Spring Farm Parkway – Stage 1

Addendum review of environmental factors

Transport for NSW

November | 2021

Spring Farm Parkway – Stage 1

Addendum review of environmental factors

Transport for NSW | November 2021

Prepared by Jacobs and Transport for NSW

Document controls

Approval and authorisation

Title	Spring Farm Parkway – Stage 1 Addendum review of environmental factors
Accepted on behalf of Transport for NSW by:	Ragavan Vythilinkam Project Manager - Western Sydney Project Office Infrastructure and Place
Signed:	
Dated:	16/11/2021

Executive summary

The proposed modification

Transport for NSW (TfNSW) proposes a modification to Spring Farm Parkway Stage 1 as detailed in the project Review of Environmental Factors (REF) (Jacobs, November 2019) and supporting submission report (Jacobs, October 2019).

The proposed modification involves design changes, additional ancillary facilities, and additional construction access routes to provide improved constructability and further long-term operational benefits of the project. The proposed modification would continue to support the objectives of Stage 1 of Spring Farm Parkway project.

The key design features of the proposed modification would include:

- Extension of entry ramp to the railway bridge
- Widening of the Hume Motorway median shoulder to facilitate the extension of the entry ramp
- Modification to bridge to meet mine subsidence design requirements as well as to improve the sight distance for the vehicle turning right from off ramp
- Inclusion of slip lanes on each leg of Spine Road intersection, and U Turn Facility on the northern leg
- Shorter tie ins along Menangle Road
- Angle of the left turn lane into Menangle Road has been realigned from 55 degrees to 70 degrees
- Temporary construction site access/egress from southbound lane of Hume Highway
- Safety improvements at Broughton Anglican College access and egress points with inclusion of raised turn bays, improved line marking extending south and provision of dedicated turning lanes into the College
- Amendments to utility works
- Inclusion of Variable Messaging Signs (VMS)
- Amendment to future space proofing arrangements
- Shared path at access to Broughton Anglican College realigned.

Other key project scope changes include:

- Utilisation and amendment of Hume Highway cross overs both north and south of the project to facilitate wide load deliveries, specifically bridge girders
- Modified ancillary facility sites to better cater for material storage requirements
- Additional temporary construction access routes to facilitate site establishment
- Decommissioning the existing ‘non formalised’ rest bay adjacent to the northern Hume Highway carriageway between the Water NSW Upper Canal and Mark Evans Bridge.

Construction is expected to commence in April 2022 and would take around 30 months to complete.

Background

The Spring Farm Parkway Stage 1 project, being developed by Transport for NSW, was assessed in a review of environmental factors (REF) and placed on public display between 27 February 2019 and 29 March 2019 for community and stakeholder comment. A submissions report was prepared in October 2019 to respond to any issues raised by the community and stakeholders. Project determination was granted in November 2019.

Spring Farm Parkway Stage 1 forms part of the delivery of Spring Farm Parkway, which is has been divided into two stages. Once both stages are complete, Spring Farm Parkway would provide a 6.1 kilometre east-west arterial road link between Camden Bypass, the M31 Hume Motorway (the Hume Motorway) and Menangle Road in Sydney's south west, 11 kilometres south of Campbelltown and 70 kilometres from Sydney CBD. Spring Farm Parkway would service existing and future residential land releases including Spring Farm, Elderslie, Menangle Park and Mount Gilead.

The proposed modification involves amendments to the design of Spring Farm Parkway Stage 1 and includes additional ancillary facilities and additional construction access routes to aid construction.

Need for the proposed modification

Government strategies such as *Directions for a Greater Sydney 2017-2056, Greater Sydney Region Plan – A Metropolis of Three Cities, State Infrastructure Strategy 2018-2038 – Building Momentum* and other relevant strategies were identified in the project REF as part of the strategic need for Spring Farm Parkway Stage 1. The proposed modification is consistent with the strategic need for the project by aligning with the outcomes of the project objectives and development criteria originally assessed.

The modified project would provide improved constructability and additional long-term operational benefits to Spring Farm Parkway Stage 1.

Proposal objectives

The objectives of the proposed modification are consistent with that outlined in the project REF. These include:

- Support residential growth by providing arterial road access to the Menangle Park land release
- Support employment growth by improving arterial road access to the Hume Motorway and Campbelltown
- Connect future communities to the NSW state road network
- Provide access for buses
- Provide a minimum of 1 in 100-year flood immunity
- Provide access for B-double vehicles
- Provide east-west connectivity for proposed and future land use
- Provide the provisions for a Smart Motorway enabled connection to the Hume Motorway.

Options considered

The progression of the detail design from the concept design (as assessed in the project REF) has resulted in a number of design refinements across the project.

These design refinements have been discussed and assessed during detail design Constructability and Safety in Design Workshops, held progressively through each detail design phase during 2020 and 2021. Key features were subject to further engineering analysis to determine the best option. These key features include:

- Extension of the entry ramp to the railway bridge
- Slight change of bridge structure design to meet mine subsidence requirements
- Modified ancillary facility sites
- Additional temporary construction access routes to facilitate site establishment.

The modified design/construction options were workshopped and assessed against the original project objectives and key development criteria detailed in Section 2.3 of the project REF. The preferred option was chosen based its ability to best address the objectives of the

proposal and support the relevant regional planning policies outlined in Section 2.1.1 of the project REF.

Statutory and planning framework

The proposal is subject to assessment under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). In line with Section 5.5 of the EP&A Act, this addendum review of environmental factors (REF) examines and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposed modification. This addendum REF also considers Clause 228 of the Environmental Planning and Assessment Regulation 2000 and matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A referral to the Australian Government Department of the Environment and Energy (DEE) under the EPBC Act is not required.

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) also applies to the proposal. Clause 94 of 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.

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

Community and stakeholder consultation

The consultation strategy for the proposed modification remains consistent with that described in Section 5.1 of the project REF. Public display of this Addendum REF was not considered necessary given that targeted consultation has occurred and is proposed.

Consultation with several stakeholders occurred during the development of the detailed design including council, residents, utility providers, schools, freight, bus networks and developers. Users of the informal rest area adjacent to the northbound lane of the Hume Motorway were also consulted in regard to its closure, and will continue to be consulted in order to provide ongoing updates.

An Aboriginal Focus Group (AFG) meeting was undertaken on the 19 October 2021 with registered Aboriginal Parties to present the proposed modifications as detailed within this Addendum REF. The revised Cultural Heritage Assessment Report (CHAR), which forms part of the Addendum REF (refer to Section 6.3 and Appendix D) was provided to registered aboriginal stakeholders for a 28-day review and comment period.

Formal consultation with the NSW State Emergency Services (NSW SES) is currently being undertaken due to the project occurring within flood liable land. Any feedback will be considered prior to works commencing, which may include an update to the CEMP or further environment assessment.

Environmental impacts

The proposed modification may result in some additional environmental impacts as well as benefits. These are discussed below.

Traffic and transport

Construction of the modified project would have minor impacts to the road network on Menangle Road. Additional temporary road network pressure at the Menangle Road/Glenlee Road intersection is likely to occur as well. Alternative access to Broughton Anglican College may be required during construction, however, access would be maintained at all times.

Construction of Hume Motorway on-ramp would require closure of the informal rest area located adjacent to the northbound lane of the Hume Motorway. Closing the informal rest area

would not impact the minimum Austroads rest area spacing and travel time requirements, and motorway users would also be encouraged to utilise the Pheasants Nest rest area, which is currently being upgraded to cater for additional Oversize Overmass (OSOM) vehicles.

The operational intersection performance of the modified project would improve from the previous design (the project) for future 2036 scenarios. It would remain consistent for future 2026 scenarios.

Non-Aboriginal heritage

A Statement of Heritage Impact (SOHI) assessment has been completed for the modified project. The modified project would impact the curtilages of Sugar Loaf Farm (SHR 01389) and Grazier's Arms Inn site (unlisted, local significance) as a result of the proposed Menangle Road widening and realignment. The modified project may also indirectly impact the Hume Motorway canal overbridge (element 4.55, little significance) and Glenlee Road Bridge of the Upper Canal System (element 4.42, exceptional significance) (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373) through construction vibration.

The works within the curtilage of Sugarloaf Farm would not visually dominate the heritage item, and no potential archaeological deposits have been identified in the acquisition area. The removal of a rural boundary fence at Sugarloaf Farm is considered to be a minor impact to the overall heritage significance of the item. An application under Section 60 of the Heritage Act is required for the subdivision and change of ownership for the Sugar Loaf Farm (SHR 01389) curtilage.

The impact to the Grazier's Arms Inn curtilage includes an area of archaeological potential. Further archaeological investigations at the Grazier's Arms Inn site would be required, in order to determine its appropriate management. An excavation permit under Section 140 of the Heritage Act would be required for further investigations.

The proposed works to the Hume Motorway canal overbridge of the Upper Canal System would remain within the road corridor and do not directly impact the fabric of the canal. These works may be self-assessed by Transport for NSW under Section 57(2) of the Heritage Act, provided a full recording of the decision is kept and the specified works are undertaken in accordance with the relevant standards. Construction vibration impacts to the Hume Motorway canal overbridge, and Glenlee Road Bridge, would be managed in accordance with appropriate vibration mitigation measures. These include dilapidation surveys and monitoring. The usage of the Glenlee Road bridge may require a permit approval under Section 60 of the Heritage Act. This will be confirmed prior to construction works.

Aboriginal heritage

The modified project would directly impact one Aboriginal archaeological site (in addition to those identified in the project REF). This site is an open artefact scatter, known as the MPRP 8 Menangle Park Rezoning Project 8 (AHIMS: 52-2-3915), and is of moderate significance. It would have a partial loss of value as a result of the impact.

Several portions of the site to be impacted are within areas covered by existing Aboriginal Heritage Impact Permits. The impact to portions of the site outside these existing AHIP areas would require an AHIP for impact mitigation through archaeological salvage excavation, prior to commencement of work.

Flooding

Construction sites and temporary material stockpiles for the modified project located outside of the operation phase 1% AEP flood extent. There would be no resulting impacts on flooding in the construction phase.

Operation of the modified project would result in an increase in in flow velocity greater than 10 per cent of the existing case at a 1% AEP event. This was identified in an existing drainage swale on Menangle Road. A riprap apron has been included in the design to mitigate this.

Socio-economic

During construction, informal bus stops on Menangle Road located opposite Broughton Anglican College would require temporary relocation due to works, resulting in possible short term delays for bus commuters. Consultation would be undertaken with the local bus operator and Broughton Anglican College prior to construction regarding the temporary relocation of the bus stops.

Additional construction access tracks may result in temporary amenity impacts to local residents and the community from the increased noise and dust as a result of heavy construction vehicles using these tracks. These impacts would be managed in accordance with appropriate noise and air quality mitigation and management measures.

Operation of the modified project would involve closure of the informal rest area adjacent to the northbound lane of the Hume Motorway. This impact is not expected to be significant due to the small number of rest area users (approximately 0.58 per cent of northbound Hume Motorway traffic). A number of other rest area options are available in the region. Pheasants Nest rest area (located 26 kilometres south of the informal rest area) is currently undergoing redevelopment and would be able to accommodate OSOM vehicles, from south of Picton Road intersection, prior to the closure of the informal rest area.

Noise and vibration

The prediction of construction noise levels assessed indicate that the highest Noise Management Level (NML) exceedances at sensitive receivers are predicted to result from: Stage 3, Stage 5 and Stage 6 work packages, with maximum predicted noise levels of 77 dB(A), 75 dB(A) and 87 dB(A), respectively.

Construction noise impacts were generally spatially influenced, and also dependant on the time of works. Two receivers will be “Highly Noise Affected” (HNA) during the works. Construction noise impacts would be minimised where possible and managed in accordance with the mitigation and management measures outlined.

The operational noise assessment shows that six additional residential receivers and eight additional buildings at Broughton Anglican College are eligible for consideration of at-property treatment (increase from the project REF). The impacted buildings at Broughton Anglican College will be reviewed with further inspections to confirm the assumptions made in the noise modelling.

Biodiversity

The proposed modification would require additional clearance of 5.51 hectares of PCT 850 DNG and tree trimming of 0.85 hectares of low condition PCT 850. The total vegetation clearance for the modified project (which includes vegetation clearing outlined in the project REF) is 12.48 hectares.

Based on the low condition of the PCT’s impacted by the proposed modification additional biodiversity offset credits were not triggered in addition to those in the project REF.

The modification is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act.

The modification is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act. Safeguards and mitigation measures have been proposed to manage and minimise impacts where possible.

Contamination

Contamination was not found at levels above the adopted site assessment criteria in the soil samples collected. No visual indicators of contamination were observed in the materials excavated from the test pit/hand auger locations or at site surfaces within approximately five

metres from these locations. It is recommended that further waste classification sampling is to be undertaken prior to construction.

There is a moderate to high potential of encountering surficial Asbestos Containing Material (ACM) and historical fill in the Hume Highway corridor, and a low to moderate potential for encountering them in the Menangle Road corridor. Areas that were unable to be investigated have a moderate potential of encountering surficial ACM due to its aforementioned presence elsewhere in the construction footprint. Further investigations would need to be undertaken prior to construction to ground truth potential ACM in areas that were not accessible during the investigation. Safeguards and mitigation measures have been proposed to manage ACM.

Justification and conclusion

The proposed modification may result in some additional, minor, adverse environmental impacts. These impacts would be managed in accordance with the mitigation and management measures provided in this Addendum REF and the project REF.

The proposal is considered justified as it would improve the constructability and additional long-term operational benefits of Spring Farm Parkway Stage 1.

