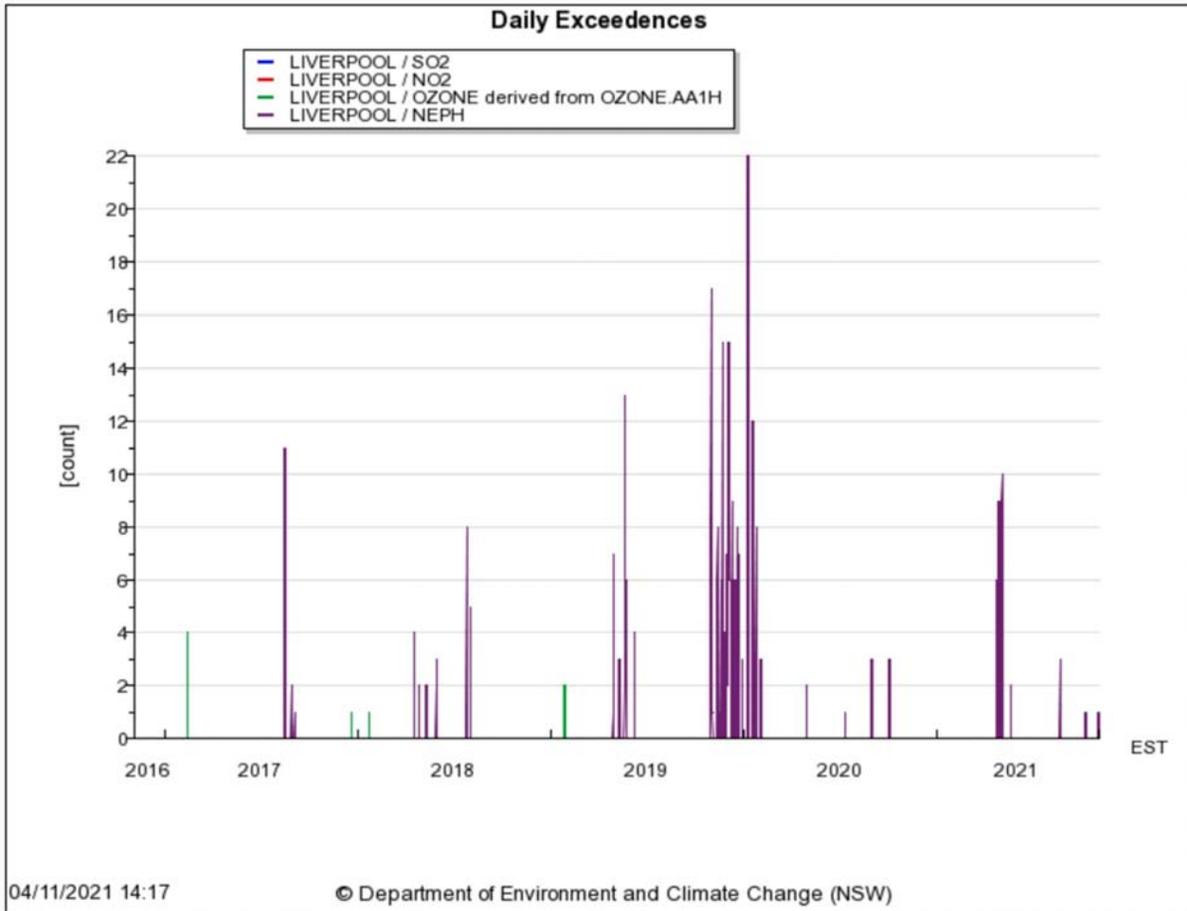


Figure 6-2 Five-year daily exceedences measured at Liverpool¹ (NSW DPIE, 2021)

Monthly exceedance trends were effectively comparable for NEPH and ozone only.

An investigation of air quality data for the first day of the previous 12 months had consistent data for nitrogen dioxide (NO₂), NEPH and atmospheric particulate matter (PM10 and PM2.5). 12-month averages are summarised in Table 6-1 below.

¹ Exceedance criteria is calculated as a function of the pollutant data reading over the national standard level for the pollutant.

Table 6-1 Average 12-month values for available air quality data (Liverpool)

Pollutants	Ozone O ₃		Nitrogen dioxide NO ₂	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO ₂	Particles PM10	Particles PM2.5
	Max 1-hour average	Max rolling 4-hour average	1-hour average	Max 1-hour average	Max rolling 8-hour average	Max 1-hour average	24-hour average	24-hour average
12-month average (Dec 2020 – Nov 2021)	3.23	3.00	2.19	0.64	0.21	0.15	22.26	9.3

GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
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The results show that the air quality for the region was generally “good” during the last 12 months.

Climate

The proposal is located within the Sydney Basin Bioregion. The Sydney Basin is dominated by a temperate climate characterised by warm summers with no dry season.

The nearest Bureau of Meteorology (BOM) Automatic Weather Station (AWS) to the proposal is Bankstown Airport AWS, approximately 4 km east of the proposal site. Between 1968 and 2021, the mean annual minimum temperature is 12.1°C and the maximum annual mean temperature is 23.4°C; the mean annual rainfall is 866.4 mm with the highest rainfall between January and March, and the lowest falling between July and September (refer to Figure 6-3).

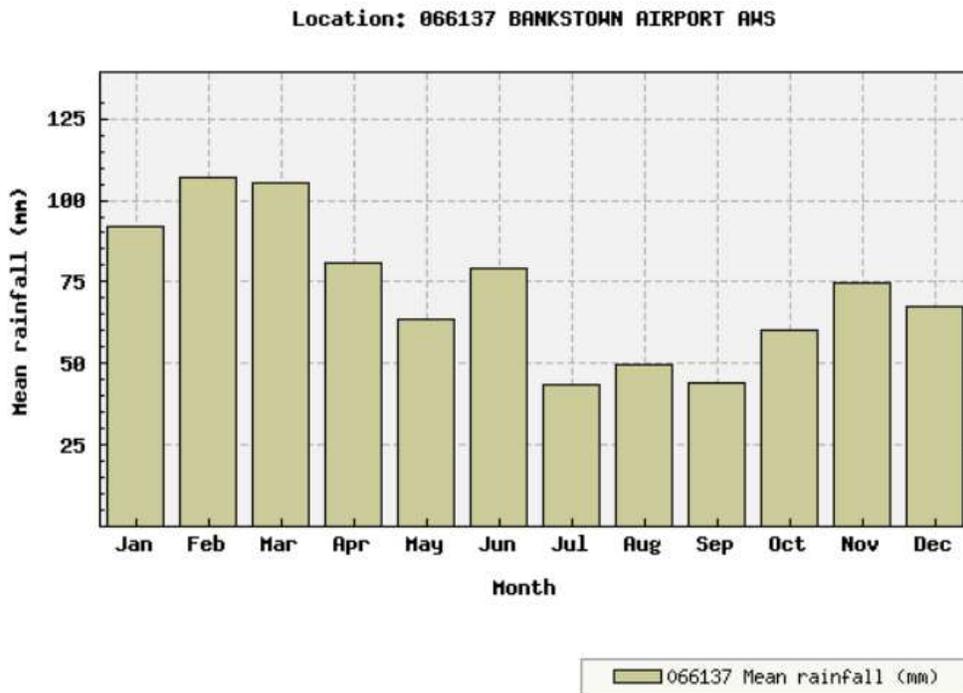


Figure 6-3 BOM mean monthly rainfall for years 1968-2021 at Bankstown Airport AWS

6.1.2. Potential impacts

Construction

Adverse impacts to air quality during construction of the proposal may result from the following:

- Dust generation from exposed areas of soil as a result of excavation and stockpiling
- Exhaust emissions from construction vehicles, plant and equipment.

The nearest sensitive receivers include residences and public recreation areas along the surrounding streets. Excavation activities would be short-term and of a minor scale. Construction equipment would be intermittently used for short periods of time throughout the construction program. The impact to these receivers would be low.

Safeguards would be in place to mitigate any unexpected finds during excavation (refer to Chapter 6.2.4), including that which may produce airborne propagules harmful to receivers (e.g. asbestos). The unexpected finds procedure would be implemented to contain any propagation of such materials.

Operation

No direct air quality impacts are expected to be generated during the operation phase as a result of the proposal.

There may be an associated increase in traffic pollutants as the roadway will be suitable for greater capacity. This may be offset by a reduction in concentrated vehicle emissions in the locality as predicted by reduced idling times and congestion as a result of the proposal.

6.1.3. Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Air quality	<ul style="list-style-type: none"> All loads will be covered during transport Limit exposed surfaces areas to the minimum area required. Maintain plant to manufacturers standards. Machinery will not be left running when idle. Water carts are to be used on stockpile sites or access roads to reduce dust. Ensure that all plant and equipment comply with Part 4 of the <i>Protection of the Environment Operations (Clean Air) Regulation 2002</i>. Where levels of dust cannot be controlled, appropriate action must be taken. This may include suspending works during periods of high wind. Smokey emissions from construction plant and vehicles will be maintained to Australian Standards. The <i>Protection of the Environment Operations Act 1997</i> requires that no vehicle shall have continuous smoky emissions for more than 10 seconds. 	Contractor	Construction

6.2. Soils and Water Quality

6.2.1. Approach

Soil profiles and associated mapping were accessed on 4 November 2021 to identify the existing soil environment in the vicinity of the proposal area.

Records of contaminated land in the vicinity of the proposal area were accessed on 4 November 2021 from the following databases:

- NSW EPA Contaminated Land: Record of Notices
- List of NSW contaminated sites notified to EPA.

Refer to Appendix B for database search results.

6.2.2. Existing Environment

Soils

The Penrith 1:100,000 Geological Map indicates that the proposal area is underlain by clayey quartzose sand of the Tertiary Cainozoic epoch which generally comprises of claystone, siltstone and has been identified as a weakly cemented sedimentary unit. The local topography comprises of the Blacktown soil landscape (bt) and is undulating with deep high clay soils of the Triassic period. The average elevation of the proposal site is approximately 30 metres ASL.

The nearest Soil Profile Report “Swamp near cnr National St & Shore St” (OEH, 1995), approximately 200 metres southeast of the proposal site, characterises the local physiography as swamp complex that is very poorly drained, with slight erosion hazard, and evident salting.

ASS mapping of the locality indicates that the proposal site is wholly within Class 5 ASS save for the Hume Highway portion (refer to Figure 6-4). The nearest Class 1-4 ASS to the proposal site is Class 3 ASS approximately 200 metres southeast.

Liverpool LEP describes Class 5 ASS as land within 500 metres of adjacent Class 1-4 ASS, and stipulates that development consent is required for works that:

- Occur below 5 metres AHD
- Is likely to lower the water table on adjacent Class 1-4 ASS.



Figure 6-4 Mapped ASS in relation to the proposal site

Contamination

The proposal is within a highly modified and urbanised landscape as a result of the Liverpool LGA region's development and expansion. A review of the EPA Contaminated Land: Record of Notices and the list of NSW contaminated sites indicated the nearest relevant site (Warwick Farm Public School) is approximately 800 metres west of the proposal.

Water Quality

The nearest waterway to the proposal site is Horseshoe Pond approximately 230 metres southeast (refer to Figure 6-4) and is a free-standing waterbody that acts as a basin for Georges River and surrounding stormwater runoff. Horseshoe Pond is also mapped as a Coastal Wetland under the CMSEPP (refer to Chapter 6.3 for details).

The water quality of waterways is highly influenced by the surrounding land use. Run-off from surrounding roads and properties that drain into the waterway is likely to include sediment, hydrocarbons, heavy metals, and high levels of nutrients, such as nitrogen and phosphorus from fertilisers associated with adjacent industrial and agribusiness activities (horse stables).

Liverpool Wastewater Treatment Plant infrastructure is immediately south of Horseshoe Pond and operates under EPA licence 372.

6.2.3. Potential Impacts

Construction

Construction would involve excavation activities to facilitate the new road formation. Potential impact on soil from construction activities would be primarily associated with soil loss from erosion of exposed soils and stockpiles at work areas and site compounds.

Construction activities with the potential to expose soils and lead to erosion, include:

- Vehicle movements
- Excavation
- Importation of fill material
- Stockpiling
- Vegetation removal.

ASS exposure is considered to be of low potential due to the works not expecting to occur below 5 metres AHD. Safeguards would be in place to manage any unexpected

Construction works may potentially increase the risk of contamination to soil through poor site management practices and inadequate waste disposal management. Other general contamination risks are associated with the handling and processing of products where liquid waste and hazardous material can escape into the soil. These are associated with the transport, handling and storage of such materials and the potential threat of releases and spills onto the ground.

Vegetation clearing and the excavation of tree roots would expose soils and increase the risk of erosion at the site. Risks to soils are influenced by landscape position, slope, soil type, hydrogeology, and land use.

The following works are likely to impact water quality in the proposal area:

- Sediment movement from construction activities transported downstream to Horseshoe Pond and Georges River
- Chemical spills from construction work or refuelling activities and plant failure.
- Run-off from stockpile and compound sites.

Soil erosion and water pollution

The risk of soil erosion from ground disturbance is present. Run off into waterways following a storm event could lead to water pollution in downstream environments. These impacts occur when the site has inadequate or unmaintained erosion and sediment controls.