Contents

Tables

Figures

Appendices

1 Introduction

1.1 Proposed modification overview

The Spring Farm Parkway Stage 1 project, being developed by Transport for NSW was assessed in a review of environmental factors (REF) and placed on public display between 27 February 2019 and 29 March 2019 for community and stakeholder comment. A submissions report was prepared in October 2019 to respond to issues raised. Project determination was granted in November 2019.

Transport for NSW proposes modification to the Spring Farm Parkway Stage 1 project as detailed in the REF (referred to in this addendum REF as the project REF) and supporting submission report.

The proposed modification involves design changes, additional ancillary facilities, and additional construction access routes in order to provide improved constructability and further long-term operational benefits of the project. The proposed modification would continue to support the objectives of Stage 1 of Spring Farm Parkway project.

The key design features of the proposed modification would include:

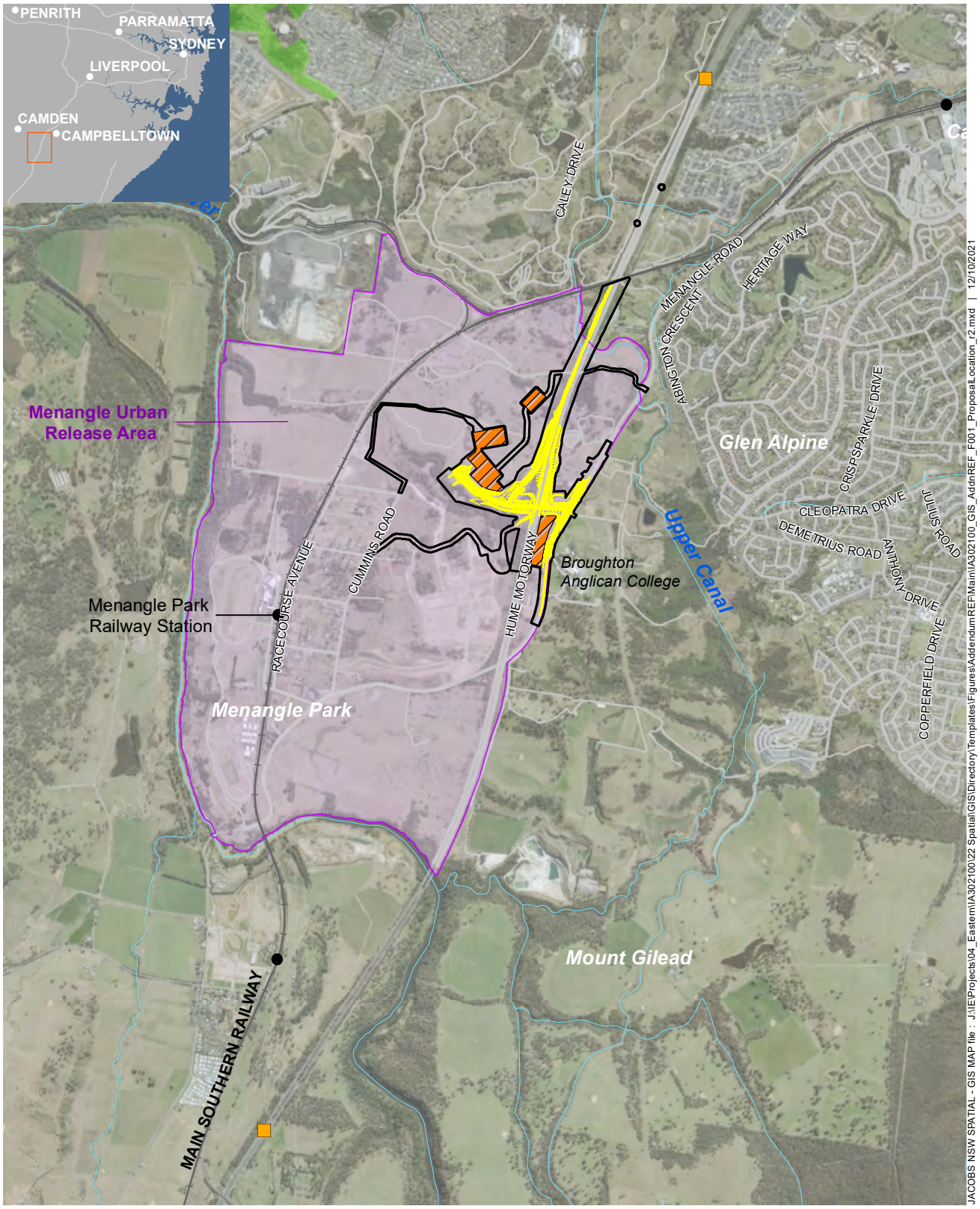
- Extension of entry ramp to the railway bridge
- Widening of the Hume Motorway median shoulder to facilitate the extension of the entry ramp
- Modification to bridge to meet mine subsidence design requirements as well as to improve the sight distance for the vehicle turning right from off ramp
- Inclusion of slip lanes on each leg of Spine Road intersection, and U Turn Facility on the northern leg
- Shorter tie ins along Menangle Road
- Angle of the left turn lane into Menangle Road has been realigned from 55 degrees to 70 degrees
- Temporary construction site access/egress from southbound lane of Hume Highway
- Safety improvements at Broughton Anglican College access and egress points with inclusion of raised turn bays, improved line marking extending south and provision of dedicated turning lanes into the College
- Amendments to utility works
- Inclusion of Variable Messaging Signs (VMS)
- Amendment to future space proofing arrangements
- Shared path at access to Broughton Anglican College realigned.

Other key project scope changes include:

- Utilisation and amendment of Hume Highway cross overs both north and south of the project to facilitate wide load deliveries, specifically bridge girders
- Modified ancillary facility sites to better cater for material storage requirements
- Additional temporary construction access routes to facilitate site establishment
- Decommissioning the existing ‘non formalised’ rest bay adjacent to the northern Hume Highway carriageway between the Water NSW Upper Canal and Mark Evans Bridge.

The location of the proposed modification is shown in

Figure 1-1, key features of the proposed modification is shown in Figure 1-2 and the revised study area is shown in Figure 1-3. Chapter 3 describes the proposed modification in more detail.



JACOBS NSW SPATIAL - GIS MAP file : J:\IE\Projects\04_Eastern\IA302100\22 Spatial\GIS\Directory\Templates\Figures\AddendumREF\Main\IA302100_GIS_AddnREF_F001_ProposalLocation_r2.mxd | 12/10/2021

Legend

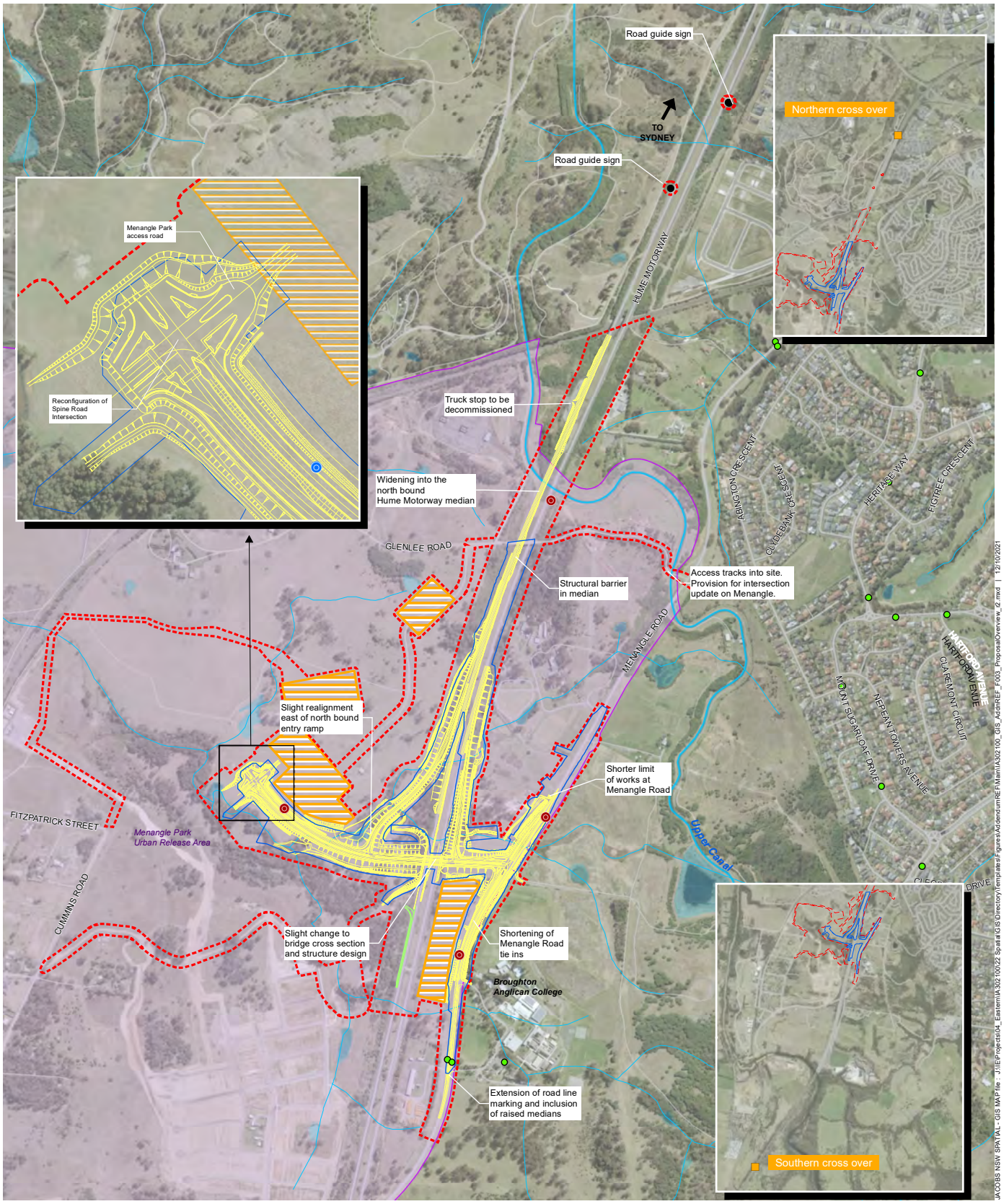
- Proposed modification design (80% detail design)
- Menangle Park Urban Release Area
- Proposed modification assessment area
- Site compound
- Cross over locations
- Train station
- Waterway
- Railway line

0 1 2 km

N

NOTE: Subject to detailed design

Figure 1-1 | Locality



Source : Ausimage 2018

Legend

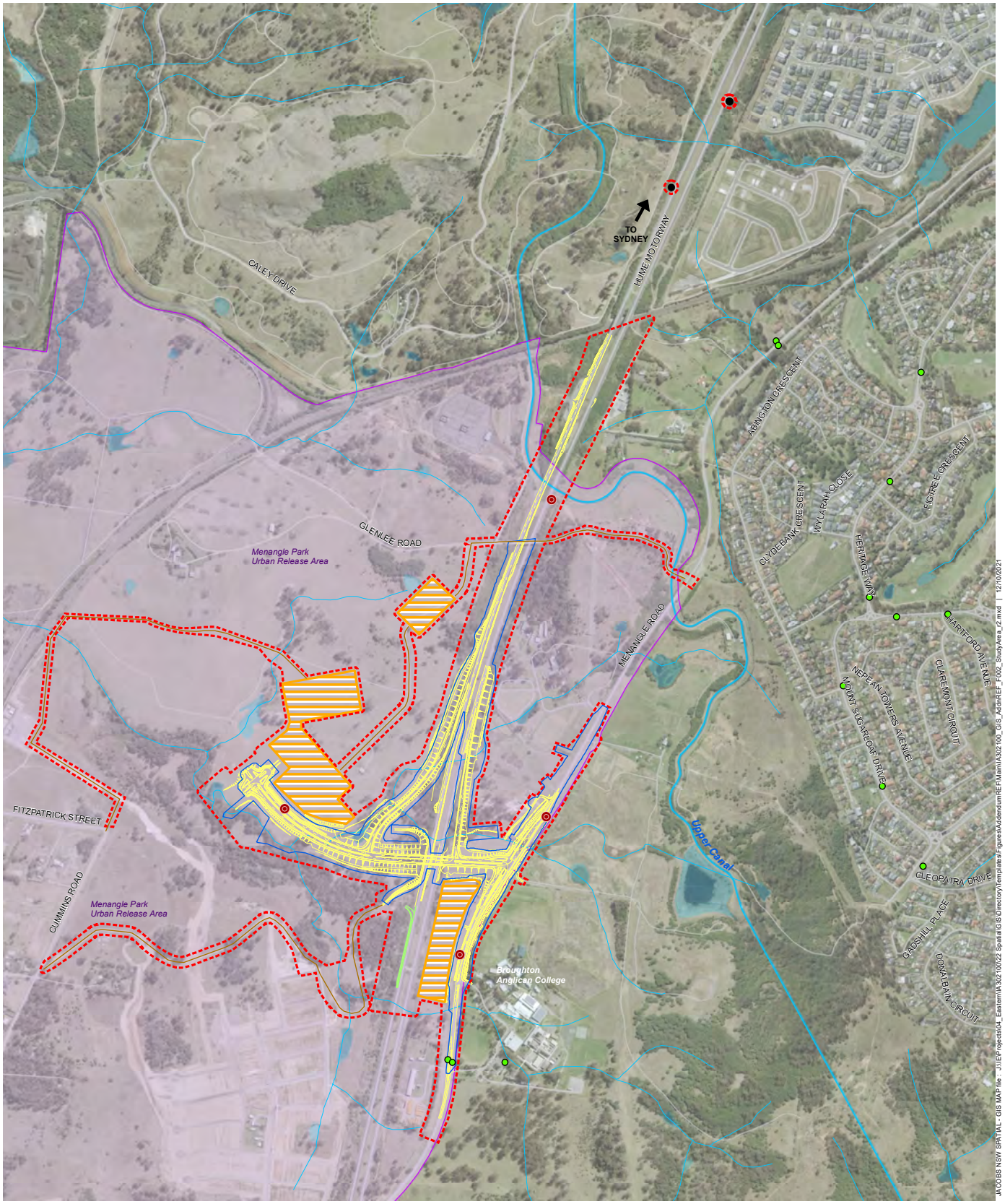
- Proposed modification design (80% detail design)
- Menangle Park Urban Release Area
- Site compound
- Project REF proposal area
- Proposed modification assessment area
- Temporary deceleration lane
- Waterway
- Bus stop
- Road guide signs
- Proposal VMS locations

NOTE: Subject to detailed design

0 200 400m

N

Figure 1-2 | Proposed modification overview



Legend

- Proposed modification design (80% detail design)
- Menangle Park Urban Release Area
- Site compound
- Project REF proposal area
- Revised study area
- Construction site access tracks
- Temporary deceleration lane
- Waterway
- Bus stop
- Proposed VMS locations
- Road guide signs

0 200 400m

N

Figure 1-3 | Revised study area

1.2 Purpose of the report

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

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

The description of the proposed work and assessment of associated environmental impacts has been undertaken in context of clause 228 of the Environmental Planning and Assessment Regulation 2000, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS Required? guidelines) (DUAP, 1995/1996), Roads and Road Related Facilities EIS Guideline (DUAP, 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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

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

- Whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Australian Government Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Need and options considered

2.1 Strategic need for the proposed modification

Chapter 2 of the project REF addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project by aligning with the outcomes of the project objectives and development criteria originally assessed.