Construction activities disturb surface soils and generate excess material that has the potential to enter the stormwater system and impact water quality. Potential downstream impacts to nearby Horseshoe Pond and Georges River would be limited to construction duration.

Spills and leaks

The risk of accidental spills and leaks of hazardous products, such as oils, fuels, lubricants, and sanitary wastewater is present. The consequences of these risks are greater when these activities occur near a waterway. Chemical and fuel spills have the potential to cause serious harm to the ecology of a river system, including fish kills, harm to other fauna, and damage to vegetation.

Spills may also occur at the construction site's storage areas or during transportation of hazardous products on and off the site. Inadequate procedures for storing, transferring, and handling may also result in spills to the ground and lead to soil contamination.

Inadequate waste management

Construction activities typically generate solid and hazardous waste fractions, as well as hazardous liquid wastes. Although these types of wastes (used oil, machinery lubricants and sludge) represent a small proportion of the total amount of construction waste, the inadequate handling, storage, and disposal of these wastes increases the risk of soil contamination at the proposal site.

Cross-contamination of soil

The nearest EPA-listed site of contamination is approximately 800 metres west of the proposal. This site is of sufficient distance from the proposal and would therefore not be impacted, nor will it impact the construction.

Use and storage of fuels and other chemicals has the potential for spills during construction. This risk is considered low with the implementation of the mitigation measures and using best practice storage, use and spill response procedures.

Soil contamination risks from any existing sources and the use and storage of fuels and other chemicals during construction would be managed using best practice storage, use and spill response procedures.

Overall risks

Overall, the works would be short-term and any risks to soils would be localised and adequately addressed through the appropriate implementation of the recommended mitigation strategies outlined below. Stabilisation and revegetation would act to resist soil erosion and sedimentation to the same extent that existing vegetation now functions.

Areas disturbed by vegetation clearing and excavations have potential to continue to be susceptible to erosion until groundcover is restored. These impacts are expected to be minimal, subject to the implementation of appropriate restoration measures, outlined below.

Operation

Upon completion, impacts to soils would be low provided stabilisation and revegetation strategies are effectively implemented. Stabilisation and revegetation would act to resist soil erosion and sedimentation and would enhance natural water treatment.

6.2.4. Safeguards and Mitigation Measures

Impact	Safeguards and mitigation measures	Responsibility	Timing
General	A Construction Management Plan (CEMP) or equivalent will be prepared by a suitably qualified person.	Contractor	Preconstruction
Erosion and sedimentation	<p>The CEMP must consider the measures below, in accordance with the requirements of Landcom’s “Managing Urban Stormwater: Soils and Construction, 2004”:</p> <ul style="list-style-type: none"> • Install and maintain erosion and sediment controls on a regular basis during construction to prevent sediment moving offsite and sediment laden water entering drainage lines. • Stabilised access is to be established to prevent mud tracking prior to exiting onto public roads. • Stabilise disturbed areas progressively. • Minimise soil disturbance from vehicle use onsite. • Inspect and maintain sediment and erosion controls until the site has been stabilised post construction 	Contractor	Preconstruction Construction
Unexpected finds	An unexpected finds procedure will be prepared and implemented to manage any unexpected finds of contaminated material including asbestos.	Contractor	Pre-construction Construction
Stockpiles	<ul style="list-style-type: none"> • Spoil is to be stored in stockpiles with adequate erosion and sedimentation control measures pending classification and appropriate disposal (refer to Chapter 6.8.3 for details). • Stockpiles will be appropriately controlled by sediment fencing or other materials identified in the Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition (Landcom, 2004) -Blue 	Contractor	Construction

Impact	Safeguards and mitigation measures	Responsibility	Timing
	Book to ensure sediments do not enter a waterway.		
Acid sulfate soils	Potential or actual acid sulfate soils are to be managed in accordance with Council’s most recent acid sulfate soils management procedure.	Contractor	Construction
Hazardous chemical spills	Spill kits will be available onsite, and all staff will be aware of their location and trained in their use.	Contractor	Construction
Storage management	<ul style="list-style-type: none"> • Wherever possible, reduce the quantity of chemicals and fuel stored on site to minimum practical level. • All servicing, refuelling, stockpiles, waste disposal and storage areas will be located as far as possible from stormwater drains to reduce potential of pollution via spillage. • Clean excavated materials will be kept in the stockpile for as short a time as possible. • No hazardous material will be stockpiled. • Induction training shall be undertaken for employees to increase their awareness of chemical management protocols including proper handling and storage of chemicals, and emergency response and contingency plans. 	Contractor	Construction
Remediation	Following the construction phase, the site will be cleaned up including remediating soils if required, removing rubbish, restoring profiles and decompacting soils in the construction areas.	Contractor	Post-construction

6.3. Hydrology

6.3.1. Existing Environment

The proposal is within the Georges River catchment and is situated between major waterways Georges River and Cabramatta Creek; respectively 900 metres east and 800 metres north. The proposal area is wholly within land mapped as flood-prone land under the Liverpool LEP and is wholly within a flood planning area (refer to Figure 6-5).



**Liverpool Local
Environmental
Plan 2008**

Flood planning
area map - sheet FLD-014

-  Flood planning area
-  Flood prone land

Cadastre

-  Cadastre 28/2/2013 © Land and Property Information

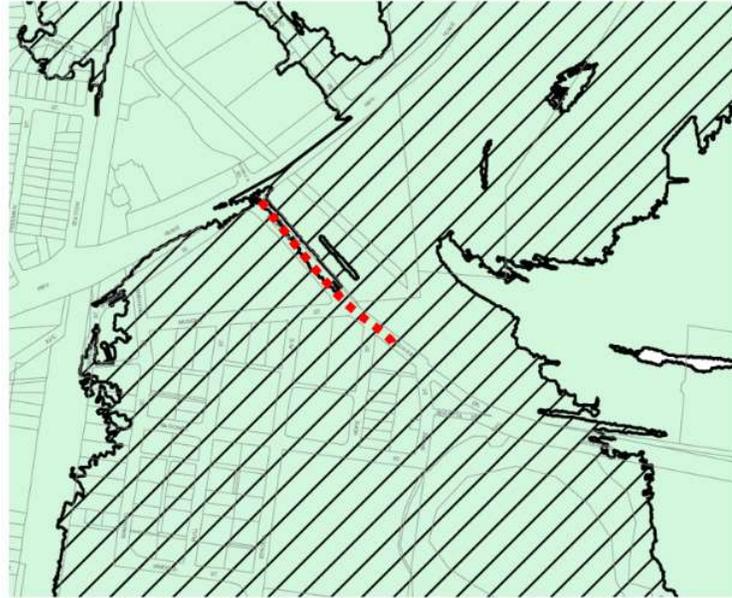


Figure 6-5 Relevant Liverpool LEP flood mapping (proposal site in red)

A Flood Impact Study for the proposal was undertaken by HydroStorm Consulting (2021) which describes the existing flood characteristics of the locality using TUFLOW hydraulic modelling parameters set by Council. Refer to Appendix J of Appendix A for details.

Hydraulic modelling results indicate that a 5% annual exceedance probability (AEP; 1 in 20-year) flood event would not affect the proposal site. However, a 1% AEP (1 in 100-year) event would inundate the road with the range of 0.3 metres to over 1 metre (refer to Figure 6-6).

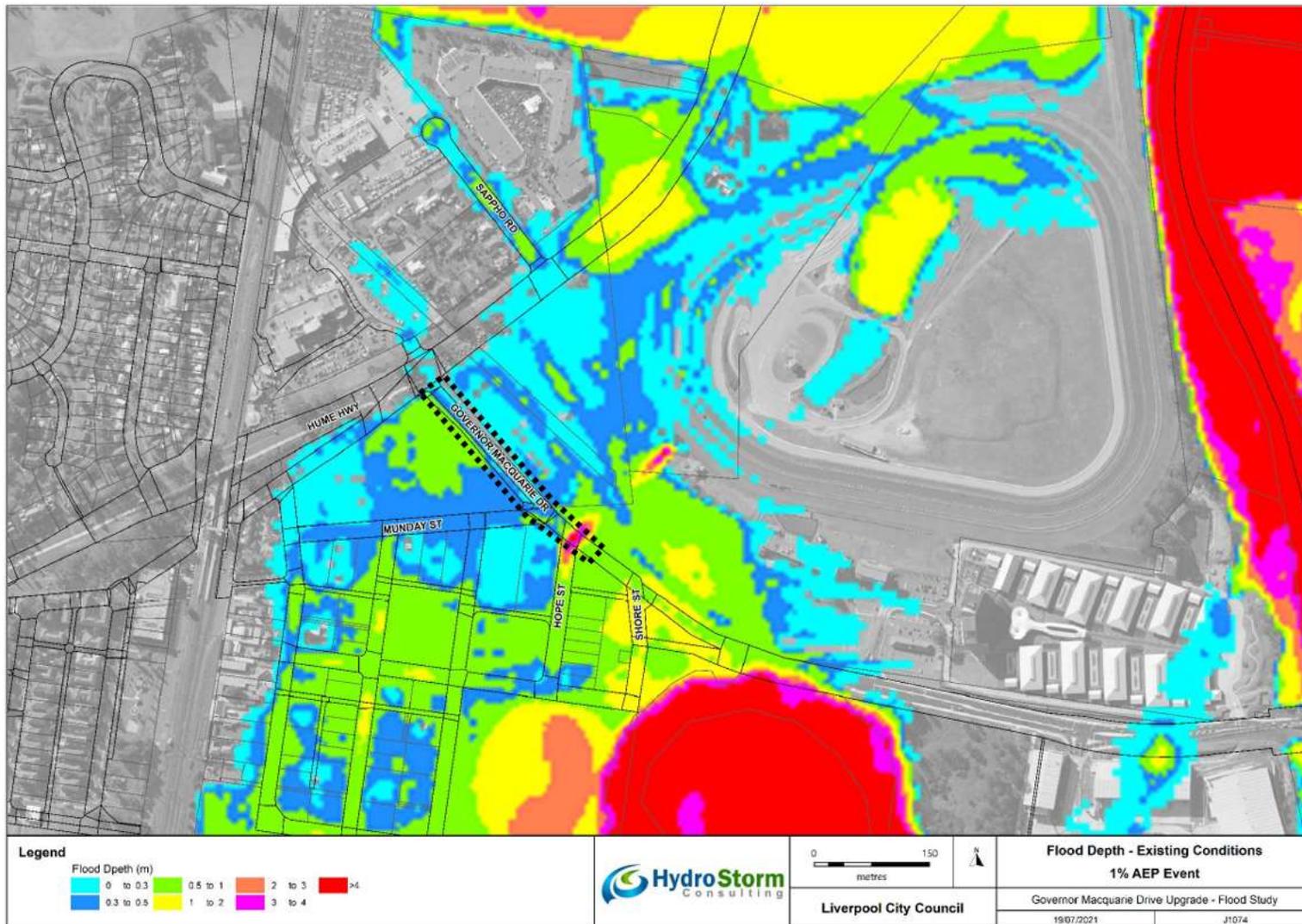


Figure 6-6 Flood depths of the proposal site (indicatively black) during a 1% AEP event

6.3.2. Potential Impacts

Flooding

The risk of flooding of the site is present due to its location within the Georges River catchment and is mapped within flood-prone land and flood planning area as per the Liverpool LEP and site-specific flood study (refer to Figure 6-5 and Figure 6-6). As a requirement of the ISEPP, SES have been informed of the proposals proximity within flood liable land so that appropriate emergency response planning can be considered.

The Flood Study Report (HydroStorm, 2021) concluded that the proposal would not change the existing flood behaviour at 1% AEP other than a 0.01-0.02-metre increase near the Munday Street intersection with GMD with an associated increase in velocity up to 0.05 metre per second. This increase is deemed insignificant. The proposal’s drainage design therefore aligns with agreed parameters set by Council.

In the event of a high rainfall occurrence, potential stormwater inundation of the proposal area may occur. Flooding would impact on any infrastructure and properties located within the flood zone. Although storm events would be temporary and short term, flood waters would recede at a slower rate and would depend on the capacity of downstream stormwater systems. The impact would be moderate to major if appropriate measures are not considered in the final design and pre-construction stage.

6.3.3. Safeguards and Mitigation Measures

Impact	Safeguards and mitigation measures	Responsibility	Timing
Flooding	Climate characteristics for the locality indicate that rainfall would be most prevalent during summer and least prevalent during winter. Therefore, it is recommended that the bulk earthworks be undertaken during winter to minimise sediment movement from potential events.	Contractor	Pre-construction

6.4. Flora and Fauna

6.4.1. Approach

A Biodiversity Assessment (BA) for the proposal was completed by NGH and is summarised below. The BA is included as Appendix C.

Background searches undertaken for the purposes of this assessment included Commonwealth and State databases to determine whether potential threatened flora and fauna species, populations, threatened ecological communities (TECs), migratory species and Areas of Outstanding Biodiversity Value (AOBV) as detailed in State and Commonwealth legislation, occur or are likely to occur within the proposal site. In addition to this, searches of the Groundwater Dependent Ecosystems Database and Priority Weeds Database were also undertaken. Note, date

depicts the most recent search date, and the resource may have been used prior to the listed date. Refer to Table 6-2 for details.