The proposed modification involves design changes, additional ancillary facilities and additional construction access routes to provide improved constructability and further long-term operational benefits of the project.

The modified project would continue to support the objectives of Stage 1 of Spring Farm Parkway project.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF identifies the proposal objectives and development criteria that apply to the proposed modification.

2.3 Alternatives and options considered

2.3.1 Methodology for selection of preferred option(s)

The progression of the detail design from the concept design (as assessed in the project REF) has resulted in a number of design refinements across the project.

These design refinements have been discussed and assessed during detail design Constructability and Safety in Design Workshops, held progressively through each detail design phase during 2020 and 2021. These workshops were attended by representatives Transport for NSW, Campbelltown City Council, Landcom and AGL and Dahua Group Australia (Menangle Park developer).

Detailed below are the key features of the proposed modification that involved further engineering analysis and selection of a preferred option.

- Extension of the entry ramp to the railway bridge
- Slight change of bridge structure design to meet mine subsidence requirements
- Modified ancillary facility sites
- Additional temporary construction access routes to facilitate site establishment.

2.3.2 Identified options

Table 2-1 below summaries the key modified design/construction options and their key features.

Table 2-1 Overview of key modified design/construction options

Modified design / construction option	Key features
Extension of the entry ramp	• Extension of the entry ramp by approximately 600m (resulting in a total length of 1.7 kilometres north of Spring Farm Parkway). • Northbound lanes of the Hume Motorway would be widened into the median by 2.5m - 4.1m to accommodate entry ramp.
Change to the bridge structure	• Modified to provide a 2.9m shoulder in the westbound direction (northern shoulder) in order to address flood width criteria, and a 1.2m shoulder in the eastbound direction (southern shoulder). • The span has been slightly shortened from 76m to 67.4m and girder depth reduced from 1.8m to 1.5m. • Inclusion of pad footings (instead of piles), RSW abutments (instead of spill through) and alternative bearing and joint types to meet mine subsidence requirements.
Modified ancillary sites	• Increase in size to accommodate materials handling and storage requirements. • Moved in location in some areas to accommodate leasing requirements.
Additional temporary construction access routes	• Additional construction access routes to improve access and serviceability to ancillary sites and the project.

2.3.3 Analysis of options

The above modified design/construction options were workshopped and assessed against the original project objectives and key development criteria detailed in Section 2.3 of the project REF. A review of these in comparison to a 'do nothing approach' and consideration of alternative design/construction methodology options was also undertaken

2.4 Preferred option

These options were considered in isolation and cumulatively are consider the preferred option(s) and best addresses the objectives of the proposal and supports the relevant regional planning policies outlined in Section 2.1.1 of the project REF.

3 Description of the proposed modification

3.1 The proposed modification

Transport for NSW proposes modifications to the Spring Farm Parkway Stage 1, as detailed in the Project REF (Jacobs, 2019), to include improved design changes, modification to ancillary facilities and provision of additional construction access routes. These changes would provide improved constructability outcomes and additional long-term operational benefits of the project. The proposed modification would continue to support the objectives of Stage 1 of Spring Farm Parkway.

The key features of the proposed modification are shown in Figure 1-2 and an overview is provided in Section 1.1.

3.2 Design

3.2.1 Design criteria

Section 3.2.1 of the project REF identifies the design criteria which also applies to the proposed modification.

3.2.2 Engineering constraints

Key engineering constraints considered during the development of the proposed modifications include:

- Uphill grade on the existing Hume Motorway at the proposed tie-in point on the Hume Motorway meant that compliant truck merge speeds could not be achieved necessitating the increase of the length of the entry ramp to the railway bridge.
- The extended entry ramp resulted in potential increase in risks of vehicle accessing the informal truck stop which triggered the removal of the informal rest area.
- Presence of existing gas well on western side of Hume Motorway dictated the horizontal alignment of entry ramp.
- The location of the site within a mine subsidence area dictated a bridge solution that was supported on reinforced soil wall rather than piles.
- The requirement to allow for the updated development and land use assumptions triggered the update of the traffic assessment and adjustment to the project road and intersection lane arrangements. This included an alternative bridge cross section.
- Presence of significant overhead HV electrical, underground high pressure gas, and large water mains at the northern end of Menangle Road supported shortening of Menangle Road.
- Limited available space for temporary storage and placement of materials generated during construction
- Existing Hume Highway lane configurations and speed limits and impact to these during site establishment activities
- Minimise safety impacts of project on school access resulted in extension of project Menangle Road works to the south.
- Stormwater channel invert level constraints and tie-in to the existing channel constraints.

3.2.3 Main features of the proposed modification

Road configuration

North facing entry ramp

The north facing entry ramp into the Hume Motorway has been extended by 600 metres (resulting in a total length of 1.7 kilometres north of Spring Farm Parkway) in order to enable trucks to achieve appropriate merge speed. The entry ramp would merge into the existing nearside lane. The northbound lanes of the Hume Motorway would be widened into the median by 2.5 - 4.1 metres to accommodate for the entry ramp.

Menangle Road

Changes to Menangle Road include:

- Section of Menangle Road, north of Spring Farm Parkway intersection, would tie in approximately 175 metres south of the extent detailed in the project REF
- Improved line marking extending further south

- Raised medians at the Broughton Anglican College access and egress points.

Bridge structure

Spring Farm Parkway Bridge has been modified to provide a 1.2 metre shoulder in the westbound direction (southern shoulder), as well as a 1.5 metre shoulder and 1.4 metre path in the eastbound direction (northern shoulder) to address flood width criteria and maintenance access.

The span has been slightly shortened from 76 metres to 67.4 metres and the girder depth has reduced from 1.8 metres to 1.5 metres. Inclusion of pad footings (instead of piles), RSW abutments (instead of spill through) and alternative bearing and joint types have been implemented to meet mine subsidence requirements.

The S bridge centre pier arrangement in the Hume Motorway median will be modified to suit the updated bridge cross section. The pier arrangement is formed of three separate uniformly shaped supports that will be consistent with any additional support provided as part of a future bridge widening.

Figure 3-1 below provides a cross section of the bridge structure arrangement in 2026 and Figure 3-2 provides a cross section of the bridge structure arrangement in 2036.

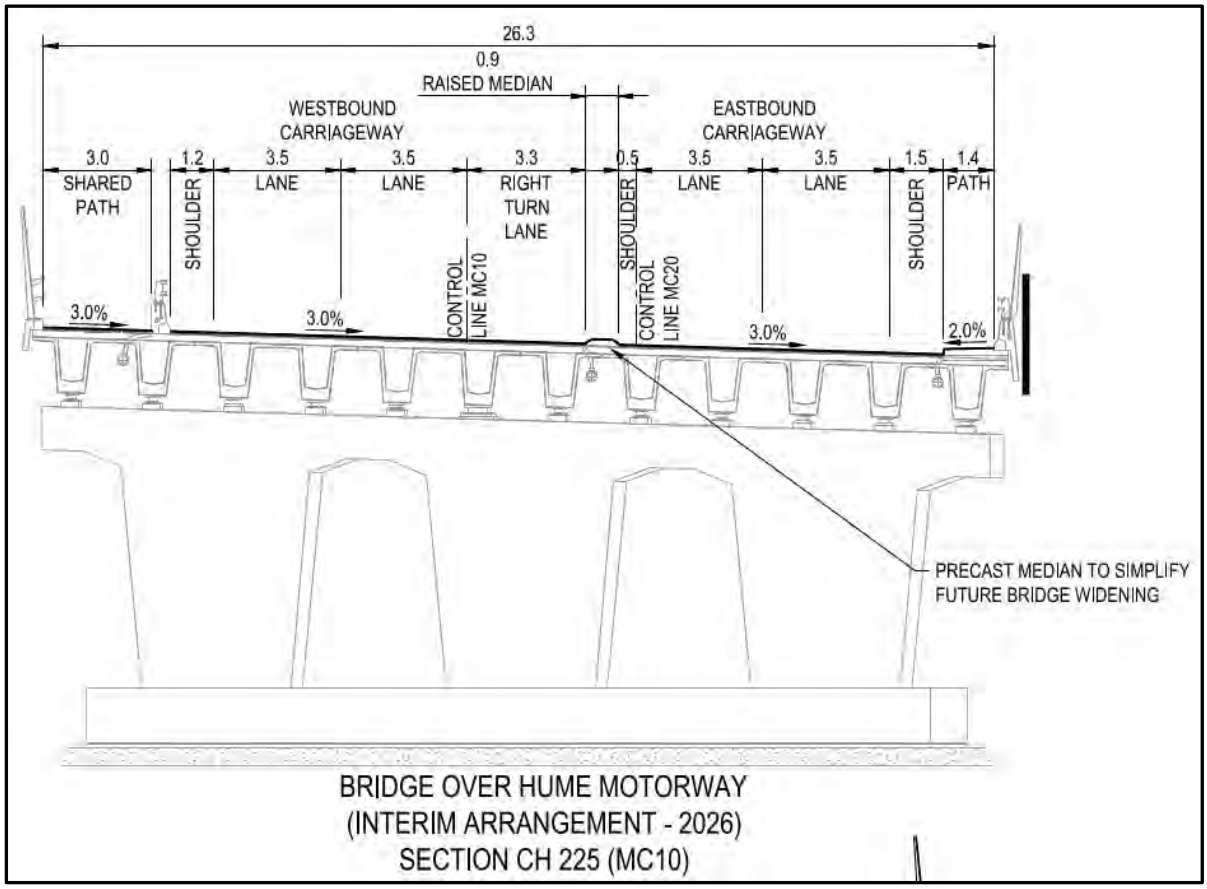


Figure 3-1 Proposed new bridge cross section arrangement in 2026

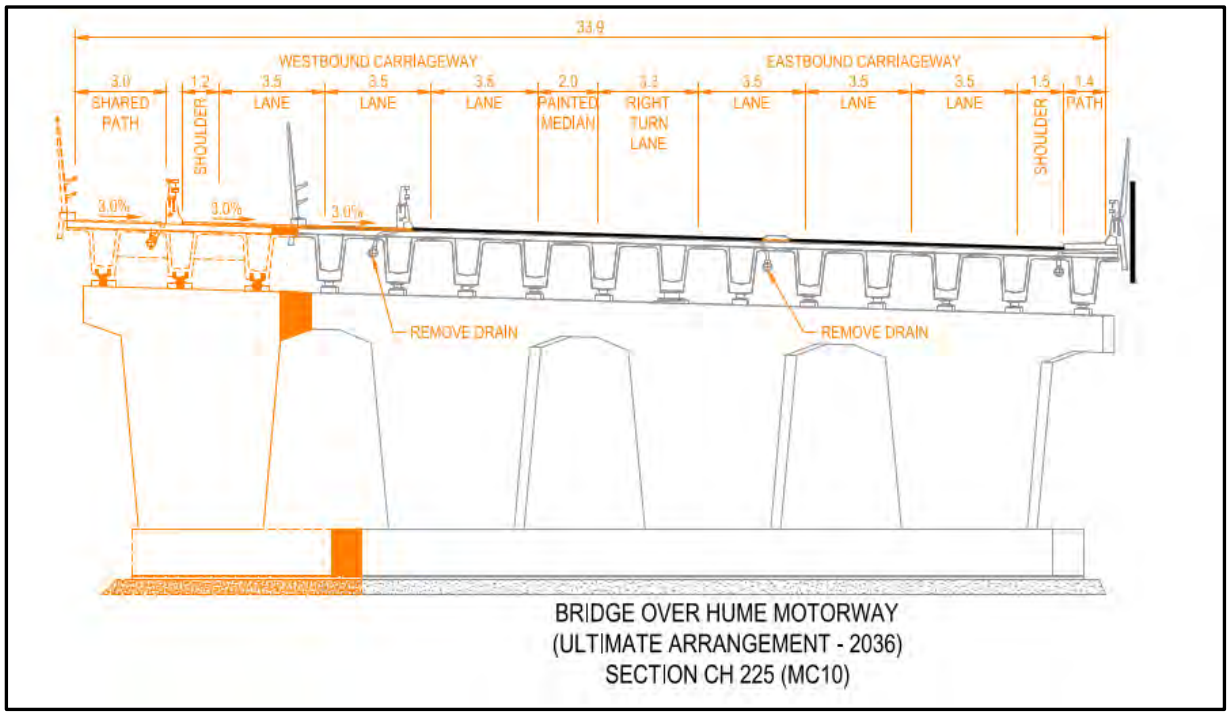


Figure 3-2 Proposed new bridge cross section arrangement in 2036

Intersections

Intersection 1 – Spring Farm Parkway and Access Road (Spine Road) 2026 Arrangement

There would be the inclusion of slip lanes on each leg of this intersection and an interim U turn facility on the northern leg until the future connection is provided.