Table 6-2 Summary of database search methods

Resource	Target	Search Area	Search Date
BioNet Atlas (DPIE, 2020)	Threatened flora and fauna species, populations and TECs listed under the BC Act	Study locality	04/11/2021
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and TECs and migratory species	Study locality	04/11/2021
DPI WeedWise	Priority weeds declared for the Greater Sydney	Greater Sydney	04/11/2021
BOM's Atlas of Groundwater Dependent Ecosystems	Groundwater Dependent Ecosystems	Proposal site	04/11/2021

The species identified by database searches (Appendix A of the BA) were evaluated for their potential to occur in the proposal site based on habitat assessments undertaken in the field.

Threatened species have been considered likely to occur where:

- The geographic distribution of the species is known or predicted to include the IBRA subregion in which the proposal site is located; and
- The proposal site contains habitat features or components associated with the species; or;
- Past surveys undertaken within the proposal site indicate that the species is present.

Refer to Appendix B within the BA for the habitat assessment table which assesses the likelihood of each threatened species, population or community identified with the potential to occur in the proposal site. The likely occurrence of threatened biodiversity is based on the presence, condition and type of habitat and previous records.

Floristic surveys, including a Random Meander Search, rapid data point (RDP) plots and targeted surveys were undertaken on 26 April 2021 across the proposal site by suitably qualified ecologists. The main aims of the field surveys were to gather enough floristic data to verify existing vegetation mapping and determine with confidence the Plant Community Types (PCTs) occurring within the proposal site, and to assess the condition and habitat quality of the native vegetation.

Incidental fauna sightings were recorded on 26 April 2021 by suitably qualified ecologists for a total of 14 person hours. Opportunistic surveys were undertaken throughout the site visit on foot. Opportunistic sightings of birds were recorded as well as presence of any large stick nests. For

mobile, diurnal threatened fauna species that would occur in the study locality such as many woodland birds, the time spent within the proposal site is considered to contribute to survey for these species. Targeted fauna species surveyed are listed in Table 6-3.

Table 6-3 Targeted threatened fauna species surveyed

Scientific Name	Common Name	BC Act	EPBC Act
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	V	-
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-
<i>Micronomus norfolkensis</i>	(previously Mormopterus norfolkensis) Eastern Freetailed-bat	V	-
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-
<i>Myotis macropus</i>	Southern Myotis	V	-
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-Bat	V	-
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-

*V=Vulnerable

Refer to the BA methodology for details.

6.4.2. Existing Environment

The proposal site falls within the Sydney Basin IBRA Region and Cumberland IBRA Subregion.

The proposal is heavily cleared landscape due to the proposal site being located within a densely populated residential zone. Remnant vegetation present in this locality is generally associated with roadside vegetation.

The proposal site does not contain any AOBV listed under the BC Act.

Flora

Vegetation in the proposal area

Vegetation mapping of the Sydney Metro Area (VIS 4489) indicates that within the proposal area, the dominant vegetation communities are urban exotic/native vegetation.

Vegetation was ground-truthed during site surveys conducted on 26 April 2021. Three (3) RDP plots were conducted to determine whether any PCTs were present. These confirmed that the existing vegetation is classified as urban exotic/native which does not constitute a PCT. Consequently, no TECs were identified to be within the study area.

Priority weeds

No priority weed species for the Greater Sydney Region were recorded within the proposal site. Two (2) High Threat Exotic (HTE) species were found within the proposal site, they are described in Table 6-4 below.

Table 6-4 HTE within the proposal site

Species	HTW (BAM)	Distribution
Panic Veldtgrass (<i>Ehrharta erecta</i>)	Yes	Recorded at RDP within the northeast of the proposal site.
Cobbler’s Pegs (<i>Bidens pilosa</i>)	Yes	Recorded at RDP within the northeast of the proposal site.

Threatened Flora

No threatened flora was observed during the site visit within the proposal area.

Fauna

Terrestrial Habitat

The study area is situated along a busy road surrounded by residential land. Generally, natural habitat for native fauna within the proposal site is low in distribution and poor in quality. This is due to significant areas of potential habitat containing exotic grassland. The most significant habitat feature of the proposal area is the planted native flora within the northeast portion of the site, which includes three (3) hollow-bearing trees (HBTs) and provides potential foraging habitat for nectivorous fauna and nesting habitat for birds, see Figure 6-7 and Figure 6-8.

The Hope Street underpass presented potential microbat habitat which may use spaces between its structures for roosting. Targeted microbat surveys were undertaken via recording echolocation calls using Anabat Detector units set to remotely record overnight, for four (4) nights from 26-29 April 2021.



Figure 6-7 Large Spotted Gums (*Corymbia maculata*) observed on site, some with hollows

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

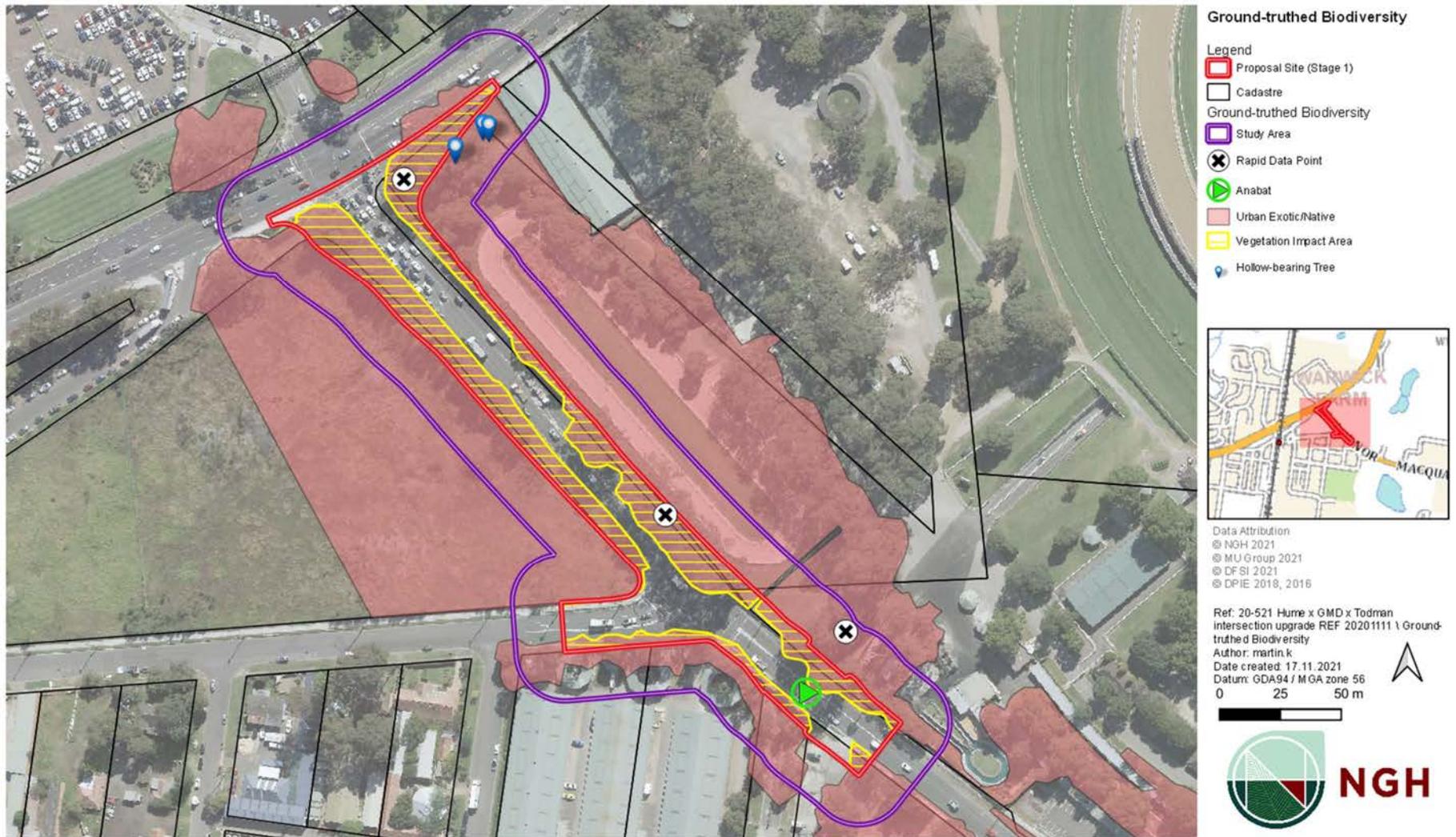


Figure 6-8 Fauna habitat within study area

Aquatic Habitat

The nearest waterbody to the proposal site is Horseshoe Pond, which occurs 350 metres southeast of the study area. Horseshoe Pond is mapped as a Coastal Wetland under the CMSEPP. However, the proposal site does not exist within the proximity area for Coastal Wetland. As such, the proposal site does not require assessment under the CMSEPP.

The nearest major waterway (Georges River) exists 900 metres to the east of the study area. No major watercourses or their tributaries are located within the proposal site.

Considering the above, the proposal site is not considered to support aquatic habitat for aquatic fauna such as fish, amphibians or crustaceans.

Threatened Fauna

99 threatened fauna species were returned from the Bionet and PMST searches as occurring, or likely to occur, within the study locality. The following species were considered to have a moderate likelihood of occurrence as a result of the Habitat Assessment due to their habitat requirements, distribution and previous records:

- Dusky Woodswallow
- Varied Sittella
- Little Lorikeet
- White-bellied Sea Eagle
- Eastern False Pipistrelle
- Eastern Freetailed-Bat
- Little Bent-winged Bat
- Southern Myotis
- Yellow-bellied Sheath-tail-Bat
- Greater Broad-nosed Bat
- Grey-headed Flying Fox.

Aside from the above, no other threatened fauna is considered likely to occur within the proposal site due to the small size of the proposal site and the lack of habitat available.

For species either recorded or considered to have a moderate or higher likelihood of occurring, the relevant significant impact assessments have been completed (refer to Appendix D of the BA).

6.4.3. Potential Impacts

Construction

Native Vegetation Clearing

The clearing of disturbed vegetation required for the proposal has been calculated using a GIS shapefile provided by MU Group. Clearing of vegetation and low-quality habitat would be up to 0.6 ha as detailed in Table 6-5 below.

Table 6-5 Summary of native vegetation removal

PCT	BC Act	EPBC Act	Clearing Area (ha)
Urban/Exotic Vegetation	No	No	0.6

The portion of native vegetation to be removed consists of planted natives and does not represent a TEC under the BC Act nor EPBC Act. As such, the area to be cleared is not considered to cause a significant impact.

The three (3) HBTs present within the proposal area may be removed due to close proximity of the development (refer to Figure 6-8); therefore impacts have been considered for the removal of all HBTs. Refer to Chapter 6.4.4 for details.

A search of the BOM’s National Atlas of Groundwater Dependent Ecosystems (GDEs) found that the vegetation within the proposal site has not been mapped (refer to Appendix B). Areas to the south-east are mapped as High Potential GDE under national assessment, however, would not be impacted by the proposal. As such, and the fact that the proposal is unlikely to decrease the availability of groundwater, the impact of the proposal on GDEs is considered negligible.

It is noted that site compounds for the proposal have not yet been determined. Further assessment of vegetation clearing may be required upon confirmation.

Fauna

The proposal may contribute to the following Key Threatening Processes (KTPs) listed in Table 6-6.

Table 6-6 KTPs relevant to the proposal

KTP BC Act	KTP EPBC Act	Relevance
Clearing of native vegetation	Land clearance	The proposal would contribute to the unavoidable net loss of 0.6 ha of Urban/Exotic vegetation.
Removal of dead wood and dead trees	-	Dead wood is present in small amounts throughout the proposal site. One stag is present that would be removed.

KTP BC Act	KTP EPBC Act	Relevance
Invasion and establishment of exotic vines and scramblers	-	The proposal may contribute to the invasion of native plant communities by vines and scramblers
Invasion of native plant communities by exotic perennial grasses	-	The proposal may contribute to the invasion of native plant communities by exotic grasses which are prevalent throughout the study area.
Invasion, establishment and spread of <i>Lantana camara</i>	-	The proposal may contribute to the invasion of native plant communities by <i>Lantana camara</i> .

6.4.4. Impacts to Threatened Species, Populations and their Habitat

The removal of 0.6 ha of urban exotic/native vegetation would result in a negligible reduction in the local extent of foraging, sheltering, and breeding (non-hollow dependent) habitat for a range of commonly occurring native fauna, primarily birds. Less disturbed areas adjacent to the proposal site, stretching hundreds of hectares, dwarf what would be removed by the proposal. Furthermore, the quality of this adjacent habitat is likely to be of higher quality and provide greater opportunities for threatened and non-threatened species alike.

One threatened fauna species (White-bellied Sea Eagle (BC Act – Vulnerable)) was observed over the wetland during the site inspection. A Test of Significance (ToS) was undertaken for this species (Appendix D of the BA), which determined that due to the proposal site being void of suitable trees for nesting and foraging habitat, the proposed works are unlikely to have a significant impact on this species.

Targeted microbat surveys were conducted via visual inspection of the bridge and acoustic detection (Anabat swift). Whilst the acoustic survey did not detect any microbats, the visual inspection and database search identified the potential for six (6) threatened microbats to utilise the proposal site for foraging and roosting. In addition, three (3) woodland bird were considered moderately likely to utilise the HBTs and native vegetation within the proposal site. The microbat and woodland bird species assessed are as follows:

- Eastern False Pipistrelle (BC Act – Vulnerable)
- Eastern Freetailed-bat (BC Act – Vulnerable)
- Little Bent-winged Bat (BC Act – Vulnerable)
- Southern Myotis (BC Act – Vulnerable)
- Yellow-bellied Sheath-tail-Bat (BC Act – Vulnerable)
- Greater Broad-nosed Bat (BC Act – Vulnerable)

- Dusky Woodswallow (BC Act – Vulnerable)
- Varied Sittella (BC Act – Vulnerable)
- Little Lorikeet (BC Act – Vulnerable).

Two (2) ToS' have been undertaken for the above species, grouped for hollow-dependent microbats, and woodland birds. Refer to **Error! Reference source not found.** of the BA for details.

The Grey-headed Flying-fox (BC Act – Vulnerable, EPBC Act – Vulnerable) was also considered moderately likely to utilise native vegetation within the proposal site for foraging. A separate ToS for the Grey-headed Flying-fox as well as an Assessment of Significance (AoS) were undertaken. The ToS/AoS concluded that the proposed works are unlikely to have a significant impact on this species.

The hollow-dependent microbat ToS concluded that whilst potential impacts to existing habitat for these species is unavoidable, if the recommended mitigation measures are implemented, the proposal is not considered likely to cause a significant impact to these species.

The woodland birds ToS concluded that due to the relatively small extent of the works and the expansive habitat nearby the proposal site, in addition to recommended mitigation measures being implemented, the proposed works are unlikely to have a significant impact on these species.

Operation

No biodiversity impacts are expected to be generated during the operation phase as a result of the proposal.

6.4.5. Safeguards and Mitigation Measures

Impact	Environmental safeguards	Responsibility	Timing
Clearing and prevention of over-clearing	<ul style="list-style-type: none"> • Prior to the commencement of any works, a physical clearing boundary is to be clearly marked and maintained. • Utilise areas already impacted by previous clearing or disturbance for access purposes, stockpiles or the establishment of compound sites. • Trees removal will be in accordance with Liverpool City Council's Tree Management Policy (2016). An authorised Council officer or independent consulting arborist with minimum AQF level 5 in Arboriculture is to assess trees prior to removal. • An ecologist is to be present on site during removal of hollow-bearing trees to minimise harm to potential fauna within. 	Contractor	Pre-construction Construction

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> If clearing of vegetation is required outside the proposal site these areas will need to be assessed by an ecologist for potential impacts to TECs, threatened species and their habitats. Trees to be retained, including trees adjacent but outside of the proposal site, require an adequate tree protection zone (TPZ) for the duration of works. Details for calculating TPZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>. If the TPZ cannot be avoided during works, the Structural Root Zones (SRZ) of trees will be retained. Details for calculating the SRZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>. 		
<p>Direct impact to TEC and to threatened flora</p>	<ul style="list-style-type: none"> Vegetation removal will be restricted to the minimum extent necessary. Where unexpected, threatened flora species are found within the worksite, all work within the vicinity would stop and Liverpool City Council would be notified immediately. 	<p>Contractor</p>	<p>Construction</p>
<p>Direct impact to threatened fauna</p>	<ul style="list-style-type: none"> Information on the threatened species within the locality are to be included in the induction process for applicable personnel. If unexpected, threatened fauna species are discovered, works will stop immediately, and the environment manager notified. An ecologist would then be engaged to determine management actions to avoid or mitigate any potential impact. 	<p>Contractor</p>	<p>Pre-construction Construction</p>
<p>Introduction and spread of priority weeds and pathogens</p>	<ul style="list-style-type: none"> A Weed Management Plan will be developed for the site to minimise risk of spread of weeds. Council will notify the Contractor of all declared Priority Weeds identified on site. 	<p>Contractor</p>	<p>Pre-construction Construction</p>

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> All declared Priority Weeds within the work area are to be cleared and managed according to the Weed Management Plan and the requirements stipulated by the <i>Biosecurity Act 2015</i>. To fulfil this requirement, all priority weeds requiring removal will need to be disposed of at a registered waste management facility. All machinery (e.g. bulldozers, excavators, trucks, loaders etc.) will be cleaned using a high-pressure washer (or other suitable device) prior to entering and exiting work sites. 		

6.5. Aboriginal Heritage

6.5.1. Approach

A search of Aboriginal heritage databases relevant to the proposal site was undertaken on 4 November 2021 to assess the proximity of any known sites and the possibility of the proposal impacting any sites of importance. The search included:

- Heritage NSW State Heritage Inventory, a state-wide database of heritage items including declared Aboriginal Places listed under the NPW Act. Records within the Liverpool LGA have been examined to determine proximity of sites to the proposal.
- The NSW Aboriginal Heritage Information Management System (AHIMS), which provides detailed information for recorded sites and archaeological and cultural heritage assessment reports. An examination of the recorded Aboriginal objects and places in proximity of the proposal site was undertaken.

Refer to Appendix B for database search results.

The site was also assessed against the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010) for the presence of any sensitive landforms within the proposal area that may indicate potential items and places, these landforms being:

- Within 200 metres of waters, or
- Located within a sand dune system, or
- Located on a ridge top, ridge line or headland, or
- Located within 200 metres below or above a cliff face, or
- Within 20 metres of or in a cave, rock shelter, or a cave mouth.

6.5.2. Existing Environment

The Liverpool LGA region was traditionally inhabited by the Darug and Tharawal people. The region has been highly disturbed since European settlement and development of the Sydney metropolitan area.

AHIMS searches showed no registered places of Aboriginal heritage within 200 metres of the proposal site.

The proposal site is not within any sensitive landform buffers as described above.

6.5.3. Potential Impacts

Construction

As no Aboriginal sites nor sensitive landforms were identified within the proposal area, which was deemed to be highly disturbed, it is concluded that the proposed works would not require any further heritage investigation and works can proceed with caution.

Consultation with the Aboriginal community is not required. No further assessment is required. Safeguards would be in place for any unexpected finds during construction.

Operation

The operation of the proposal is unlikely to impact on Aboriginal heritage.

6.5.4. Safeguards and Mitigation Measures

Impact	Environmental safeguard	Responsibility	Timing
<p>Unexpected finds</p>	<p>In the event that any unexpected Aboriginal heritage places or objects are unexpectedly discovered during the proposal, the following management protocols will be implemented:</p> <ol style="list-style-type: none"> 1. Works at that identified heritage location will cease with an appropriate buffer zone of at least 20 metres to allow for the assessment and management of the find. All site personal will be informed about the buffer zone with no further works to occur within the buffer zone. 2. A heritage specialist will be engaged to assess the Aboriginal place or object encountered, Representatives from the Metropolitan Local Aboriginal Land Council may also be engaged to assess the cultural significance of the place or object; 3. The discovery of an Aboriginal place or object will be reported to the local office of the Biodiversity and Conservation Division (BCD) and Enviroline on 131 555. 	<p>Contractor</p>	<p>Construction</p>

Impact	Environmental safeguard	Responsibility	Timing
	<p>4. If the heritage place or object can be managed <i>in situ</i>, works at the heritage location will not recommence until appropriate heritage management controls have been implemented, such as protective fencing, and until advice has been received from the BCD</p> <p>5. If the project cannot avoid impacting upon the object, further assessment of the object will be required in the form of an Aboriginal Cultural Heritage Assessment (ACHA), which would include consultation with the Aboriginal community. An ACHA is a requirement for an Aboriginal Heritage Impact Permit application.</p>		
	<p>Where human skeletal remains are unexpectedly found during works for the Project the following protocol would be adopted:</p> <ul style="list-style-type: none"> • Works at that location will cease, and an appropriate buffer zone of at least 50 metres will be established; • The human remains will not be moved; • The NSW police will be notified, and if the human remains are deemed a crime scene, the place will be managed by the police; • Should the human remains be deemed Aboriginal or historical by the police, BCD must be notified immediately to assess the remains; and • Should the human remains be deemed Aboriginal in origin all relevant Aboriginal stakeholders are to be notified in writing. 	Contractor	Construction

6.6. Non-Aboriginal Heritage

6.6.1. Approach

NGH completed the following database and documentation searches in November 2020 (refer to Appendix D):

- The Australian Government Department of Agriculture, Water and the Environment (DAWE) National Heritage List was utilised to determine if any sites of natural or historic significance were near the proposal
- Commonwealth Heritage List, an inventory developed by DAWE
- Heritage NSW State Heritage Inventory is a state-wide database of heritage items including items listed on the State Heritage Register, Interim Heritage Orders and State Agency s.170 heritage registers. These were examined to determine proximity of sites to the proposal.

- Liverpool LEP.

Searches revealed the following relevant results:

- No items of World Heritage nor National Heritage were found in the vicinity of the proposal
- No items listed under the NSW Heritage Act were found in the vicinity of the proposal
- No items are listed on any agency s.170 heritage registers that would be impacted by the proposal
- Liverpool LEP local heritage item adjacent to the proposal site “Warwick Farm Racecourse Group, including grandstand, race track, stables, interiors and landscape” (item no. 66) – refer to Figure 6-9.

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Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

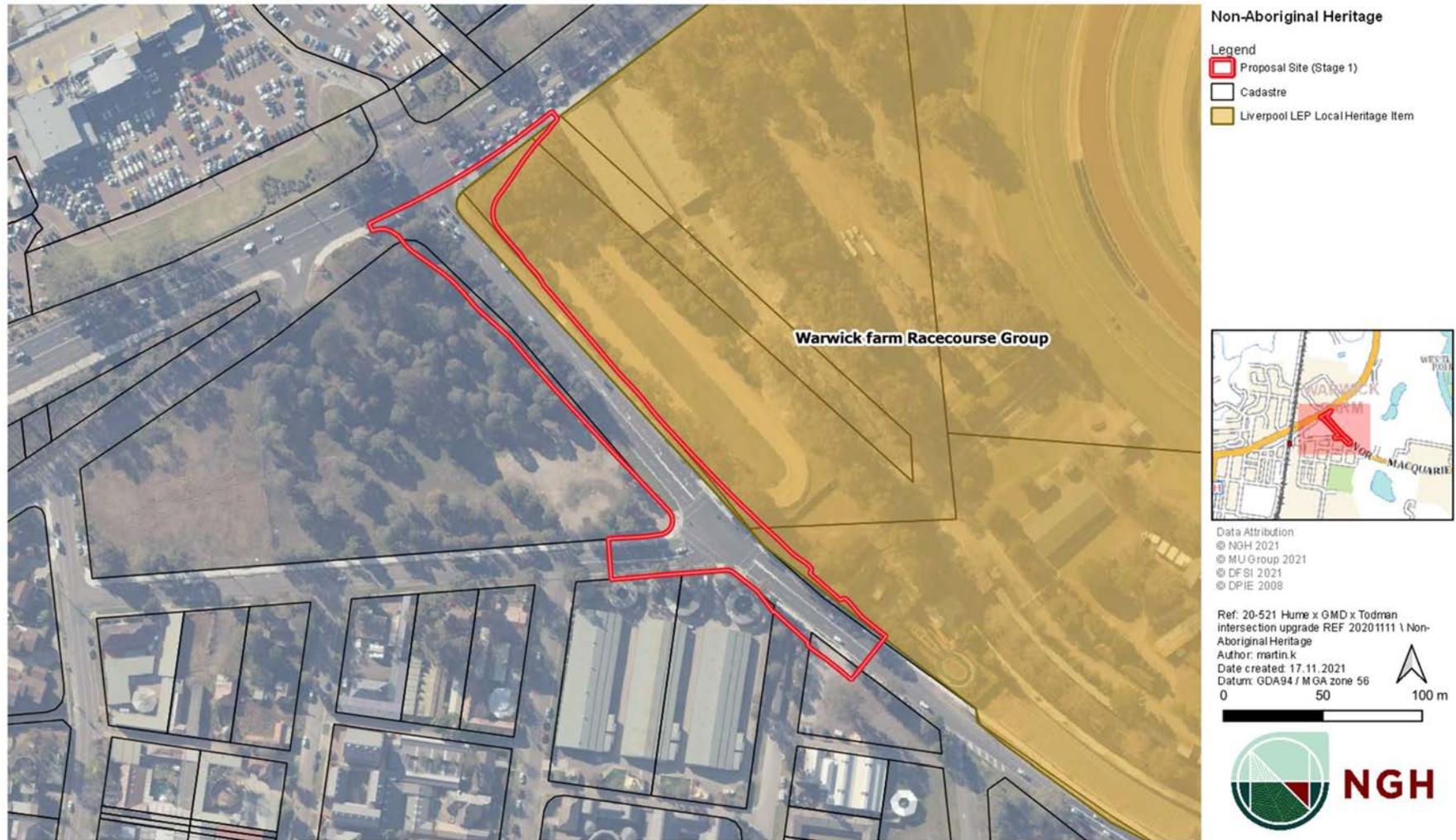


Figure 6-9 Liverpool LEP local heritage item curtilage within the proposal site

A Statement of Heritage Impact (SOHI) is being undertaken to assess the proposal's potential impact on "Warwick Farm Racecourse Group, including grandstand, race track, stables, interiors and landscape" (the Racecourse) in which this item would undergo land acquisition by Council. The SOHI would assess this physical impact on its item curtilage as well as more subjective impacts including aesthetics and visual amenity.