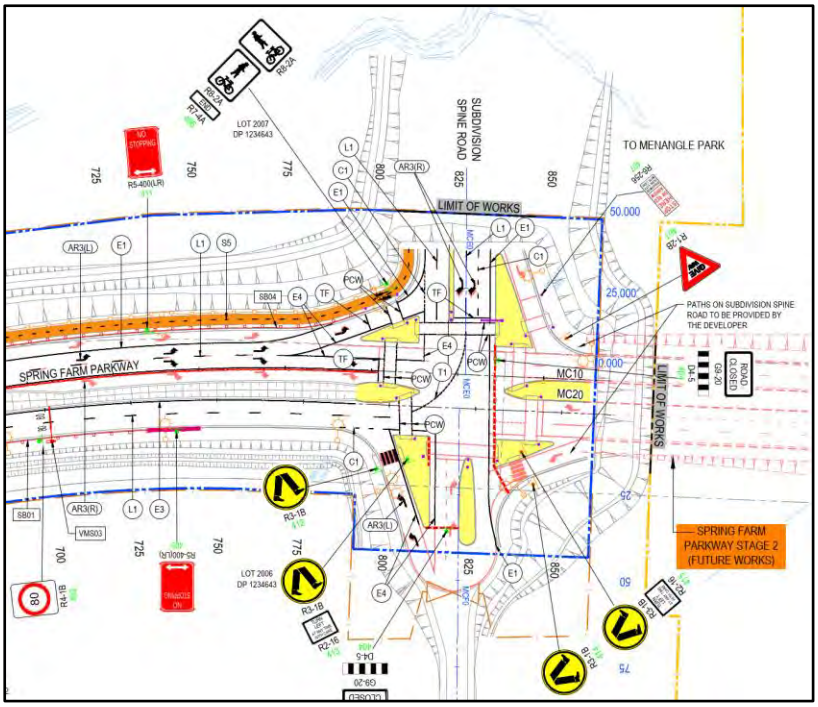


Figure 3-3 Spring Farm Parkway and Access Road (Spine Road) 2026 Arrangement

Intersection 4 – Spring Farm Parkway and Menangle Road

The intersection has been slightly modified with:

- Angle of left turn into Menangle Road realigning from 55 degrees to 70 degrees
- Inclusion of a left turn slip lane from Spring Farm Parkway to Menangle Road northbound.

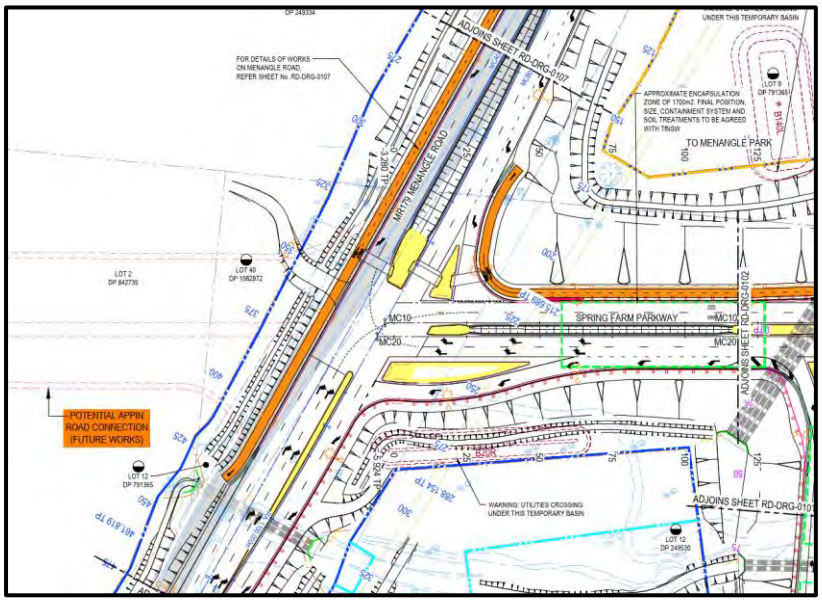


Figure 3-4 Spring Farm Parkway and Menangle Road

Pedestrian and cycle connectivity

Shared paths on the southern side of Spring Farm Parkway, and south of the Spring Farm Parkway intersection on Menangle Road, have increased in width from 2.5 metres to 3.0 metres.

Provisions for cyclists have also been included as part of the proposed modification which comprise of crossing points to cross the entry and exit ramps on the Hume Motorway, and 1.5 metre shoulders at stop lines adjacent to spitter islands.

Utility works

The amendments to the utility works include:

- Changed limit of works for electrical and comms design due to the modified Menangle Road tie in
- Extension of TPG tie ins to existing network
- Lighting on the Hume Motorway entry ramp extended to the WaterNSW Canal Bridge.

Signage

New guided signage would be installed to direct traffic at the Hume Motorway entry and exit ramps as well as Spring Farm Parkway and Menangle Road intersection.

ITS Infrastructure

There will be the inclusion of Variable Messaging Signs (VMS) across the project at the following locations:

- Menangle Road Southbound, north of the Spring Farm Parkway intersection (Type B)
- Menangle Road Northbound, south of the Spring Farm Parkway intersection (Type B)
- Hume Motorway Southbound, north of the Mark Evans (Glenlee Road) Bridge (Type C)
- Spring Farm Parkway Eastbound, east of the Spine Road intersection (Type B).

Both VMS types are shown in Figure 3-5 and Figure 3-6 below. Each structure will require vehicle access and a maintenance bay hardstand.

There will also be provision for a VMS located on the Spring Farm Parkway Bridge structure.

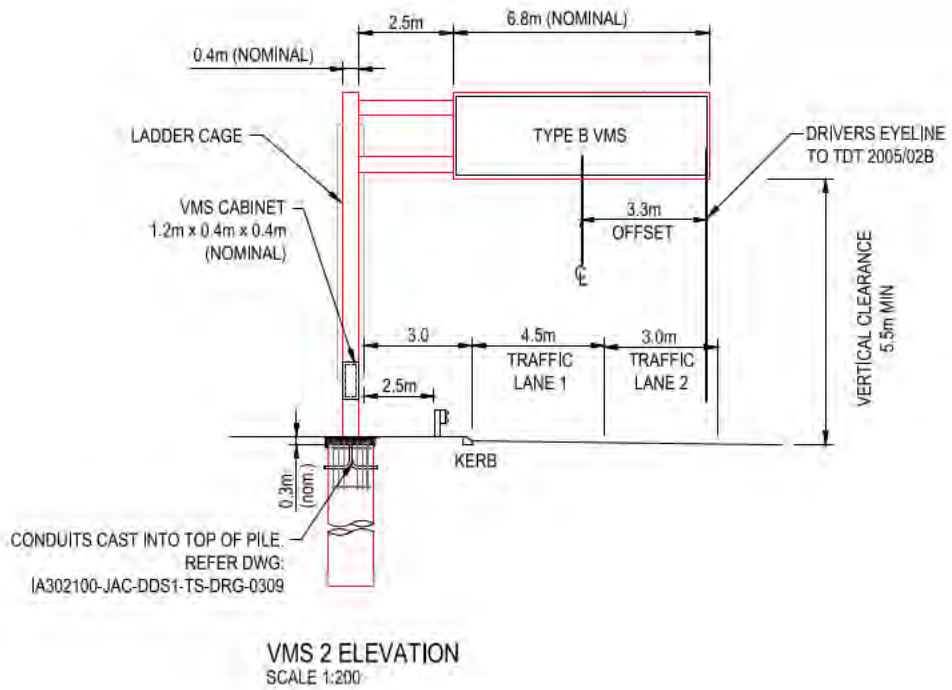


Figure 3-5 Type B VMS typical design

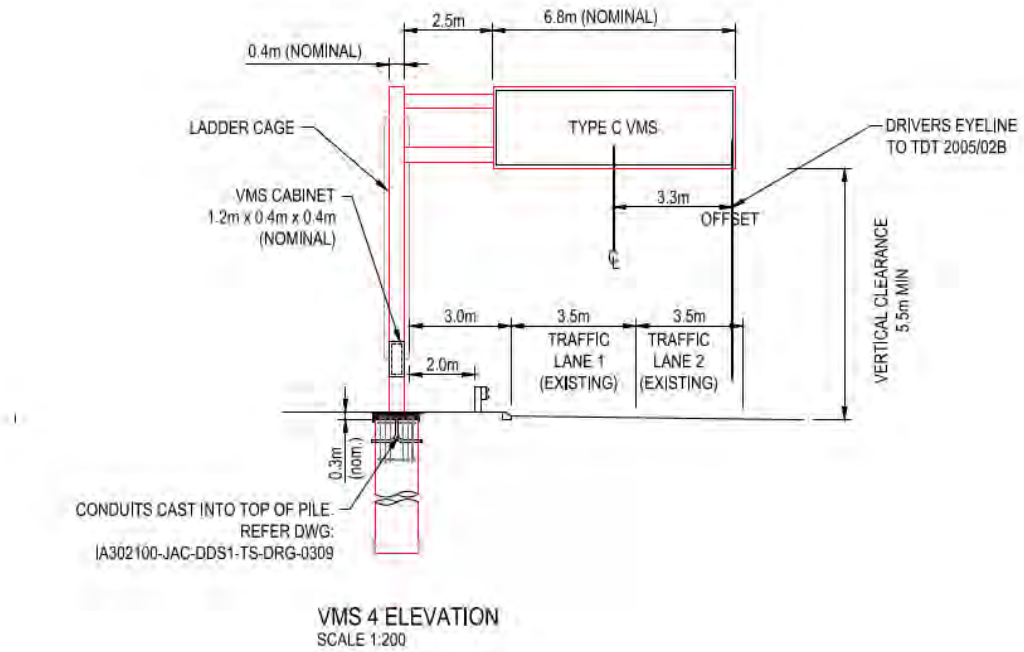


Figure 3-6 Type C VMS typical design

Drainage Infrastructure

The drainage infrastructure has been updated to comply with any road design changes previously mentioned.

Catch-drain has been included along the northern stub of the Spring Farm Parkway and Spine Road intersection and has been designed for a 1% AEP.

Swales have been removed from the northern extent of Menangle Road. The new culvert proposed has been removed and existing culvert retained at northern end of Menangle Road due to shortening of tie ins.

Additional swales have been included at the western extent of the Spring Farm Parkway and Spine Road intersection.

3.3 Construction activities

3.3.1 Work methodology

Construction activities would be guided by a construction environmental management plan (CEMP) to ensure work is carried out to Transport for NSW specifications within the specified work area. The proposed work methodologies are described below.

The proposed construction work and methodology is indicative and detailed construction staging plans and methods would be determined by the construction contractor(s). In the event that the construction activities result in any environmental impacts additional to that assessed in the project REF and this addendum REF, further environmental assessment would be required to be carried out and approved by Transport for NSW.

Construction work for the proposed modification is expected to involve the following:

- Site establishment (including temporary fencing and construction compounds)
- Installation of traffic management measures such as placing safety barriers in accordance with the traffic control plan
- Construction of temporary access routes from both Glenlee Road and Cummins / Fitzpatrick street
- Construction of temporary access and egress from the fast lanes of the Hume Motorway to the construction median
- Installation of erosion and sediment controls
- Utility adjustments
- Culvert cleaning work for existing culvert underneath of Hume Motorway and relining works (if required)
- Drainage work
- Potential protection slab over APA Gas (widening on exit ramp)
- Hume Highway Median crossover construction
- Earthwork
- Potential contamination encapsulation
- Road construction work that includes placement and compaction of subbase, base and wearing surface materials
- Mill and re-asphalting of the road section in-front of the School including line marking and raised median installation
- Bridge construction works
- Construction of private driveways impacted by the project
- Kerb and gutter construction
- Installation of permanent traffic control signals
- Installation of line marking, signposting and other road furniture
- Installation of Variable Messaging Signs (VMS)
- Landscaping work
- Site clean-up.