6.6.2. Existing Environment

Warwick Farm Racecourse is the focal point of a distinctive precinct bounded by the Hume Highway to the west and the Georges River to the east. It extends south of GMD to include the small residential area north of the industrial estate and sewage treatment works, bounded by Church Street (now Munday Street) to the north, Priddle Street to the south and Shore Street to the east.

The Racecourse was originally established on land that was owned by John Hawley Stroud, who named it Warwick Park. The area was developed by thoroughbred breeder William Long (M.P. and colonial Treasurer) in c.1880 as a private training course. Ownership transferred to well-known horse breeder William Forrester, before eventually being acquired by the Australian Jockey Club in 1925.

During World War II the Racecourse was utilised as a camp by Australian, American and British armed forces and was known as Camp Warwick and also HMS Golden Hind (Racing and Sports 2021).

In 1950, the use of the Racecourse expanded, and Warwick Farm also began to be used as a motor racing circuit. The site became a major track and hosted the Australian Grand Prix, Australian Touring Car Championship and Tasman Series until it was eventually closed in 1973.

During the 1980s, the Racecourse underwent significant design changes with the extension of a chute along the river side of the course. Further upgrades at the site have occurred over the last 20 years to improve racecourse facilities. However, the 2011 merger of the Australian Jockey Club and Sydney Turf Club has resulted in the Racecourse being downgraded to a midweek venue (Racing and Sports 2021). The Racecourse is currently owned and operated by ATC.

The following statement of significance for the Racecourse is described by NSW Heritage (2016):

Warwick Farm Racecourse demonstrates the development of a leisure/recreational activity and facility for over a 100 year period in the Liverpool area. The Racecourse specifically demonstrates the history of the horse racing industry and is associated with various famous owners and horse breeders. The Racecourse contains some fine buildings of various architectural design and style dating from a range of time periods, it reflects a level of technical achievement and creativity. Set within well-maintained landscaped grounds creating an almost semi-rural setting close to the urban centre of Liverpool, the complex is aesthetically pleasing and is a rare within the wider Liverpool area. The precinct represents the grand nature of the sporting facilities and social venues associated with the horse racing industry. The core 1920's racecourse buildings are representative of the architectural style of that era. There is the potential to gain more information on the site from further architectural, archaeological and documentary research.

6.6.3. Potential Impacts

The proposal would involve physical impacts to the curtilage of the Racecourse where land acquisition by Council would be required to facilitate the widening of GMD. Approximately 0.15 ha of land owned by ATC would be acquired which comprises about 0.17% of the approximate 90.56 ha area of the Racecourse curtilage. This would involve tree removal, noise wall adjustments and the extension of shared paths over the Hope Street underpass. No existing structures directly related to the heritage significance of the Racecourse are expected to be impacted by the proposal.

The overall impact to the Racecourse would be discussed further within the SOHI, wherein detailed recommendations would be implemented to minimise potential impacts to local heritage.

6.6.4. Safeguards and Mitigation Measures

Impact	Safeguard and mitigation measures	Responsibility	Timing
Physical and visual impacts	<ul style="list-style-type: none"> The Statement of Heritage (SOHI) is to act as a standalone safeguard for the purpose of this REF upon completion. All recommendations within the SOHI must be adhered to minimise potential impacts to the locally significant item “Warwick Farm Racecourse Group, including grandstand, race track, stables, interiors and landscape” Works must not commence until the SOHI has been reviewed and approved by Council. 	NGH / Council	Pre-construction

6.7. Noise and Vibration

6.7.1. Approach

The proposal has the potential to affect the community due to noise and vibration during construction. The Interim Construction Noise Guideline (ICNG; DECC, 2009) was applied to set qualitative parameters for a quantitative application of the TfNSW Construction Noise Estimator Tool (CNET) to assess the worst-case noise impact scenario during construction. The following key factors were identified during assessment:

- Appropriate background noise levels
- Noise management levels (NMLs)
- Noise catchment areas (NCAs)
- Potential noise and vibration impacts
- Reasonable safeguards and mitigation measures.

The CNET was used to identify these factors for the proposal’s worst-case construction duration. Noise area category “R3” was chosen as the representative noise area for the proposal due to the following factors to determine background noise levels:

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

- Low-density residential and private recreational adjacent to the proposal site
- Vehicle movements along Hume Highway and GMD with posted speed limits of 70 km/hr and 60 km/hr respectively
- Generally flat topography and direct line of sight to the proposal site from sensitive receivers.

As per the ICNG, NMLs are set to be 10 dB(A) above the background noise level during standard hours:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm (due to proximity to residential premises)
- No work on Sundays and Public Holidays.

The proposal would involve some works outside standard hours to avoid traffic impacts during peak hours. Outside standard hours, NMLs are set to be 5 dB(A) above the background noise level (DECC, 2009).

The CNET was applied to assess potential worst-case noise impacts during construction. The selected distance-based noise impact scenario as modelled by the CNET was 'local road works' due to the closest fit of potential construction plant and equipment (refer to Chapter 3.1.3). Outside standard hours, the worst-case potential noise impact was assessed for night works with the lowest predicted NML.

Based on the variables above, the following conditions would apply to the proposal:

- Background noise level (rating background level (RBL)):
 - 50 dB(A) during standard hours
 - 40 dB(A) outside standard hours
- Noise management level (NML):
 - 60 dB(A) during standard hours
 - 45 dB(A) outside standard hours
- Noise environment: 'Developed settlements (urban and suburban)'
- Noisiest scenario: 'Local road works' (L_{Aeq} 120 dB(A)).

Refer to Appendix F for the CNET outputs.

Sensitive receivers were grouped into NCAs to assist with assessment based on their distance range and line of sight from the proposal site.

Refer to Figure 6-10 and Figure 6-11 for maps of NCAs relative to the proposal site during and outside standard hours.

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

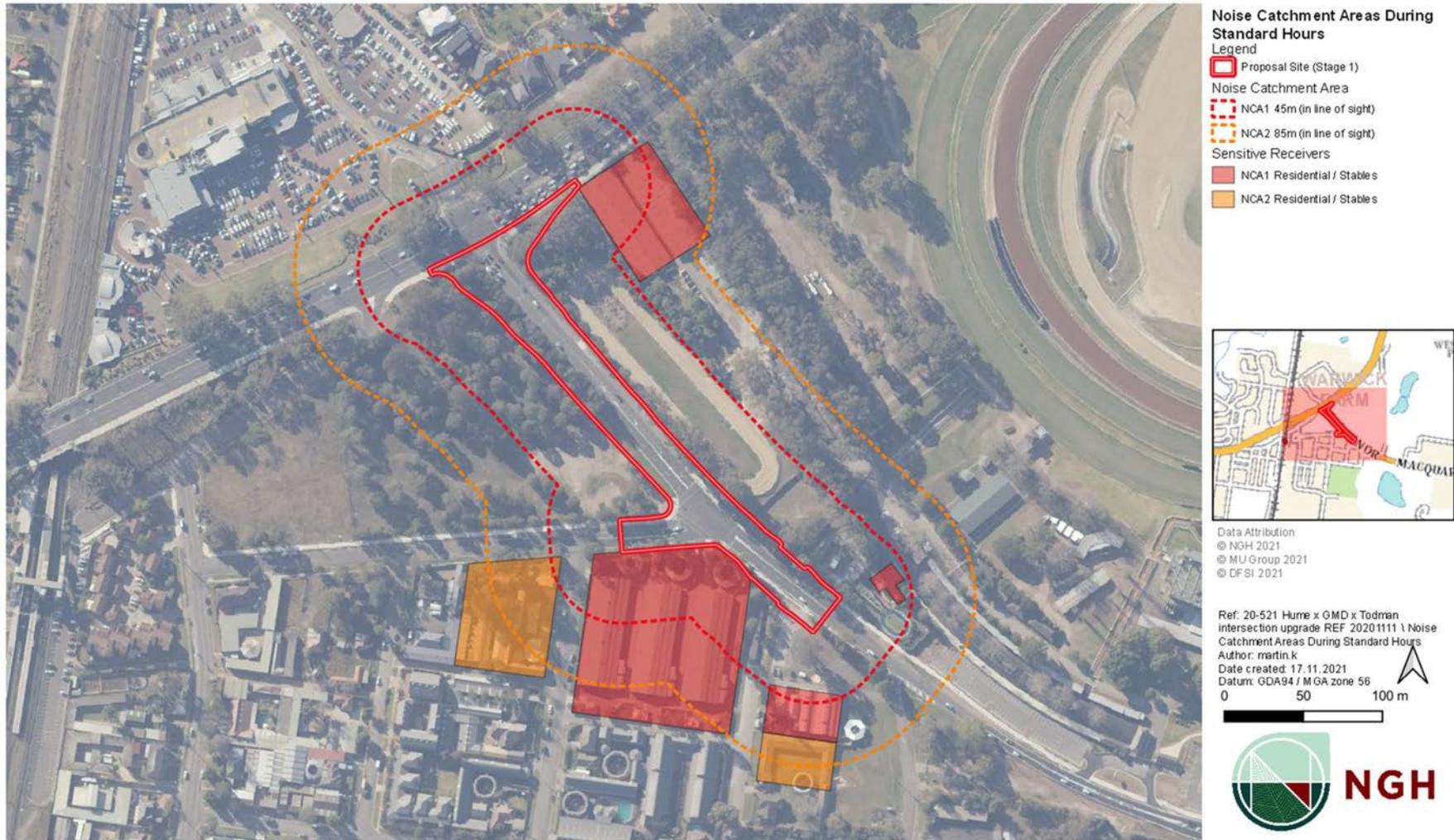


Figure 6-10 Sensitive receivers within NCAs during standard hours

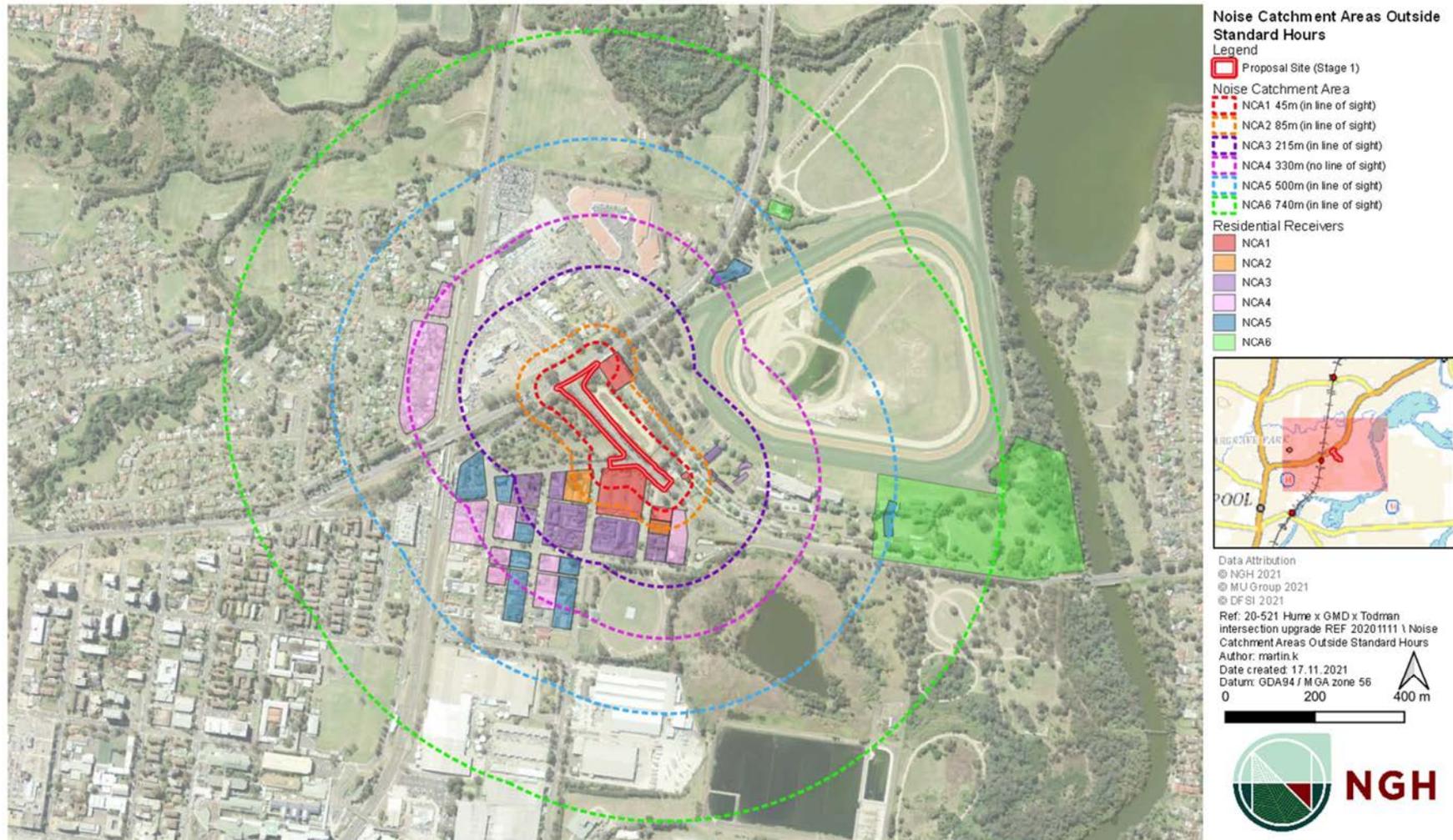


Figure 6-11 Sensitive receivers within NCAs outside standard hours

6.7.2. Existing Environment

The nearest noise-sensitive receivers are adjacent to the proposal site along GMD, Hume Highway and Munday Street and include Warwick Farm Racecourse and associated stables, commercial premises and low-density residential properties.

Other potential noise-sensitive receivers relative approximately to the proposal include:

- Rosedale Oval 250 metres south
- Warwick Farm Railway Station 300 metres west
- Lawrence Hargrave School 350 metres northwest
- Jacquie Osmond Reserve 500 metres north
- Hart Park 500 metres southwest
- Liverpool Boys High School 700 metres southwest
- Liverpool General Hospital 1 km south.

6.7.3. Potential Impacts

Construction

A summary of potential noise-affected sensitive receivers to the proposal site were found to be the following:

- Residents / horse stables within 85 metres during standard hours
- Residents / horse stables within 740 metres from the proposal site outside standard hours.

There are no industrial, commercial nor educational premises within the affected distances during the proposed construction periods, as well as hospitals and places of worship.

Noise would be generated by construction vehicles bringing materials to site and the operation of plant and machinery. Application of the CNET assumed the worst-case scenario of continuous construction activities with simultaneous plant/equipment usage; however, it is unlikely that this would occur for extended periods across the whole proposal site.

It is noted that site compounds for the proposal have not yet been determined (refer to Chapter 3.1.3). Further noise assessment may be required to assess potential impacts.

Table 6-7 and Table 6-8 summarise the worst-case CNET results during standard hours and outside standard hours, respectively. Residential properties and horse stables were assessed together for potential impacts outside standard hours.

Table 6-7 Summary of NCAs during ‘local road works’ during standard hours

NCA	Receivers affected	RBL, dB(A)	NML, dB(A)	Mitigation level, dB(A)	Recommended additional mitigation measures
NCA1 (45m) <i>in line of sight</i>	<ul style="list-style-type: none"> Horse stables along GMD 	50	60	75	N, PC, RO “Highly intrusive”
NCA2 (85m) <i>in line of sight</i>	<ul style="list-style-type: none"> Residents / horse stables along: <ul style="list-style-type: none"> Munday Street Stroud Street Hope Street 	50	60	70	N “Moderately intrusive”

* N=notification; PC=phone call; RO=respite offer

Table 6-8 Summary of NCAs during ‘local road works’ outside standard hours

NCA	Receivers affected	RBL, dB(A)	NML, dB(A)	Mitigation level, dB(A)	Recommended additional mitigation measures
NCA1 (85m) <i>in line of sight</i>	<ul style="list-style-type: none"> Horse stables along GMD Residents / horse stables along: <ul style="list-style-type: none"> Munday Street Stroud Street Hope Street 	40	45	70	AA, N, PC, SN, R2, DR “Highly intrusive”
NCA2 (215m) <i>in line of sight</i>	<ul style="list-style-type: none"> Residents / horse stables along: <ul style="list-style-type: none"> Munday Street Stroud Street Hope Street Bull Street 	40	45	60	N, PC, SN, R2, DR “Moderately intrusive”

NCA	Receivers affected	RBL, dB(A)	NML, dB(A)	Mitigation level, dB(A)	Recommended additional mitigation measures
NCA4 (330m) <i>no line of sight</i>	<ul style="list-style-type: none"> • Residents / horse stables along: <ul style="list-style-type: none"> ○ Manning Street ○ Bull Street ○ Station Street ○ Freeman Street ○ Nicholls Street 	40	45	45	N "Noticeable"
NCA5 (500m) <i>in line of sight</i>	<ul style="list-style-type: none"> • Residents / horse stables along: <ul style="list-style-type: none"> ○ Munday Street ○ Manning Street ○ Bull Street ○ Stroud Street ○ Homestead within Warwick Farm Racecourse near Gate B 	40	45	50	N, R2, DR "Clearly audible"
NCA6 (740m) <i>in line of sight</i>	<ul style="list-style-type: none"> • Homestead within Warwick Farm Racecourse near Gate A • The William Inglis Hotel and adjacent stables within Warwick Farm Racecourse 	40	45	45	N "Noticeable"

* N=notification; PC=phone call; R2=respite period 2; DR=duration respite; SN=specific notification; AA=alternative accommodation

During standard hours, the CNET indicated a mitigation level of 75 dB(A) within NCA1. Within NCA2, the mitigation level of 70 dB(A) was calculated. Outside standard hours, mitigation levels ranged 70-45 dB(A) where this decreased inversely with distance from the proposal site.

Consultation has been undertaken to consider accelerating the program to reduce the overall impact on the potential sensitive receivers, and therefore adopting a duration respite approach. It is not anticipated that mitigation measures such as respite periods would be required for the works as it would only prolong the works resulting in more exposure to noise impacts. However, such measures would remain available to affected residences and stables and provided if deemed necessary throughout the duration of the proposed works, including providing alternative accommodation. These measures would be considered on an individual and 'as needs' basis if complaints are received and intrusive noise levels are verified in consultation with the affected receiver.

Plant and equipment used for construction activities such as roadside earthworks and compacting for road formation may have vibration impacts on nearby buildings. Table 6-9 details minimum working distances recommended for vibration-intensive plant that may be used for the proposal.

Table 6-9 Recommended minimum working distances for vibration-intensive plant from sensitive receiver (Roads & Maritime Services, 2016).

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

Note: More stringent conditions may apply to heritage or other sensitive structures

The nearest buildings to the proposal site range 2-10 metres from areas which may involve vibration-intensive works, particularly at the Munday Street intersection with GMD. While the final construction plant and equipment list would be determined by the successful contractor, it is recommended that appropriately sized items are selected for smaller cosmetic damage radii to minimise potential vibration impacts to buildings adjacent to the proposal.

A Noise and Vibration Management Plan (NVMP) as part of the CEMP will detail site-specific measures to minimise impacts to sensitive receivers.

Operation

With respect to the nearest residential receivers south of GMD, the proposal would result in one additional traffic lane approaching Hume Highway at the northern region of the proposal site. The design angle of this additional lane relative to the nearest receivers towards Munday Street is not expected to contribute more than 2 dB(A) above the existing noise levels ($L_{Aeq(15h)}$ and $L_{Aeq(9h)}$), as described by the Noise Criteria Guideline (NCG; Roads and Maritime, 2015) GMD already facilitates relatively high traffic volumes and are not intended to accommodate a significant traffic increase. Therefore, it is expected that operational road noise would not exceed that described by the NCG.

Reinstatement and operation of noise walls along eastbound GMD would effectively result in negligible noise impacts to the adjacent Warwick Farm Racecourse. This is due to the pavement widening of eastbound GMD being limited to an additional shared path; no additional traffic lane would be operational. Therefore, Warwick Farm Racecourse activities north of the reinstated noise walls at this location are not expected to be impacted by the proposal's operation.

6.7.4. Safeguards and Mitigation Measures

Impact	Safeguard and mitigation measures	Responsibility	Timing
<p>Construction noise and vibration</p>	<p>A Noise and Vibration Management Plan (NVMP) will be prepared, by appropriately qualified acoustic consultants, to the satisfaction of Council and be implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG)) and identify:</p> <ul style="list-style-type: none"> • All potential significant noise and vibration generating activities associated with the activity. • Feasible and reasonable mitigation measures, in accordance with Appendix A & B of Appendix B of the Transport for NSW Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016). • 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. 	<p>Contractor</p>	<p>Pre-Construction</p>
	<ul style="list-style-type: none"> • Avoid noisy works near horse stables surrounding calendar events and periods associated with ATC. • Use less noisy plant and equipment, where feasible and reasonable. • Plant and equipment will be properly maintained. • Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended. 	<p>Contractor</p>	<p>Construction</p>

Impact	Safeguard and mitigation measures	Responsibility	Timing
	<ul style="list-style-type: none"> • Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel. • Select smaller vibration-intensive plant where possible when working adjacent to buildings. • Given the proximity of works to buildings, the NVMP will include a risk assessment to determine if vibration monitoring is required. • Avoid any unnecessary noise when carrying out manual operations and when operating plant. • Any equipment not in use for extended periods during construction work will be switched off. • Affected neighbours to the construction works shall be advised in advance of the proposed construction period at least 7 days prior to the commencement of works – see below for specific measures. 		
<p>Construction Noise – receivers</p>	<p>Mitigation measures for noise catchment areas during standard hours:</p> <ul style="list-style-type: none"> • Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works – to all potential receivers within 85 metres of the proposal site • Phone calls detailing relevant information made to identified/affected stakeholders within 7 days of proposed work – to all potential receivers within 45 metres of the proposal site • Respite offer to any receivers would be provided should there be any noise complaints received – e.g. 1-hour breaks between 3-hour work periods 	<p>Contractor</p>	<p>Construction</p>
	<p>Mitigation measures for noise catchment areas outside standard hours:</p> <ul style="list-style-type: none"> • Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works – to all potential receivers within 740 metres of the proposal site • Phone calls / specific notification detailing relevant information made to identified/affected stakeholders within 7 days of proposed work – to all potential 	<p>Contractor</p>	<p>Construction</p>

Impact	Safeguard and mitigation measures	Responsibility	Timing
	<p>receivers within 215 metres of the proposal site</p> <ul style="list-style-type: none"> • Respite offer to any receivers would be provided should there be any noise complaints received – e.g. 1-hour breaks between 3-hour work periods • Alternative accommodation may be considered on an as-needs-basis. 		

6.8. Waste Management

6.8.1. Approach

Council is committed to the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2001*. These resource management hierarchy principles, in order of priority are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

By adopting the above principles, Council aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of Ecologically Sustainable Development (ESD).

6.8.2. Potential Impacts

Construction

Waste material generated as a result of the proposal would include:

- General solid waste (non-putrescible), including steel, aluminium and concrete
- General waste (putrescible), including paper waste, food waste and general rubbish generated by the construction workforce
- Liquid waste including small volumes of oils, paints, lubricants and other chemicals.

The estimated waste streams for the proposal are detailed in Chapter 3.2.2 of the REF.

Excavation of existing pavement would generate the greatest amount of waste and would largely comprise of concrete. This concrete would be reused onsite if practicable. All other wastes including excess concrete would be implemented in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2001*.

Vegetation waste would be generated by the removal of groundcover, shrubs and trees for shared path construction.

Construction of the proposal would involve activities that generate solid and hazardous waste, as well as liquid wastes. Waste generated during these activities poses a threat to soils on site and downstream waterways. Measures would be in place to minimise the impact of accidental spills, and stockpiling standards to prevent any seepage.

Operation

The proposal would not produce any waste upon operation.

6.8.3. Safeguards and Mitigation Measures

Impact	Environmental safeguard	Responsibility	Timing
Waste Management	All wastes would be managed in accordance with the <i>Protection of the Environment Operations Act 1997</i> .	Contractor	Construction
Generation of waste	The CEMP will include the following measures to handle waste but not be limited to: <ul style="list-style-type: none"> • Measures to avoid and minimise waste associated with the project • Classification of waste and management options (re-use, recycle, stockpile, disposal) • Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • Procedures for storage, transport and disposal • Monitoring, record keeping and reporting. 	Contractor	Construction
Disposal of waste	<ul style="list-style-type: none"> • All waste generated by the Proposal will be classified in accordance with the <i>NSW Waste Classification Guidelines Part 1: Classifying Wastes</i> (EPA 2014). <ul style="list-style-type: none"> ○ All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible). ○ All waste material that has been positively identified to be acid sulfate soils, asbestos or other must be managed in accordance with the Guidelines. • Waste is not to be buried on-site. • Site amenities will discharge all sewage to the sewer system, or into holding tanks which will be regularly removed by a licensed liquid waste contractor • Waste material is not to be left on site once the works have been completed. 	Contractor	Construction

Impact	Environmental safeguard	Responsibility	Timing
	<ul style="list-style-type: none"> Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day Material and waste for disposal (including recyclable waste, general waste and oil contaminated waste) must be classified and transported by appropriately licensed contractors to approved facilities. 		
Storage of waste	<ul style="list-style-type: none"> Waste shall be stored in an appropriate location. For example; spoil is to be stored in a stockpile with adequate erosion and sedimentation control measures pending classification and appropriate disposal. General litter to be stored in bins. Waste receptacles shall be available to facilitate on-site source separation of waste. 	Contractor	Construction

6.9. Transport and Access

6.9.1. Existing Environment

The proposal is located along GMD including its signalised intersections with Hume Highway and Munday Street. Traffic within the proposal area is moderate and is highly influenced by typical peak hours.

There is no street parking along the proposal site. Signalised pedestrian crossings are located the GMD’s intersections with Hume Highway and Munday Street.

Pedestrian access along GMD is currently facilitated by a concrete footpath along eastbound GMD where this terminates approximately 30 metres east of the GMD-Munday Street intersection. There are no pedestrian facilities along westbound GMD between Hume Highway and Munday Street.