Table 3-1 Overview of construction activities and methodology

Construction activity	Construction methodology
Preconstruction / Early work	
Site establishment	• Obtain required working approvals from network authorities (including Traffic Management Centre (TMC) and Campbelltown City Council) • Notify adjacent businesses and residents of proposed work at least five days prior to the work commencing • Establish temporary fencing to secure work site (ATF fencing and/or traffic barriers to re-direct pedestrians and traffic using appropriate directional signage) • Establish no-go zones and refinement of vegetation clearance boundaries • Installation of construction signage and advisory signs • Installation of environmental controls • Establishment of temporary ancillary facilities, including clearing and grubbing, installation of office accommodation, utilities and other facilities • Establishment of temporary road works including any temporary barriers and line marking • Establishment of construction site access points • Establishment of temporary haulage routes, including the northern entrance off Cummins road and the Hume Motorway fast lanes • Establishment of traffic control at worksite including the supply of Variable Message Signs (VMS) • Establishment of temporary drainage.
Service relocations	• Adjust utility infrastructure as required. Some of the service relocations would be carried out as pre-construction activities if possible, but there may be some relocation where part of the construction work would need to be carried out first. In these instances, temporary relocations of services may be required to enable safe and efficient construction operations • Install temporary signals as required.
Construction	
Earthwork	• Install drainage structures such as culverts and sediment basins to manage surface water during construction • Topsoil stripping and stockpiling • Management of any encountered contaminated material • Excavation of any excess or geo-technically unsuitable subsoils • Areas of new cut and fill along the alignment • Cut and fill for preparation of site for the new bridge over the Hume Motorway and north facing access ramps • Installation of road drainage infrastructure.
Drainage	• Culvert cleaning work for existing culvert underneath of Hume Motorway and relining works (if required)

Construction activity	Construction methodology
	• Establish sediment and erosion controls including temporary basins • Where required, a temporary diversion channel would be constructed to enable the installation of culverts • Excavate, install and backfill new drainage lines as required including subsurface drainage.
Pavement work	• Hume Highway Median crossover construction • Minor demolition of asphalt, other road elements and structures on Menangle Road • Clearing of any vegetation • Removal and stockpiling of topsoil • Cut to fill operations including the removal of spoil to achieve the required levels at the underside of the new road surfaces and access ramps • Placement and compaction of selected material (usually crushed rock or natural gravels) • Placing, compacting and finishing of either concrete or stabilised road sub-base layers (to match existing adjacent road profile where required) • Placing, compacting and finishing of pavements and wearing course. • Mill and re-asphalting of the road section in-front of the Broughton Anglican College including line marking and raised median installation.
Bridge construction	• Installation of foundations and footings • Construction of bridge abutments and the pier(s) in the central median of the Hume Motorway • Installation of pre-cast concrete girders • Bridge superstructure construction including decking and barriers • Installation of lighting and throw screens.
Road furniture and signalised intersections	• Installation of traffic lights and ITS such as VMS and advertising • Finishing work, such as: line marking; kerb and gutter construction; installation of safety barriers, street lighting and sign posting.
Finishing work	• Install safety barriers (if/where required) • Carry out landscape and re-vegetation work Install final line marking, signs and guideposts • Remove traffic management and reopen lanes to traffic • Decommission temporary facilities (e.g. site compounds and temporary deceleration lane from the Hume Motorway) and rehabilitate to original condition or better • Clean up the site and dispose of all surplus waste materials.

3.3.2 Construction hours and duration

It is anticipated that construction would generally be carried out during standard construction working hours in accordance with the *Interim Construction Noise Guidelines* (DECC, 2009):

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm
- Sundays and public holidays: no work.

To minimise disruption to daily traffic and disturbance to surrounding landowners and businesses, it would be necessary to carry out some work outside of these hours. It is expected that out of hours work would be required for the following activities:

- Installation of bridge girders
- Installation of construction access (declaration lane) to western side of Hume Highway
- Undertaking works immediately adjacent to traffic lanes where boundaries are constrained, works window is small and no barrier is provided. Such as at Menangle Road tie-ins
- Undertaking work close to traffic lanes where temp barrier is provided but works are within the barrier deflection zone
- Set-up and access to the median of the Hume Motorway
- Setting up any traffic switches that might be needed on the Hume Motorway or Menangle Road
- Pavement mill and re-sheet works
- Delivery of fill materials on the western side of the Hume Motorway
- Delivery of some materials to compounds.

Out of hours work would be subject to permitted road occupancy licenses (ROLs) and construction staging. Out of hours work would be carried out in line with the procedures contained within the EPA *Interim Construction Noise Guideline* (ICNG) (DECC 2009) and the Roads and Maritime (now Transport for NSW) *Construction Noise and Vibration Guideline 2016*.

The local community would be notified a minimum of five working days prior to work outside of standard hours commencing. They would be provided with work details and contact information if there are any issues.

A noise and vibration assessment has been carried out for the proposed modification. Refer to Section 6.6 and Appendix H for details.

3.3.3 Plant and equipment

A range of plant and equipment would be used during construction. The final equipment and plant requirements would be determined by the construction contractor. An indicative list of plant and equipment is provided below:

- Front end loaders
- Bulldozers
- Backhoes
- Dump trucks
- Cranes
- Road trucks
- Excavators
- Road sweepers
- Water trucks
- Elevated work platforms
- Concrete saws
- Asphalt/concrete pavers

- Compacters and rollers
- Graders
- Scrapers
- Concrete trucks
- Generators
- Chainsaws
- Light vehicles
- Wood chippers.

3.3.4 Earthworks

Consistent with the project REF, excavations would be required to widen Menangle Road, construct Spring Farm Parkway, widen Hume Motorway and to relocate utilities. The proposed modification overall has slightly increased the extent of cuts and volumes of imported (fill) materials to construct cut and fill batter slopes

Overall, the modified project is expected to require slight increases in earthworks from those calculated during the project REF.

Table 3-2 Overview of earthwork volumes

Earth work Type	Project REF volumes (m^3)	Modified project volumes (m^3)
Excavated (Cut)	13,700	37,267
Fill	374,000	389,774

Source and quantity

Overall, the modified project would require the importation of about 352,507m^3 of material. This assumes that excavated materials would be physically and chemically suitable to reuse as engineering fill. The ability to reuse the material would depend on its physical and chemical properties. Uncontaminated material that is not suitable for use as structural fill could be placed in batter areas of landscaping.

Material unsuitable for construction use and/or are contaminated would need to be placed in an encapsulation cell onsite or transported offsite by a licensed contractor for disposal at a licensed waste management facility following testing and classification (refer to Section 6.8). Any unsuitable or surplus material would be managed in accordance with Transport for NSW policy.

Table 3-3 provides a breakdown of proposed earthwork volumes based on work zones across the proposal footprint.

Table 3-3 Proposed earthworks volumes

Earthwork's location	Topsoil (m^3)	Cut (m^3)	Unsuitable (m^3)*	Fill (m^3)
SFP – EAST	1,864	986	98	57,548
SFP - WEST	8,844	13,328	1,332	190,215
Entry Ramp	5,338	8,086	808	80,672
Exit Ramp	3,514	3,016	301	55,810
Menangle Road	4,033	6,952	695	15,519

Earthwork's location	Topsoil (m^3)	Cut (m^3)	Unsuitable (m^3)*	Fill (m^3)
Pathways / Shoulder Widening / Other	1,087	4,075	407	3,974
Temporary Access (included above)				
Totals	24,680	36,443	3,641	403,738

* Calculations of unsuitable is based on 10% of cut material not being suitable for reuse.

3.3.5 Traffic management and access

Traffic management and controls would be implemented under a construction traffic management plan. Specific temporary traffic speed reductions that would be required and include:

- Hume highway reduced to 80km/hr posted and design speed (from 110 posted)
- Menangle Road reduced to 60km/hr posted and design (from 80 posted)
- No Road closure during the school drop off and pick uptime
- Speed reduced to 40km/hr posted and design for Hume and Menangle during night works.

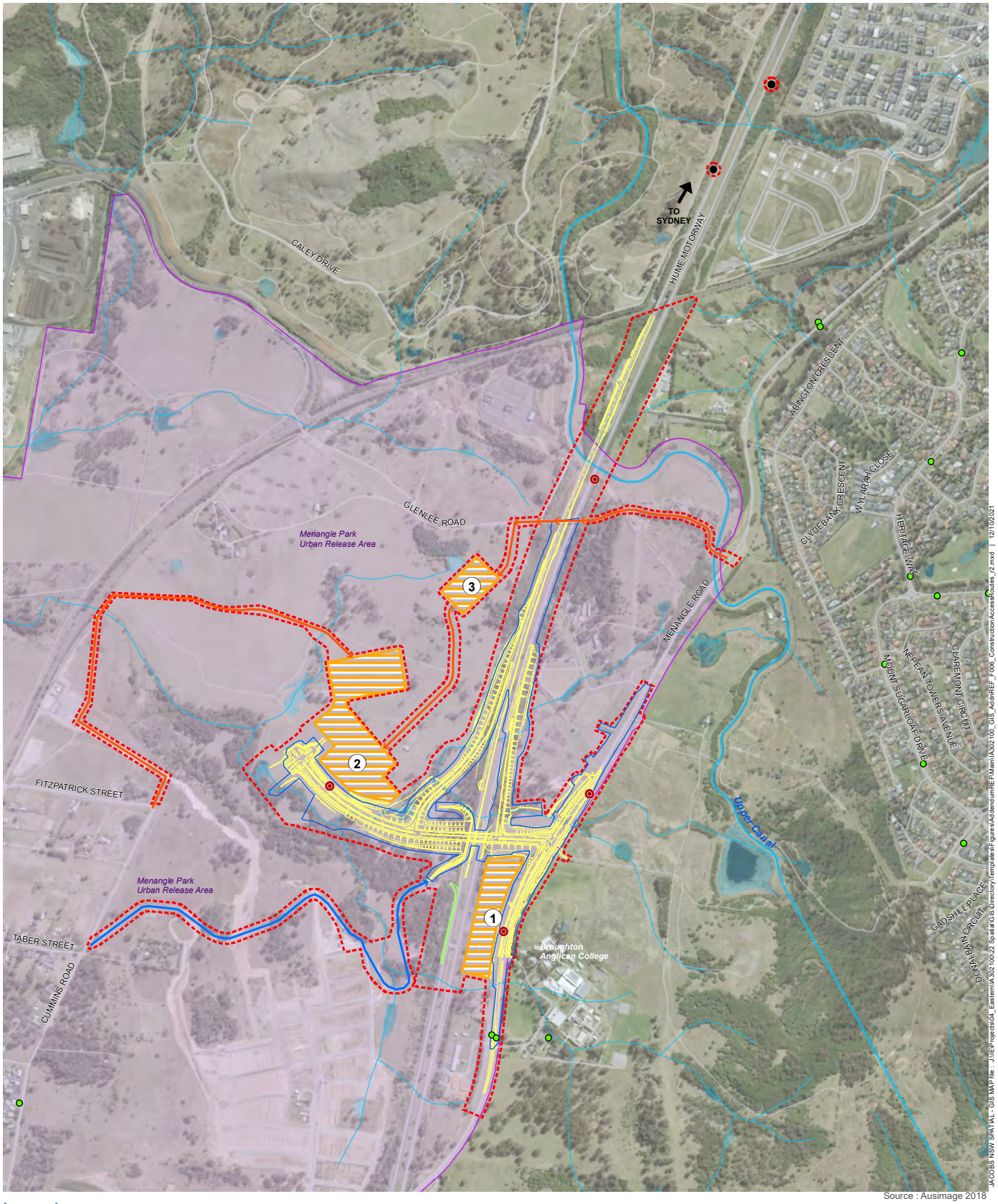
The proposed modified ancillary sites are bound by Menangle Road, Glenlee Road and Cummins Road/Fitzpatrick Street.

Indicative modified haulage/construction access routes to these sites have been developed and include Menangle Road, Glenlee Road and Cummins Road/Fitzpatrick Street. These are described below and shown in Figure 3-7.

- Access to the north eastern side of the Hume Highway would be right-in, left-out via the Upper Canal Bridge/Mark Evans Bridge and local road of Glenlee Road subject to bridge load and capacity limits
- Access to the south eastern side of the Hume Highway would be right-in, left out via the local road of Cummins Road/Fitzpatrick Street and existing Sydney Water Track
- A slight modification to the alignment of the AGL access track due to recent development works would also provide access to the south eastern side of the Hume Highway.

The main haulage routes as described in the project REF (refer to section 3.4.8) are still current. These include direct access off Menangle Road for construction activities east of Hume Highway and utilising the temporary deacceleration lane on the southbound of the Hume Highway for construction activities west of the Hume Highway.

Temporary relocation of the existing bus stop along Menangle Road, opposite Broughton Anglican College, may be required during construction works which would be undertaken in consultation with the local bus operator and the Broughton Anglican School.



Source : Ausimage 2018

JACOBS NSW SPATIAL - GIS MAP file : J:\IE\Projects\04_Eastern\A302100\22 Spatial\GIS\Directory\Templates\Figures\Addendum\REF\Main\A302100_GIS_AddnREF_F006_ConstructionAccessRoutes_r2.mxd | 12/10/2021

Legend

- Proposed modification design (80% detail design)
- Menangle Park Urban Release Area
- Site compound
- Project REF proposal area
- Study area
- Construction site access tracks
- Existing Project REF construction site access route
- Temporary deceleration lane
- Waterway
- Bus stop
- Proposed VMS locations
- Road guide signs

0 200 400m

N

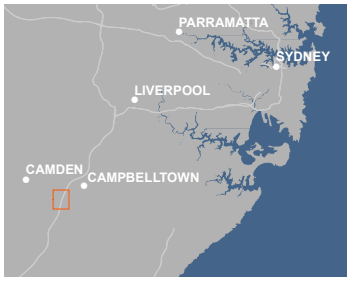


Figure 3-7 | Construction access routes

3.4 Ancillary facilities

The three proposed project REF ancillary facility sites have been modified and revised in location and size to better facilitate constructability and material handling and storage during construction. Below is an overview of changes to these ancillary facilities.

Compound 1 (Lot 9 DP 791365) - is located on the eastern side of Menangle Road, within a clear paddock opposite Broughton Anglican College. This compound has shifted slightly north and increased in size from 24,000m^2 to 28,000m^2.

The additional area to the north is a cleared paddock and based on the previous project REF ecology assessment (Niche, 2019) does not consist of any sensitive flora and fauna within its footprint.

The potential Graziers Inn local heritage item is no longer a constraint at this location with it's revised location to the east of Menangle Road and within the grounds of the Broughton Anglican College (refer to Section 6.2).