Hope Street underpass is a private path for horses to directly access Warwick Farm Racecourse and stables either side of GMD. No vehicle access is permitted and is restricted by signposts on Hope Street at this location. Public access via the Hope Street underpass is not permitted.

6.9.2. Potential Impacts

Construction

Through the construction of the proposed road improvements and shared pathways, GMD is expected to become safer and more efficient for motorists, cyclists and pedestrians.

During construction, impacts on traffic would include altered speed zones, lane closures and stop-start traffic. Plant and equipment required for construction activities would require temporary lane closures at the proposal location. As Council is the owner of the roads, this would be determined

upon the finalised construction method for activities required along each applicable street during the approximate 52-week construction period.

Construction at the Hope Street underpass would involve the addition of shared path pavement along both sides of GMD. Installation of these structures would aim to be undertaken to minimise the construction period and hence access impacts at this location. Where access cannot be maintained during specific construction activities, consultation with ATC would establish agreed-upon periods of temporary closure to complete these activities.

The final location of the site compound would be determined prior to construction by Council and the successful contractor. Impacts to traffic regarding the determined site compound would be discussed upon finalisation and within the TMP.

Operation

Upon completion of the proposal, all access restrictions would be removed and would operate at their original capacity. Operation of additional shared paths along GMD would increase pedestrian access, efficiency, and safety to this area by connecting existing paths. The improved GMD is expected to increase road safety and enhance traffic thoroughfare at this location.

The proposed Stage 2 widening of GMD is expected to continue the proposed elements of Stage 1 to include additional lanes and shared paths up to the ATC access road at Warwick Farm Racecourse. This would be assessed at a future date at Council's discretion.

6.9.3. Safeguards and Mitigation Measures

Impact	Environmental safeguard	Responsibility	Timing
Traffic and access	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will include: <ul style="list-style-type: none"> • Confirmation of haulage routes • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and horse access • Requirements and methods to consult and inform the local community of impacts to the intersection • Entry and exit locations and measures to prevent construction vehicles queuing on public roads. • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic. 	Contractor	Pre-Construction

Impact	Environmental safeguard	Responsibility	Timing
Consultation	Consultation with ATC will be undertaken to establish construction periods that would minimise temporary occupation of access areas including the Hope Street underpass.	Contractor	Pre-construction
	Consultation will be undertaken with Council seeking approval regarding the proposed traffic arrangements and establishment of the compound site.	Contractor	Pre-Construction
	Surrounding local communities will be provided with timely, accurate, relevant and accessible information about changed parking arrangements, access across the intersection, and potential delays owing to construction activities.	Contractor	Pre-Construction

6.10. Visual Impacts

6.10.1. Approach

A visual impact assessment of the proposal on sensitive receivers has been undertaken with reference to the TfNSW Guideline for Landscape Character and Visual impact Assessment (TfNSW, 2020).

The potential landscape character and visual impact of the proposal has been assessed in relation to the key viewpoints. The assessment considered the magnitude of visual change and the distance from the viewer, as well as the sensitivity. The sensitivity refers to the quality of the view and how sensitive it is to the proposed change. The magnitude refers to the overall size of the proposed change and number of affected receivers. The assessment is kept objected through the use of existing landscape character assessment.

The combination of sensitivity and magnitude then provides an overall landscape character and visual impact rating based on the grading matrix shown in Table 6-10. This table has been reproduced from TfNSW (2020).

Table 6-10 Landscape character and visual impact grading matrix (TfNSW, 2020)

		Magnitude			
Sensitivity		High	Moderate	Low	Negligible
		High	High Impact	High-Moderate Impact	Moderate Impact

Magnitude					
	Moderate	High-Moderate Impact	Moderate Impact	Moderate-Low Impact	Negligible Impact
	Low	Moderate Impact	Moderate-Low Impact	Low Impact	Negligible Impact
	Negligible	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

6.10.2. Existing Environment

The visual environment in the vicinity of the proposal can be summarised as follows:

- Located within an urban landscape
- Surrounded by a mixed-use region consisting of recreational, residential and commercial
- Directly traversed by users of GMD and adjacent roads Hume Highway and Munday Street including motorists, pedestrians, and cyclists.

Site photographs are provided in Appendix G.

6.10.3. Potential Impacts

The assessment of impact is based on the identification of key viewpoint sensitive receivers, which were determined from site investigations, and are listed below:

- Horse stables along GMD, Munday Street and Hope Street associated with Warwick Farm Racecourse
- Residential premises including temporary accommodation associated with Warwick Farm Racecourse
- Warwick Farm Racecourse itself as an item of local heritage significance
- Commercial premises along Hume Highway
- Motorists, cyclists and pedestrians along GMD and surrounding streets.

Refer to Table 6-11 for a summary of visual impacts from the nearest sensitive receivers.

Table 6-11 Summary of landscape character and visual impact of the proposal

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
Views from horse stables	Moderate	Moderate	Moderate Impact	<p>Viewpoint sensitivity from horse stables would be moderate as construction activities would be adjacent to the affected receivers.</p> <p>Stables along GMD, Munday Street and Hope Street would have the most direct fields of view to the proposed construction from multiple angles.</p> <p>Some stables along Stroud Avenue and Bull Street would marginally be affected. These roads join Munday Street but have connections to other streets, therefore only a few stables would be visually impacted.</p> <p>Due to the existing privacy requirements, the majority of these stables are housed within existing structures such as sheds and fences that shield direct views of construction for most sight angles. Street trees and shrubs provide an additional layer of shielding particularly along GMD and Munday Street.</p> <p>Construction activities are expected to be staged and would not result in large construction areas exposed simultaneously. Affected stables are only predicted to experience moderate visual magnitudes for works undertaken on their respective streets.</p> <p>Boundary fencing, exclusion tape, construction vehicle movements and other construction site-related features would have negative visual impacts.</p> <p>Visual impacts would be temporary during construction and negligible upon completion of the proposal.</p>

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
Views from residential premises and temporary accommodation	Moderate	Moderate	Moderate Impact	<p>Viewpoint sensitivity from residents and temporary accommodation would be moderate as construction activities would be within the line of sight from the affected receivers.</p> <p>Accommodation along Munday Street and Hope Street would have the most direct fields of view to the proposed construction along GMD and its intersection with Munday Street. Residents along Manning Street would marginally be affected.</p> <p>Construction activities are expected to be staged and would not result in large construction areas exposed simultaneously. Affected premises are only predicted to experience moderate visual magnitudes for works undertaken on their respective streets.</p> <p>Boundary fencing, exclusion tape, construction vehicle movements and other construction site-related features would have negative visual impacts.</p> <p>Visual impacts would be temporary during construction and negligible upon completion of the proposal.</p>
Views from Warwick Farm Racecourse	Moderate	Moderate	Moderate Impact	<p>Due to the local heritage significance of Warwick Farm Racecourse, viewpoint sensitivity from this area would be moderate as construction activities would be within the line of sight of receivers from within. However, this would be limited to the southwest corner of the racecourse during construction of the proposal.</p> <p>Construction activities are expected to be staged and would not result in large construction areas exposed simultaneously. Affected areas are only predicted to experience moderate visual magnitudes for works undertaken along GMD.</p>

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
Views from Hume Highway commercial premises				<p>Boundary fencing, exclusion tape, construction vehicle movements and other construction site-related features would have negative visual impacts.</p> <p>Visual impacts would be temporary during construction. Upon completion, streetside trees adjacent to GMD would be removed to facilitate the proposal; the extent of widening is not expected to result in more than moderate visual impact. Reinstatement of noise walls would effectively restore the key visual focal point from within this specific southwest region of the racecourse.</p>
	Moderate	Moderate	Moderate Impact	<p>Viewpoint sensitivity from commercial premises along Hume Highway would be moderate as construction activities would be adjacent to the affected receivers.</p> <p>Peter Warren car dealerships would have the most direct fields of view to the proposed construction along GMD and its intersection with Hume Highway. Some commercial premises along Sappho Road would marginally be affected. These roads are only accessible via Hume Highway.</p> <p>The majority of these businesses are set back from the road and have parking available at the front of the stores. This may act to shield direct views to the construction.</p> <p>Construction activities are expected to be staged and would not result in large construction areas exposed simultaneously. Affected businesses are only predicted to experience moderate visual magnitudes for works undertaken towards Hume Highway. This magnitude is expected to decrease as works progress away from Hume Highway.</p> <p>Boundary fencing, exclusion tape, construction vehicle movements and other construction site-related features would have negative visual impacts.</p>

Review of Environmental Factors

Upgrade of Governor Macquarie Drive between Hume Highway and Shore Street, Warwick Farm

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
View from motorists, cyclists and pedestrians				Visual impacts would be temporary during construction and negligible upon completion of the proposal.
	Moderate	Low	Moderate-Low Impact	<p>The majority of road user viewpoints would be from surrounding streets immediately adjacent to the proposal, where this would be moderately sensitive given the scale of the work.</p> <p>The posted speed limit on Hume Highway and GMD is 70 km/h and 60 km/h respectively. Munday Street operates as per standard unmarked suburban roads at 50 km/h. These speeds would be reduced to 40 km/h during construction. Drivers along these roads are not expected to experience works that are atypical of Council-approved road works; therefore, a low visual magnitude was designated to produce a moderate-low impact.</p> <p>Visual impacts would be negligible upon completion of the proposal.</p>

Construction activities would be temporary and associated visual impact would be minimised upon implementation of safeguards. Visual impacts regarding removal of vegetation would be negligible upon completion of landscape works to revegetate ground cover.

Due to the majority of tree removal and works affecting visual amenity being limited to 0.17% of the Racecourse area, no discernible operational visual impacts of the proposal are expected. Existing noise walls would be reinstated upon operation, where its design / colour scheme would be determined in consultation with ATC.

6.10.4. Safeguards and Mitigation Measures

Impact	Environmental safeguards	Responsibility	Timing
Minimise visual and landscape impact during construction	Project work sites, including construction areas will be managed to minimise visual impact. A site arrangement plan showing at minimum the following: <ul style="list-style-type: none"> Storage areas for equipment and materials Sufficient parking areas are available at the work sites Waste storage areas, and ensure waste is sorted and recycled. 	Contractor	Pre-Construction
			Construction
	Solid fencing and/or hoarding with project information and project design would be installed around the perimeter of proposal site, to shield views of the works and maintain public safety.	Contractor	Construction
Reinstatement / landscaping	A Landscaping Plan is to be developed in consultation with ATC to determine the following agreements: <ul style="list-style-type: none"> New noise wall design / colour-scheme Areas considered for revegetation including tree planting. 	Council	Pre-construction

6.11. Socio-economic Impact

6.11.1. Existing Environment

The area surrounding the proposal site comprises of mixed-use land within the suburb of Warwick Farm within the Liverpool LGA. The proposal is flanked by Warwick Farm Racecourse and its associated horse stables, with low- to medium-density residential properties also within this area.

The main stakeholders in the vicinity of the proposal site include the following:

- ATC
- Surrounding horse stables and residents

- Commercial premises within the vicinity of GMD
- Tourists and motorists travelling within Warwick Farm.

Socio-economic Profile

The composition of the population helps provide information about the area’s communities and values. It also assists in profiling how adaptable the community is likely to be to change. The study area’s demography in 2016 could be broadly described as technicians and trades workers, where the median age was 35. Table 6-12 summarises the suburbs social and economic characteristics as of 2016.

Table 6-12 Warwick Farm socio-economic profile (ABS, 2016)

Category	Sub-category	Characteristics
Social Characteristics		
Population and Demography	Population	<ul style="list-style-type: none"> • 5,884 people lived in this suburb • There were 2.6% more males than females • 42.3% of the population were registered as married, 34.8% never married and the remainder separated, divorced or widowed
	Age	<ul style="list-style-type: none"> • Median age as of 2016 was 33
	Cultural diversity	<ul style="list-style-type: none"> • 33.7% of residents stated that they were born in Australia, which was followed by India (6.5%), Vietnam (4.8%) and Iraq (4.3%) • In 28.2% of households English was only spoken, and 58.6% of households spoke a non-English language; the top languages being Arabic (10%) and Vietnamese (7.2%) • 19.6% of the population responded that they are Catholic, 16.5% did not state and 13.1% declared no religion
Families and Housing	Families	<ul style="list-style-type: none"> • The largest proportion of the suburb were couple families with children (41.6%) followed by couples without children (29%)
	Housing costs and tenure	<ul style="list-style-type: none"> • 11.7% of the population owned their homes outright, while 16.2% owned with a mortgage and 67.2% rented • The median weekly rent was \$300, while the state median was \$380 • The median monthly mortgage repayment was \$1,517, while the state average was \$1,986
Travel to work	Car travel	<ul style="list-style-type: none"> • 55.4% of the population travelled to work in a car as a passenger or driver
	Public transport	<ul style="list-style-type: none"> • 22.7% of the population travelled to work using public transport
Economic characteristics		
Income	Income	<ul style="list-style-type: none"> • Median personal income for people aged 15 years and over was \$476, while the state average is \$664 • Median weekly family income was \$1,202 as compared to the Australian median of \$1,734 at the time

Category	Sub-category	Characteristics
Employment	Employment	<ul style="list-style-type: none"> 40.3% of employed people aged 15 and over (working population) worked 40 hours or more per week, while 26% worked 35-39 hours per week 57.2% of the working population worked full-time as of 2016, while 23.1% were working part-time and 13.8% were unemployed The main occupations in the suburb were professionals, labourers, technicians and trade workers

6.11.2. Potential Impacts

Construction

The following socio-economic impacts have been assessed in previous chapters:

- Noise and vibration (Chapter 6.7)
- Transport and access (Chapter 6.9)
- Visual impact (Chapter 6.10).