Figure 3-8 Compound 1 revised location and extent

Compound 2 (Lot 2008 DP 1234643) – is located to the west of the Hume Motorway, on the northern boundary of Spring Farm Parkway. This compound has expanded north and increased in size from 7,600m² to 61,00m².

The additional area to the north is a cleared paddock and based on the recent ecology assessment (Niche,2021) (refer to Section 6.7 and Appendix C) the area consists of non-native exotic grasses and low condition derived native grassland (DNG).

The native grass species are associated with plant community type PCT 850 - *Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin* (PCT 850). However, based on the poor condition, it does not meet the listing as defined under the EPBC Act.

The compound is north west of two existing Aboriginal archaeological sites (52-24491 & 52-2-4492).

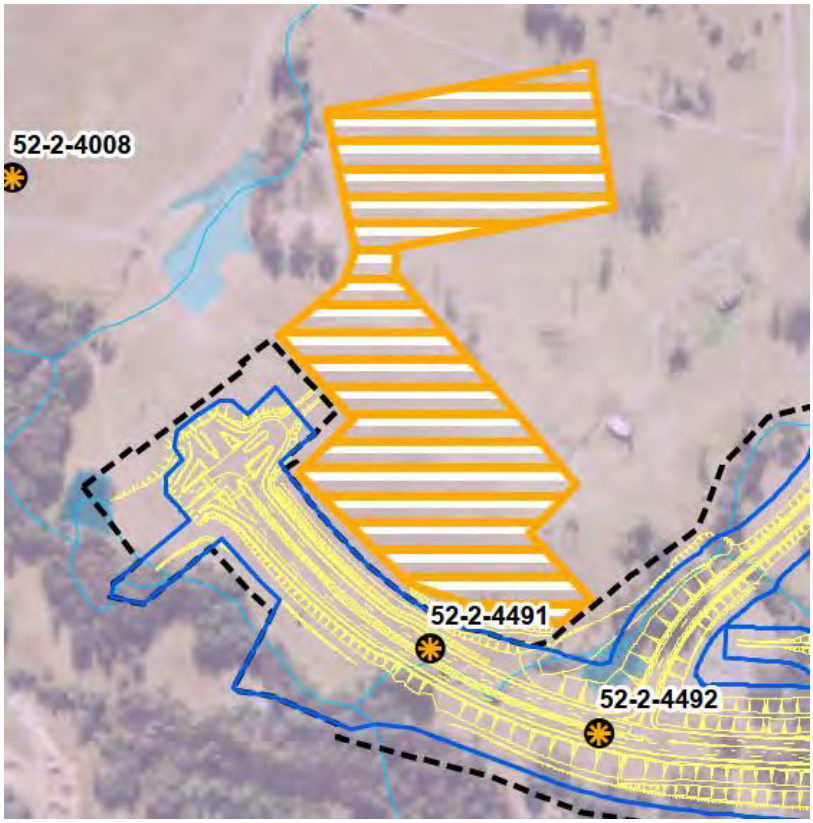


Figure 3-9 Compound 2 revised location and extent

Compound 3 (Lot 2006 DP 1234643) – is located site on the western side of the Hume Motorway and has shifted from adjacent to the northbound entry ramp to be closer to Glenlee Road. This compound has increased in size from 9,500m²to 13,500m².

The additional area to the north is a cleared paddock and based on the recent ecology assessment (Niche, 2021) (refer to Section 6.7 and Appendix C) the area consists of non-native exotic grasses.

Figure 3-10 Compound 3 revised location and extent

3.5 Public utility adjustment

Public utility adjustments, as detailed in Section 3.6 of the project, are still current with the addition of the following modified scopes as detailed Table 3-4 below.

Table 3-4 Public utility adjustments

Utility	Location	Adjustment
AAPT (PowerTel / TPG)	As per project REF	**Relocation** to the eastern side of Menangle Road in a shared trench. TPG asset will then cross Menangle Road and run adjacent to SFP and the Exit ramp. Relocation works outside of the project boundary are to be undertaken by TPG. If any additional ground disturbance or traffic management (such as lane closures) are identified to be required by TPG, further environmental assessment will be carried out in consultation with Transport for NSW Environmental Section.
AGL Energy	As per project REF	**Relocation** at the major box culvert outlet on the southern side of SFP. Remaining AGL assets to remain in place.
APT Management Services (APA)	As per project REF	Further assessment is being carried out pending results of APA's load study.
Endeavour Energy	As per project REF	Pad Mound sub location has been moved from north of Menangle Road intersection to South of Menangle Road intersection.
Jemena	Menangle Road	**Protection:** Jemena to install protection slabs as agreed when laying their new main prior to SFPS1 works.
Jemena Eastern Gas Pipeline	As per project REF	As per project REF.
Jemena Gas Land Services NSW	One high pressure gas main crossing Menangle Road and Hume Motorway	No protection slabs required based on load study results for existing assets.
NBN	As per project REF	**Relocation** to proposed shared trench on eastern side of Menangle Road.
NextGen	One optical fibre conduit runs on the western side of Menangle Road	**Relocation** to proposed shared trench on eastern side of Menangle Road.

Optus	North-eastern side of Menangle Road	As per project REF no impact.
Telstra	As per project REF	**Relocation** to proposed shared trench on eastern side of Menangle Road. **Relocation** to existing verge on the western side of the Hume Motorway. **Relocation** of 2 x existing emergency telephones on the Hume Motorway northbound carriageway.
Sydney Water	Sydney Water have multiple watermains and one sewer main within the proposal area: • Western side of the Hume motorway • Eastern side of Menangle Road • Crossing under the Hume Motorway.	**Relocation:** 2 x DN200 water mains are being relocated to avoid clashes with the project works. All other Sydney Water assets are to remain in place.

3.6 Property acquisition

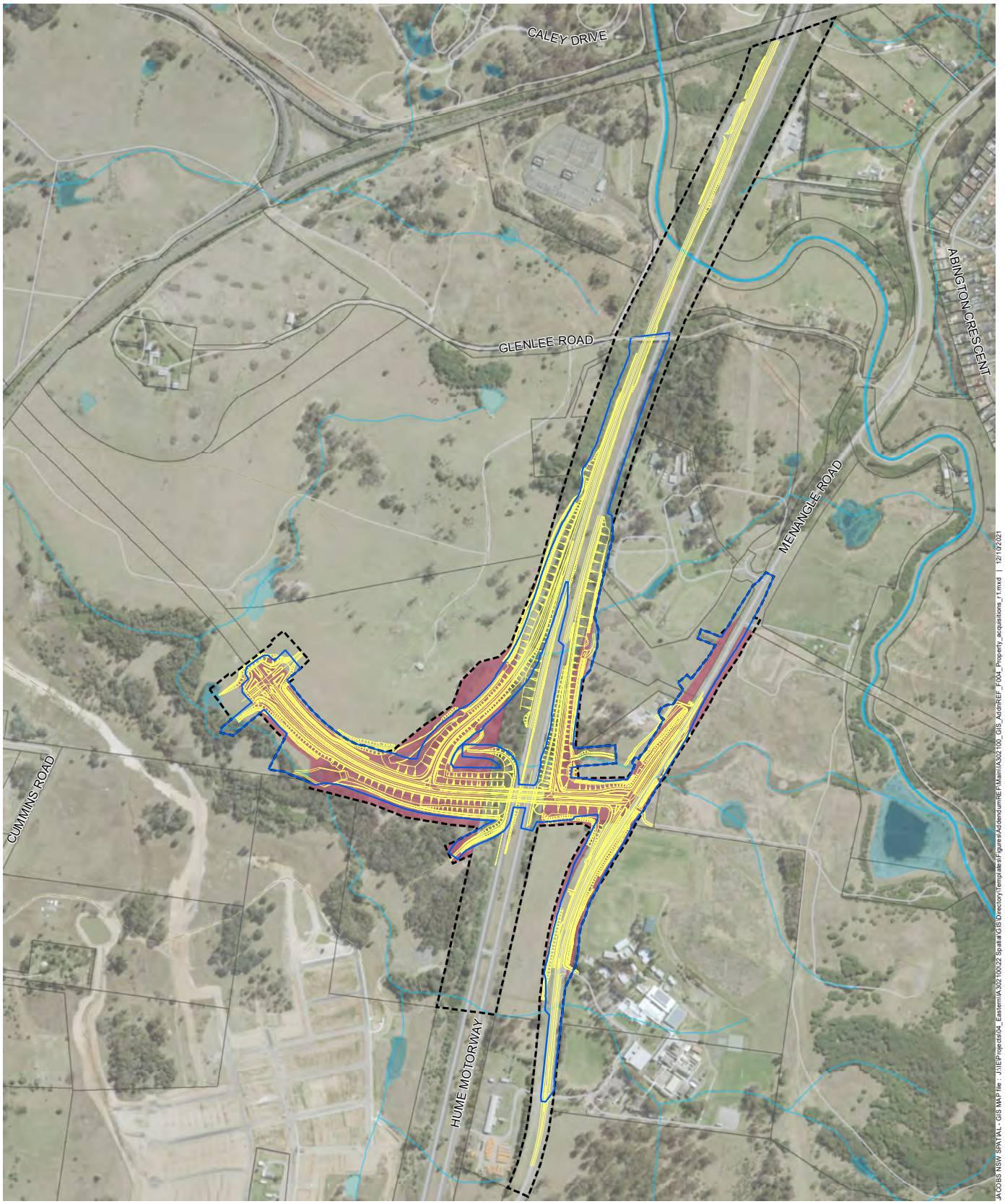
Figure 3-11 provides an overview of the existing cadastre boundaries and proposed property acquisition required for the modified project.

Table 3-5 includes a summary of the impacted Lot and DP's and required acquisition area.

Table 3-5 Proposed property acquisition

Description	Acquisition type	Current owner	Lot / DP	Area Acquired (m^2)	Easement Area (m^2)	Land use zone (LEP)
Spring Farm Parkway, West of the Hume Highway	Required Acquisition / Easement	Dahua Group	Lot 2006 DP1234643	16,491	2928	R2, R5 and RE1
Spring Farm Parkway, West of the Hume Highway	Required Acquisition	Dahua Group	Lot 2007 DP1234643	13,195	-	RE1
Spring Farm Parkway, West of the	Required Acquisition	Landcom	Lot 2011 DP1234643	48,574	-	SP2

Hume Highway						
Spring Farm Parkway, West of the Hume Highway	Required Acquisition	Landcom	Lot 2012 DP1234643	1,047	-	SP2
	Required Acquisition	Dahua Group	Lot 1 DP598067	2,221	-	SP2
	Required Acquisition	Landcom	Lot 1002 DP1234642	12,499	-	
	Required Acquisition	Dahua Group	Lot 9 DP249530	436	-	RE1
	Easement	Mapplethorpe	Lot 3004 DP802845	4,674	1007	R5
96 Menangle Road	Easement	Mapplethorpe	Lot 11 DP249530	7,369	293	R5
116 Menangle Road	Easement	Wilson	Lot 12 DP249530	23,932	3149	R5
Sugarloaf Horse Centre, Eastern side of Menangle Road	Required Acquisition	NSW Office of Strategic Lands	Lot 2 DP842735	5,494	-	E3
	Required Acquisition	Fitzpatrick	Lot 12 DP791365	805	-	RU2
Eastern side of Menangle Road	Required Acquisition	Broughton Anglican College	Lot 19 DP249334	4,059	-	RU2
Eastern side of Menangle Road	Required Acquisition	Prestia	Lot 9 DP791365	5,874	-	RU2
Eastern side of Menangle Road	Required Acquisition	Broughton Anglican College	Lot 40 DP1082972	654	-	RU2
Western side of the Menangle Road	Required Acquisition	NSW Steam Preservation Co-operative Society	Lot 2000 DP790848	139	-	R5



Source : Ausimage 2018

Legend

- Proposed modification design (80% detail design)
- Project REF proposal area
- Operational road corridor
- Waterway
- Property acquisition
- Cadastre

NOTE: Subject to detailed design

0 200 400m

N

Figure 3-11 | Proposed property acquisition

4 Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies (SEPP)

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of 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 proposed modification is for a road and is to be carried out by Transport for NSW, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP), State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

Part 2 of ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

Consultation, including consultation as required by ISEPP (where applicable), is discussed in Chapter 5 of this addendum REF.

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 relates to the use of land within the Sydney drinking water catchment. Clause 12 of the SEPP requires consideration of whether or not an activity to which Division 5.1 of the EP&A Act applies will have a neutral or beneficial effect on water quality before carrying out the activity.

The proposal is not located within the boundary of Sydney's Drinking Water Catchment.

State Environmental Planning Policy No. 44 – Koala Habitat Protection

The Campbelltown Local Government Area (LGA) is listed in Schedule 1 of the State Environmental Planning Policy No 44 – Koala Habitat Protection. The policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas.

A biodiversity assessment carried out for the project REF (Section 6.7 of project REF) found that it was unlikely that the study area contains core koala habitat as defined in SEPP 44, given the poor condition of the habitats in the study area and the absence of any signs of koalas during the targeted surveys.

A biodiversity assessment carried out for the proposed modification as part of this addendum REF (refer to Section 6.7) has concluded the same result.

State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land promotes the remediation of contaminated land and specifies when development consent is required to carry out remediation work. SEPP 55 describes 'category 1 remediation work' as requiring development consent and 'category 2 remediation work' as not requiring development

consent. In SEPP 55 'remediation' is defined 'as removing, dispersing, destroying, reducing, mitigating or containing the contamination of any land, or eliminating or reducing any hazard arising from the contamination of any land (including by preventing the entry of persons or animals to the land)'.