During construction, works would occur in stages, with intervals of reduced vehicle and worker activity. This construction sequence ensures that works along the applicable streets would only be occupied as required throughout the construction program.

The proposal would not limit access to any surrounding streets. Construction activities would involve partial closures of some sections of GMD, Munday Street and Hope Street. These impacts would be temporary and would be managed by detours and diversions to minimise impacts.

Construction of shared paths over the Hope Street underpass may require temporary restriction of thoroughfare during this activity. Ongoing consultation with ATC would minimise the impact of this restriction such as timing works to avoid calendar events and periods that would require extensive use of the underpass. The TMP would include management of ATC thoroughfare in conjunction with the proposed construction activities at this location.

Vehicle movements to the proposal site such as for material deliveries would create minor traffic volume increase on GMD, particularly during construction activities that require larger equipment. The TMP would include management of construction traffic for the proposal and would be revised upon the final location of site compounds.

Operation

The objective of the proposal is primarily to improve road safety for vehicles and pedestrians along GMD. Impacts during construction would be temporary and reversed upon operation of the Proposal. The Proposal is expected to have an overall positive impact by improving such access to users at its location, including the construction of a narrow, shared path along Silverdale Road for pedestrians and cyclists.

6.11.3. Safeguards and Mitigation Measures

Impact	Environmental safeguards	Responsibility	Timing
Socio-economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	timely and accurate information to the community during construction. The CP will include (as a minimum): Mechanisms to provide details and timing of proposed activities to affected businesses and residents, including scope of the works, changed traffic and access conditions Contact name and number for complaints		
Complaints	A project information board will be displayed at the work site. A contact phone number for complaints and enquiries would be on display.	Contractor	Construction
	A complaint handling procedure and register will be included in the CEMP. The complaints register will be maintained throughout construction.	Contractor	Pre-construction and construction
Communication	Start of Work letters would be distributed one week before commencement of works	Contractor	Detailed design / pre-construction
	The following will be undertaken to manage complaints from the community and stakeholders: <ul style="list-style-type: none"> • Regular review of complaints and enquiries received to identify emerging trends and unresolved issues. • Review of initial response time to complaints and timing of response letter/email/phone call/visit to assess compliance • Regular review of all communication materials • A weekly “look ahead” of activities along the project timeline to be shared with the construction manager to plan engagement activities • Complaints with resolution to be reported by Contractor at monthly contractor meetings with Council • Escalated complaints will be reported to Council no more than one week if outstanding • Records/logs of complaints and resolution will be made available for review by Council at any time • Reviewing timing of notifications • Monitoring of the media (traditional and social) 	Contractor Council	Construction

6.12. Cumulative Impact

6.12.1. Existing Environment

As of 11 November 2021, there were 17 public exhibitions and notices displayed within the Liverpool LGA as current submissions. Most of these submissions relate to amendments of the Liverpool LEP and various precinct plans.

One precinct plan on display is directly related to the proposal area called “Warwick Farm Racing Precinct Revised Draft Structure Plan, Planning Proposal and Contributions Plan” where Council proposes to rezone the Warwick Farm Racing Precinct to enable urban renewal of the area (the Precinct Plan). This area is directly south of the proposal site and encompasses the existing stables and lodges along Munday Street, Hope Street and others south of GMD.

18 Development Application (DA) exhibitions were on public display as of 11 November 2021. The majority of the DAs are for private developments for activities such as residential modifications and demolitions. The nearest DA to the proposal is approximately 100 metres west at 12 Munday Street, Warwick Farm for a proposed demolition of an existing dwelling and construction of equestrian infrastructure. Another nearby DA is for a proposed mixed-use development at 240 GMD, Warwick Farm approximately 700 metres east of the proposal site.

6.12.2. Potential Impacts

The Precinct Plan directly relates to the proposal in terms of GMD’s upgrade which would serve to facilitate its future development. It is expected that the proposal would be constructed in advance of any construction work related to the Precinct Plan, which is part of Council’s *Connected Liverpool 2040* local strategic planning statement. Therefore, it is not expected to contribute directly to any potential environmental impacts as a result of this proposal. The widening of GMD and construction of additional shared paths is expected to contribute to the Precinct Plan by upgrading and linking existing infrastructure to facilitate this development.

Stage 2 of the GMD upgrade between the Hope Street underpass and ATC access road would not be undertaken concurrently with Stage 1. The separation of GMD upgrades into Stage 1 and 2 reduces the duration of works for an otherwise continuous corridor and would effectively provide respite for nearby sensitive receivers. As Stage 2 work timing would not commence soon after completion of Stage 1, no negative cumulative impacts are expected as a result of the proposal.

Council’s publicly displayed DAs all relate to relatively small-scale residential work. As none of these are within the proposal area, cumulative impacts during construction are small but would include factors such as an increased haulage of construction materials. This is also applicable to the DA proposed at 240 GMD, Warwick Farm where construction traffic along GMD may impact existing traffic conditions at certain times.

For the purpose of this cumulative assessment, the worst-case scenario would be that the demolition and construction work at 12 Munday Street, Warwick Farm and 240 GMD, Warwick Farm would occur at the same time as the proposal. While the cumulative impact of simultaneous construction of the proposal and the DAs is not expected to result in more than minor environmental impacts, the TMP for the proposal should include provisions to account for additional traffic generated by the surrounding DAs. This measure is included within Chapter 6.9.3. As such, no further mitigation measures are proposed.

7. ENVIRONMENTAL FACTORS CONSIDERED

7.1. Consideration of Clause 228 Factors

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* details those factors to be taken into account when assessing the likely effect of an activity on the environment. If after considering the Clause 228 factors, Is an EIS Required? (DUAP, 1995/1996) can be utilised if this is still unclear.

Consideration of each of the Clause 228 Factors is included in the table below. The impacts have been quantified as:

Clause 228 Factors	Impact		
	N/A	Negative	Nil Positive
<p>Any environmental impact on a community?</p> <p>The local communities may experience some minor impact from air quality, noise, and traffic during construction. No impacts during operation.</p> <p>Socio-economic impacts may be minor positive as a result of increased sales and demand for local products, during construction. Operational impacts will be moderate positive as the proposal would improve vehicle and pedestrian LoS and safety along GMD and through the intersection.</p>		Minor short-term negative during construction.	Moderate long-term positive during operation
<p>Any transformation of a locality?</p> <p>The proposal would negatively transform the locality in the short-term due to construction works and the presence of construction materials, machinery and signage.</p> <p>Once operational the proposal would provide improved vehicle and pedestrian thoroughfare through the intersection.</p>		Minor short-term negative during construction.	Moderate long-term positive during operation
<p>Any environmental impact on the ecosystems of the locality?</p> <p>The proposed scope of work would remove approximately 50 trees. This removal has been assessed to be minor in terms of vegetation and habitat potential. The proposal would have an overall low impact on biological diversity and ecological integrity.</p> <p>The long-term impact of this removal would not be more than minor due to the existing quality of vegetation when compared to better-quality vegetation nearby.</p>		Minor short-term negative during construction.	Nil
<p>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p>		Minor short-term negative during construction.	Moderate long-term positive

Clause 228 Factors	Impact			
	N/A	Negative	Nil	Positive
There would be minor short-term recreational inconveniences to vehicles and pedestrians during construction of the proposal. However, the proposal would result in increased safety and thoroughfare upon completion.				during operation
<p>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?</p> <p>The proposal would not impact any locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.</p>	Nil		Nil	
<p>Any impact on the habitat of protected fauna (within the meaning of the <u>National Parks and Wildlife Act 1974</u>)?</p> <p>Three (3) habitat trees were observed within the proposal area. Any tree removal required within the proposal footprint would be minimised and retained where practicable.</p>		Minor short-term negative during construction.	Nil	
<p>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>Upon the implementation of safeguards, no form of life would be endangered as a result of the proposal.</p>	Nil		Nil	
<p>Any long-term effects on the environment?</p> <p>The proposal would have no adverse long-term effect on the environment.</p>	Nil		Nil	
<p>Any degradation of the quality of the environment?</p> <p>The proposal would remove approximately 0.6 ha of vegetation including approximately 50 trees. Ecological assessment of this vegetation removal found that the impact would not be more than minor. The long-term impact of this removal would not be more than minor due to the existing quality of vegetation when compared to better-quality vegetation nearby.</p> <p>Removal of roadside non-native vegetation including priority weeds would result in minor long-term benefits to local ecological conditions through the implementation of a Weed Management Plan. The net long-term impact is therefore considered to be neutral.</p>		Minor short-term negative during construction.	Nil	

Clause 228 Factors	Impact			
	N/A	Negative	Nil	Positive
<p>Any risk to the safety of the environment?</p> <p>The proposal would pose a minimal risk to the safety of the environment; however, the potential impacts would be minimised with the implementation of the safeguards of this REF.</p>		Minor short-term negative during construction.	Nil	
<p>Any reduction in the range of beneficial uses of the environment?</p> <p>Vehicle and pedestrian thoroughfare would be temporarily diverted during the construction phase. Once operational the proposal would benefit vehicle/pedestrian thoroughfare.</p>		Minor short-term negative during construction		Moderate long-term positive during operation
<p>Any pollution of the environment?</p> <p>The proposal could generate pollution risks for soils and water quality during construction works. These risks would be confined to the construction phase and are manageable with implementation of the safeguards outlined in Chapter 6.2.</p>		Moderate short-term negative during construction	Nil	
<p>Any environmental problems associated with the disposal of waste?</p> <p>There are no expected problems associated with the disposal of waste. Mitigation measures have been provided to manage waste disposal.</p>		Minor short-term negative during construction	Nil	
<p>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</p> <p>Resources required are readily available, and are unlikely to become in short supply.</p>	Nil		Nil	
<p>Any cumulative environmental effect with other existing or likely future activities?</p> <p>The objective of the proposal is to improve existing road infrastructure to facilitate Sydney's outward expansion in conjunction with the development of the Aerotropolis. In comparison with this overall future development, the cumulative impact of the proposal is predicted to be positive.</p>	Nil			Minor long-term positive during operation
<p>Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</p>	Nil		Nil	

Clause 228 Factors	Impact			
	N/A	Negative	Nil	Positive
The proposal is not located in a coastal area under the CMSEPP, and would not impact on other coastal processes and coastal hazards, including those under projected climate change conditions.				

7.2. Consideration Of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the Proposal should be referred to the DAWE.

Factor	Impact
a. Any impact on a World Heritage property? There are no world heritage listed items located near the proposal area that would be affected as part of the Proposal.	Nil
b. Any impact on a National Heritage place? There are no national heritage listed places located near the proposal area that would be affected as part of the proposal.	Nil
c. Any impact on a wetland of international importance? There are no wetlands of international importance within 5km of the proposed works.	Nil
d. Any impact on a listed threatened species or communities? No threatened entities conforming to MNES would impacted by the proposed works.	Nil
e. Any impacts on listed migratory species? Although a number of migratory species have been recorded within a 10km radius of the proposal area, the works would not affect any of these species.	Nil
f. Any impact on a Commonwealth marine area? There are no Commonwealth marine areas located near the proposal.	Nil
g. Any impact on the Great Barrier Marine Park? The proposal would not impact on the Great Barrier Marine Park.	Nil
h. Does the proposal involve a nuclear action? The proposal does not involve a nuclear action.	Nil
i. Does the proposal impact on any Commonwealth land? The proposal does not impact on any Commonwealth Land.	Nil

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8. SUMMARY OF MITIGATION MEASURES

Impact	Environmental safeguards	Responsibility	Timing
Air quality	•		
Soils and water quality	•		
Hydrology	•		
Noise and vibration	•		
Flora and fauna	•		
Waste management	•		
Traffic and transport	•		
Aboriginal heritage	•		
Non-Aboriginal heritage	•		
Visual impacts	•		
Socio-economic impacts	•		

9. CONCLUSION AND CERTIFICATION

This Review of Environmental Factors identifies the likely impacts of the proposal on the environment, and details the mitigation measures to be implemented to minimise the potential impact to the environment.

The assessment has concluded that as the proposed works as described in this REF, including any proposed management measures and safeguards, will not result in a significant effect on the environment.

The proposed works will not result in a significant impact on any declared critical habitat, threatened species, populations or ecological communities or their habitats. Therefore, a Species Impact Statement (SIS) is not required.

Prepared by:

Martin Kim

Environmental Planner

XX 2021

Determining officer (print name) _____

Position _____

Signature _____

Date _____

10. REFERENCES

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APPENDIX A DETAILED DESIGN REPORT

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APPENDIX B DATABASE SEARCH RESULTS

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APPENDIX C BIODIVERSITY ASSESSMENT

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APPENDIX D STATEMENT OF HERITAGE IMPACTS

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APPENDIX E CONSULTATION

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APPENDIX F CNET OUTPUTS

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APPENDIX G SITE PHOTOGRAPHS

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