Initial preliminary investigations carried out for the proposed modification indicate the potential for contamination at site that would require excavation and emplacement in a dedicated onsite encapsulation cell or off-site disposal. The removal of surplus fill would meet the definition of remediation if the fill is contaminated, which would mean that SEPP 55 can be applied.

As the proposed modification is permissible without consent under the Infrastructure SEPP, if remediation work is required it would be classified as Category 2 Remediation Work. This category would not require development consent under section 14 of SEPP 55, and therefore can be applied to the proposed modification. The assessment of potential contamination impacts of the proposed modification and measures on how to mitigate these can be found in Section 6.8.

Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River (No 2 –1997)

All regional environmental plans are now deemed SEPPs. The proposed modification is located on land to which Sydney Regional Environmental Plan No. 20 – Hawkesbury Nepean River (No.2 – 1997) (SREP 20) applies. The aim of SREP 20 is to protect the environment of the Hawkesbury Nepean River System. The proposed modification does not require consent under SREP 20. However, under Clause 4(1)(b), the matters listed under Clauses 5 and 6 that apply to a proposal must be considered by a public authority or State owned corporation carrying out development that does not require consent. Table 4-1 addresses these matters as they apply to the proposal.

Table 4-1 SEPP Considerations of proposed modification

Consideration	Comment
Clause 5 general planning considerations are:	
The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impact of future land uses is considered in a regional context.	The Addendum REF assesses the impacts of the proposed modification and considers the potential regional impact of its construction and operation. The proposed modification is not anticipated to have regional level impacts.
The strategies listed in the Action Plan of the Hawkesbury-Nepean Environmental Planning Strategy.	The proposed modification is not inconsistent with the strategies listen in the Action Plan.
Whether there are any feasible alternatives to the development or other proposal concerned.	Chapter 2 (Need and options considered) describes and assesses options of the proposed modification.
The relationship between the different impact of the development or other proposal and the environment, and how those impacts would be addressed and monitored.	Chapter 6 (Environmental assessment) assesses the impact of the proposed modification. The proposed modification is not expected to significantly impact the Hawkesbury Nepean River System environment.
Clause 6 specific planning policies and recommended strategies are:	

Specific planning policies and recommended strategies.	The specific planning policies and recommended strategies have been noted in Chapter 4 (Statutory and planning framework) and considered throughout the environmental assessment in Chapter 6. Mitigation measures that are consistent with SREP 20 have been outlined in Chapter 7 (Environmental management).

4.1.2 Local Environmental Plans

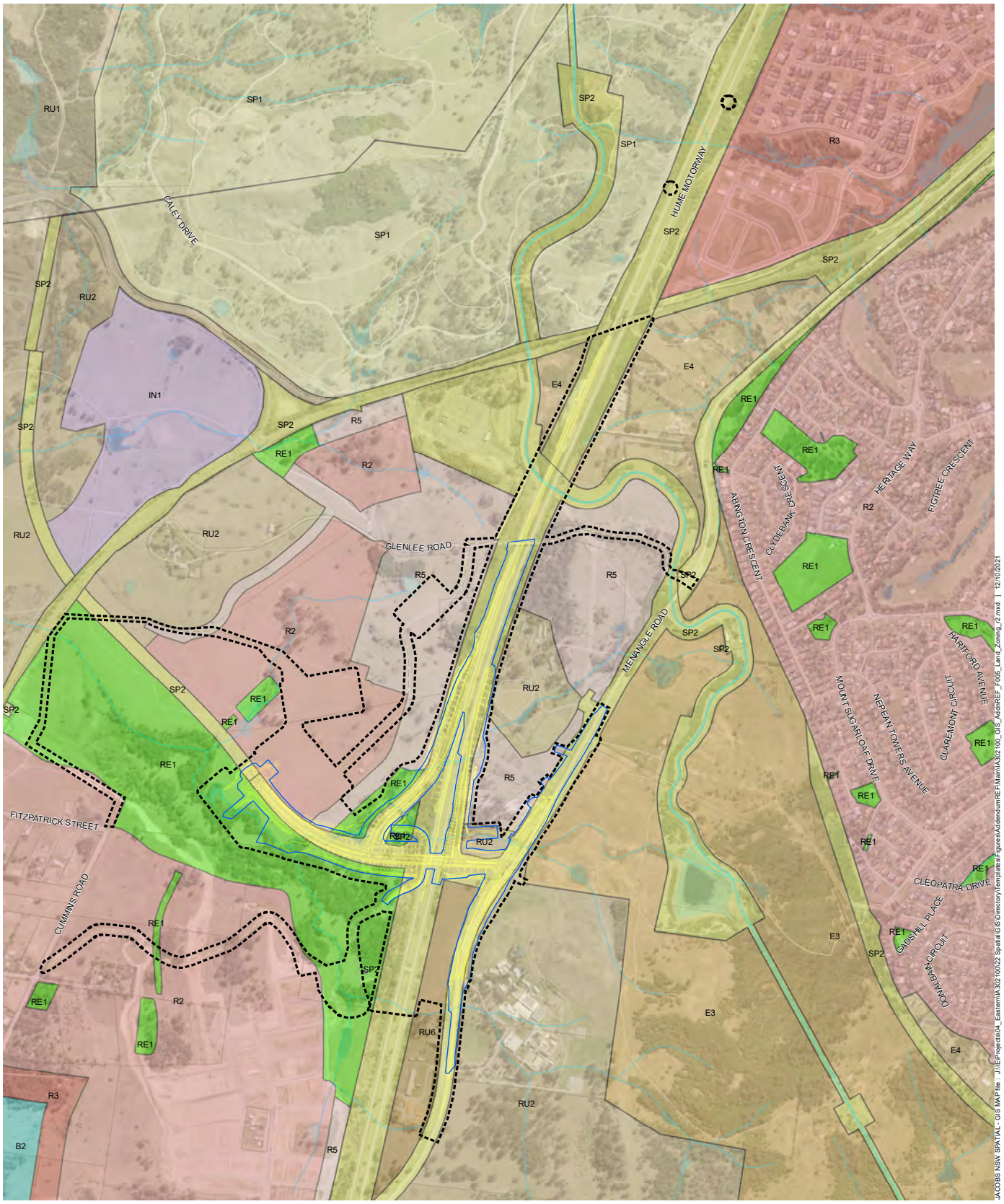
The proposal is within the Campbelltown and Camden local government areas. Development and land use within these areas are primarily regulated by the Campbelltown Local Environmental Plan 2015 (Campbelltown LEP). The zonings which apply to the land affected by the proposal are outlined with their objectives in Table 4-2.

Table 4-2 Consistency of proposed modification with LEP zoning

LEP Zone	Objectives	Consistency of the proposed modification with the objectives
Campbelltown LEP		
RE1-Public Recreation	• To enable land to be used for public open space or recreational purposes • To provide a range of recreational settings and activities and compatible land uses • To protect and enhance the natural environment for recreational purposes • To provide for land uses compatible with the ecological, scientific, cultural, or aesthetic values of land in the zone • To facilitate the multiple use of certain open space areas • To facilitate development that is ancillary or incidental to the special land uses provided for in this zone • To provide for the sufficient and equitable distribution of public open space to meet the needs of the local community • To preserve and rehabilitate bushland, wildlife corridors and natural habitat, including waterways and riparian lands, and facilitate public enjoyment in these areas • To provide for the retention and creation of view corridor • To protect and enhance areas of scenic value and the visual amenity of prominent ridgelines	Yes – The proposed modification would amend the original proposal with shorter road tie ins and an alignment that better suits the natural landscape which would protect areas of scenic value and visual amenity.

LEP Zone	Objectives	Consistency of the proposed modification with the objectives
	• To preserve land that is required for public open space or recreational purposes.	
SP2 – Infrastructure	• To provide for infrastructure and related uses • To prevent development that is not compatible with or that may detract from the provision of infrastructure • To encourage activities involving research and development • To optimise value-adding development opportunities, particularly those associated with research • To provide for the retention and creation of view corridors • To preserve bushland, wildlife corridors and natural habitat • To maintain the visual amenity of prominent ridgelines.	Yes – the proposed modification improves on the design of the original proposal and is consistent with the objectives of this land zone.
R2 – Low Density Residential	• To provide for the housing needs of the community within a low density residential environment • To enable other land uses that provide facilities or services to meet the day to day needs of residents • To enable development for purposes other than residential only if that development is compatible with the character of the living area and is of domestic scale • To minimise overshadowing and ensure a desired level of solar access to all properties • To facilitate diverse and sustainable means of access and movement.	Yes – the proposed modification, consistent with the original proposal, improves and supports access to and from this residential area.
RU2 – Rural Landscape	• To encourage sustainable primary industry production by maintaining and enhancing the natural resource base • To maintain the rural landscape character of the land • To provide a range of compatible land uses, including extensive agriculture • To preserve and enhance bushland, wildlife corridors, natural habitat, and water resources, including waterways, ground water and riparian land	Yes - The proposed modification would amend the original proposal and shorten road tie ins, which would decrease the encroachment into this land zone on the eastern side of Menangle Road. The use of this land use from the remaining construction

LEP Zone	Objectives	Consistency of the proposed modification with the objectives
	• To protect and enhance areas of scenic value, and the visual amenity of prominent ridgelines, by minimising development and providing visual contrast to nearby urban development.	footprint would not be compromised or detracted.
E3 – Environmental Management	• To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values • To provide for a limited range of development that does not have an adverse effect on those values • To enable development for purposes other than rural-residential only if that development is compatible and complementary, in terms of design, size and scale, with the character of land in the zone • To allow cellar door premises, restaurants and cafes only where they are directly associated with the agricultural use of the land • To protect, and maintain the environmental, ecological and visual amenity of, the Scenic Hills, the Wedderburn Plateau and environmentally sensitive lands in the vicinity of the Georges River from inappropriate development • To preserve the rural heritage landscape character of the Scenic Hills • To protect and enhance areas of scenic value and the visual amenity of prominent ridgelines • To protect bushland, wildlife corridors and natural habitat, including waterways and riparian lands • To ensure the preservation and maintenance of environmentally significant and environmentally sensitive land.	Yes – The proposed modification is consistent with the original proposal, and has been designed to reduce the required impact on and loss of areas of high ecological, scientific, cultural or aesthetic values by restriction work in these areas where possible. Measures have been taken to ensure feasible and reasonable controls would be implemented to minimise any impact.



Source : Ausimage 2018

JACOBS NSW SPATIAL - GIS MAP file : J:\IE\Projects\04_Eastern\A302100\22 Spatial\GIS\Directory\Templates\Figures\Addendum\REF\Main\A302100_GIS_AddnREF_F005_Land_Zoning_r2.mxd | 12/10/2021

Legend

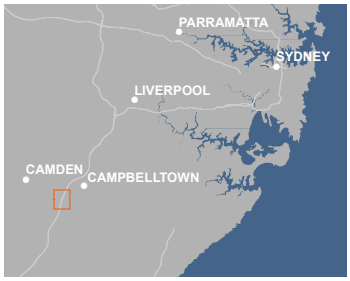
- Proposed modification design (80% detail design)
- Project REF proposal area
- Proposed modification assessment area
- Waterway
- Cadastre

Land zoning

- B2 Local Centre
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- R2 Low Density Residential
- R3 Medium Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RU1 Primary Production
- RU2 Rural Landscape
- RU6 Transition
- SP1 Special Activities
- SP2 Infrastructure

0 200 400m

N



NOTE: Subject to detailed design

Figure 4-1 | Land zoning

4.2 Other relevant NSW legislation

4.2.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) is the primary legislation dealing with Aboriginal cultural heritage in NSW. Items of Aboriginal cultural heritage (Aboriginal objects) or Aboriginal places (declared under Section 84) are protected and regulated under the NPW Act. Aboriginal objects are protected under section 86 of the Act. Under section 90(1) of the Act the Director-General may issue an Aboriginal heritage impact permit (AHIP) for an activity which would harm an Aboriginal object.

An Aboriginal cultural heritage assessment report (CHAR) has been prepared for the proposed modification in accordance with the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011) and is summarised in Section 6.3 and detailed in full in Appendix D.

One identified Aboriginal heritage site will be directly impacted by the modified project and an AHIP application is required for sections of the site and is to be submitted and approved prior to works impacting this item. Impacts would be managed by safeguards and mitigation measures outlined in Section 6.3.4. Any unexpected Aboriginal heritage items found during construction of the modified project which are not assessed in this Addendum REF, or the project REF, would be managed in accordance with *The Standard Management Procedure – Unexpected Heritage Items* (Roads and Maritime, 2015).

4.2.2 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to protect items of State and local heritage significance and outlines the process for the approval of development that may impact on items of heritage significance.

Matters protected under the Act include items subject to an Interim Heritage Order and items listed on the State Heritage Register, the heritage schedules of local council Local Environmental Plans (LEPs), and the heritage and conservation registers established under section 170 of the Act by NSW Government agencies (section 170 Registers). The Act also provides for the protection of archaeological 'relics', being any deposit, object or material evidence that relates to the non-Aboriginal settlement of NSW and is of State or local heritage significance. Under section 57(1), approvals are required for work to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register (SHR). An excavation permit under section 139 is required to disturb or excavate any land containing or likely to contain a relic.

A Statement of Heritage Impact Assessment (SOHI) has been prepared for the proposed modification and is summarised in Section 6.2 and detailed in full in Appendix E. The proposed modification would not directly impact the heritage curtilage of the Upper Canal System (Pheasants Nest Weir to Prospect Reservoir), however it may indirectly impact the Hume Motorway overbridge and the Glenlee Road Bridge which form part of this heritage item. Works near the Hume Motorway overbridge may be self-assessed under Section 57(2) of the Heritage Act. The usage of the Glenlee Road bridge may require a permit approval under Section 60 of the Heritage Act and will be confirmed prior to construction works. The proposed modification would directly impact the area of archaeological potential at Grazier's Arms Inn curtilage. As an area of identified potential for archaeological relics of local significance, this will require an excavation permit as per Section 140 of the Heritage Act. Further management measures and application of the requirements administered under the Heritage Act would then be confirmed. The proposed acquisition of land within the Sugarloaf Farm (SHR 01389) SHR curtilage will require an application under Section 60 of the Heritage Act for the subdivision and change of ownership. Depending on the staging of

acquisition and the road works a separate approval to undertake the proposed works may also be required.

4.2.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017, repealing the *Threatened Species Conservation Act 1995*. The BC Act seeks to conserve biological diversity and promote ecologically sustainable development (ESD); to prevent extinction and promote recovery of threatened species, populations and ecological communities; and to protect areas of outstanding biodiversity value. The BC Act provides a listing of threatened species, populations and ecological communities, areas of outstanding biodiversity value, and key threatening processes.

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act or *Fisheries Management Act 1994* (FM Act), are assessed using a five-part test. Where a significant impact is likely to occur, a SIS or Biodiversity Assessment Report (BAR) must be prepared in accordance with the Director-General's requirements.

An assessment of the potential impact to biodiversity is provided in Section 6.7.

The following threatened biodiversity listed on the BC Act are known to occur or considered likely to occur in the study area:

- Cumberland Plain Woodland – listed as a Critically Endangered Ecological Community (CEEC) under the BC Act
- Pimelea spicata (spiked Rice-flower) – listed as Endangered under the BC Act
- Southern Myotis (Myotis macropus), Large Bent-winged Bat (Miniopterus orianae oceanensis), Little Bentwing Bat (Miniopterus australis) and the Large-eared Pied Bat (Chalinolobus dwyeri) – listed as Vulnerable under the BC and EPBC Acts.

The potential impact of the proposal on the threatened species, threatened ecological community and their habitats have been assessed via the application of the Five Part Test under the BC Act. The proposed modification is unlikely to have a significant impact on these species.

4.2.4 Fisheries Management Act 1994

The Fisheries Management Act 1994 (FM Act) aims to conserve, develop and share the fisheries resources of the State for the benefit of present and future generations, including conserving fish stocks and key fish habitats and promoting ecologically sustainable development. The FM Act applies to all waters within the limits of the State, except where Commonwealth legislation applies.

Threatened species, populations and ecological communities of fish and marine vegetation are protected under the FM Act. In addition, an object of the FM Act is to conserve key fish habitat. Permits from NSW Department of Primary Industries (DPI) – Fisheries are required for certain impact in key fish habitat, including blocking of fish passage.

Within the study area there are three unnamed tributaries/drainage lines that are directly traversed by the proposal and all drain in a westerly direction towards the Nepean River. Waterways (Tributary 1, and Drainage Lines 1a and 1b) were assessed against the Key Fish Habitat "Types" in the Department of Primary Industries (DPI) *Policy and Guidelines for Fish Habitat Conservation and Management* (2013) (DPI, 2013) and the *Fish Passage Requirements for Water Crossings* (Fairfull & Witheridge, 2003).

Overall the majority of the waterways were classified 'Class 4' unlikely key fish habitat, with a section of Tributary 1 to the west of the Hume Motorway classed conservatively as 'Type 2' key fish habitat. The waterways are not considered to be sensitive receiving environments.

Refer to Section 6.4 and Appendix E of the project REF for an assessment of the condition of these waterways.

The construction of the proposed modification would be in proximity to these watercourses and may impact water quality due to the disturbance of bed and banks, potentially resulting in erosion, sedimentation, and alteration of downstream flows. This may result in the temporary displacement of aquatic fauna (such as frogs and tadpoles) and temporary changes to the turbidity and sedimentation of waterways. These impacts are unlikely to affect threatened species of fish protected under the FM Act. Impacts to other biodiversity would be managed in accordance with the safeguards and management measures mentioned in Section 6.7.4.

As per the NSW DPI Policy and Guidelines for fish habitat, under s199 of the FM Act, the Minister for Primary Industries is to be consulted over any dredging or reclamation works carried out, or proposed to be authorised, by a public authority (other than a local government authority) (i.e. any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land that disturbs, moves or harms these in stream habitats); and a Part 7 Fisheries Management Act Permit may be required. This work would not be carried out as part of the proposed modification. No permits or further consideration of the FM Act is required.

As the proposed modified access track utilising an existing bridge structure, direct impacts to in stream habitats is unlikely and a Permit under the FM act is not required.

4.2.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) provides for the issue of an Environment Protection Licence (EPL) for scheduled activities.

An EPL would be required for the scheduled activity of ***road construction***, as the proposed modification falls under the definition in s156 as 'the existence of 4 or more traffic lanes (other than bicycle lanes or lanes used for entry or exit) of at least 1 kilometre—where the road is in a metropolitan area and is classified, or proposed to be classified, as a freeway or tollway under the *Roads Act 1993*.'

Section 148 of the POEO Act requires immediate notification of pollution incidents causing or threatening material harm to the environment to each relevant authority. Incident management measures would be included in the CEMP.

4.2.6 Waste Avoidance and Resource Recovery Act 2001

The purpose of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) is to develop and support the implementation of regional and local programs to meet the outcomes of a State-wide strategy for waste avoidance and resource recovery. It also aims to 'minimise the consumption of natural resources and final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste'.

Waste generation and disposal reporting would be carried out during the construction and operation of the proposal. Procedures would be implemented during construction in an attempt to promote the objectives of the Act.

4.2.7 Coal Mine Subsidence Compensation Act 2017

The *Coal Mine Subsidence Compensation Act 2017* was passed by the NSW Parliament in August 2017. The Act, which repealed and replaced the *Mine Subsidence Compensation Act 1961*. The purpose of this Act is to make provision of the payment of compensation for damage caused by subsidence arising from coal mining. The Act also includes conditions

relating to the approval of development within mine subsidence districts, and functions and powers of the Subsidence Advisory NSW (previously the Mine Subsidence Board). Part 3 of the Act outlines the conditions and approvals required for development within mine subsidence districts.

The proposed modification is located within the South Campbelltown Mine Subsidence District. Approval under section 22 of the *Coal Mine Subsidence Compensation Act 2017* was granted for the project and proposed modification, subject to conditions detailed in Section 6.13.2 of the project REF.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

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

The proposed modification will result in clearing of up to 5.51 ha of potential habitat in a low condition for *Pimelea spicata* (Endangered, BC Act and EPBC Act). An Assessment of Significance (AoS) under the BC Act and EPBC Act was undertaken (refer to Appendix C) The AoS concluded that a significant impact as a result of the proposal was unlikely.

Construction of the modified project would result in heavy vehicles accessing site via a bridge in the western portion of the study area, which provides potential habitat for threatened microbat species. Heavy vehicles may cause an indirect impact in the form of vibrations. Given this potential, further assessment via an AoS for potential microbat species was undertaken (refer to Appendix C) which found significant impacts as a result of the modified project works were unlikely. Safeguards have been put in place (refer to Section 6.7.4) to state that a stop works, and further assessment procedure (by an ecologist) should be implemented if microbats are encountered during construction.

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

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

4.4 Confirmation of statutory position

The proposed modification is categorised as development for the purpose of a road and/or road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of ISEPP the proposed modification is permissible without consent. The proposed modification is not State significant infrastructure or State significant development. The proposed modification can be assessed under Division 5.1 of the EP&A Act. Consent

from Council is not required. ISEPP requirements for consultation with local council to inform them of the project have been fulfilled as part of the project REF and is relevant to the proposed modification as well. This is detailed in Section 5 of the project REF.

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

5 Consultation

5.1 Consultation strategy

The consultation strategy for the project remains consistent with that described in Section 5.1 of the project REF. Public display of this Addendum REF was not considered necessary given that targeted consultation has occurred and is proposed.

5.2 Consultation outcomes

Consultation with the following stakeholders occurred during the development of the detailed design (including the elements of the proposed modification):

- Campbelltown Council – regarding flooding criteria, future widening and south facing ramp, maintenance responsibility, intersection performance based on project traffic model
- Residences and property owners – regarding property adjustments and fencing requirements
- Mine Subsidence Board – regarding subsidence requirements during design development of both road works and bridge structures
- Utility Providers – regarding required adjustments
- Broughton Anglican College – regarding access issues, shared path arrangements and finished treatments including fencing types
- Environmental Protection Agency (EPA) – regarding project Environmental Protection Licensing (EPL) requirements
- Water NSW- Regarding load limits and use of the Upper Canal bridge structures
- Transport Management Centre (TMC) – regarding decommissioning of the uniformalised rest area and construction staging requirements
- Heavy vehicle industry - regarding decommissioning of the uniformalised rest area
- Local Bus networks – regarding interaction with local bus network during construction and operation
- Developers – regarding interfaces during construction and operation.

5.3 Aboriginal Community Consultation

The revised draft Cultural Heritage Assessment Report (CHAR), which forms part of the Addendum REF (Refer to Section 6 an Appendix D) was provided to registered aboriginal stakeholders for a 28-day review and comment period.

During this period an Aboriginal Focus Group (AFG) meeting was undertaken on 19 October 2021 with registered Aboriginal Parties to present the proposed modifications as detailed within this Addendum REF.

Reponses received from the stakeholders during this review period are included in final CHAR (refer to Appendix D).

5.4 Specific Consultation regarding decommissioning of the non - formalised rest area

Transport for NSW have undertaken consultation with a range of stakeholders including NSW Freight Team regarding the decommissioning of the non-formalised rest area during construction of Spring Farm Parkway Stage 1.

The existing site is a paved area adjacent to the Hume Motorway northbound carriageway (refer to Figure 1-2). There are no rest area facilities such as toilets/shelter/picnic areas and it is not included in Transport for NSW formal listing of NSW rest areas. There is no signage to advice motorists of this rest area.

Outlined below is an overview of the consultation process and outcomes to date.

5.4.1 Investigations undertaken

Investigations were undertaken to collect information regarding the uniformalised rest area to understand existing usage and impacts. These investigations included:

- site visit
- Transport for NSW internal stakeholder meetings
- survey (online/ voice message/ emails to freight operators/ webpage update)
- site monitoring for a period of three weeks (19 March 2020 to 9 April 2020)
- rest area network mapping.

5.4.2 Feedback obtained from existing non-formalised rest area users

Along with the site survey, stakeholder consultation was undertaken. An online survey was circulated through various channels to obtain feedback from the users of the unformalised rest area. The survey was advertised through the following channels:

- Emails to Freight operators with the survey link
- Project webpage was updated with the survey link
- Portable Variable Message Sign (VMS) was placed at the Dustbowl site advising the survey.

Key results from the survey include:

- 120 operators responded to the survey
- 87% of the operators indicated they operate OSOM vehicles
- 85% of the operators indicated that they accessed the non-formalised rest area from the south or Port Kembla/ Illawarra
- 79% of the operators indicated the key reason for using the unformalised rest area was as a layover point to wait until travel restrictions through Sydney are lifted at midnight
- 61% of operators indicated that they would use Pheasants Nest or Cataract Rest Area if the non-formalised rest area was closed. The remaining 39% raised issues in using Pheasants Nest/ Cataract Rest Area including:
    - Pheasants Nest Rest Area has limited bays for OSOM vehicles.
    - Some OSOM vehicles had issues entering/exiting Pheasants Nest Rest Area due to the constraints with turning radius
    - Some of the OSOM operators noted that the Cataract Rest Area has parallel parking, because of which wide-bodied trucks couldn’t use the Rest Area

5.4.3 Outcomes of the traffic counts and online survey

Key outcomes of the investigations include:

- Non-formalised rest area usage by light vehicles is less than 0.5%. Light vehicles have an option to rest at Pheasants Nest as well as many other rest area opportunities present in Sydney region.

- Non-formalised rest area usage by heavy vehicles is slightly more than 1%. Heavy vehicles coming from the south have an option to use Pheasants Nest Rest Area, 26km before the site. Heavy vehicles coming from Illawarra/ Port Kembla have an option to use Cataract Rest Area, 31km before the site on Picton Rd. Both these rest areas are considered a better alternative to the unformalised rest area as they are equipped with basic rest area facilities and safety features.
- OSOM vehicle usage of the non-formalised rest area is less than 0.5% of all passing OSOM vehicles. 39% of the operators sighted issues with using alternate rest areas if the site was not available.

In summary both light and heavy vehicles have sufficient alternatives in the absence of the non-formalised rest area.

5.4.4 Consultation outcomes of decommissioning non-formalised rest area

Investigations into the network impact of closing the non-formalised rest area has been considered based on data of existing usage, alternate rest area facilities and projects, rest area guidelines and strategies, road safety.

These investigations have found that closing the non-formalised rest area would:

- Improve the safety of the Hume Motorway due to better managing safe access
- Still, enable TfNSW to meet minimum Austroads rest area spacing and travel time requirements
- Provide an opportunity to encourage current users to utilise the Pheasants Nest rest area that is currently being upgraded to cater for additional OSOM vehicles.

5.5 Ongoing or future consultation

Ongoing or future consultation would be consistent with Section 5.6 of the project REF.

As noted above, further consultation with road users regarding decommissioning of the non-formalised rest area and community updates on the progress of this consultation will be undertaken by Transport for NSW.

Formal consultation with NSW State Emergency Services (NSW SES) is currently being undertaken as part of ISEPP clause 15AA, as the modified project is located on flood liable land. Details of the of modified project and the existing case flood maps were provided and input is being awaited from NSW SES on any issues or concerns they may have. Any feedback will be considered prior to works commencing, which may include an update to the CEMP or further environment assessment.

6 Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification (referred to as the modified project) of Stage 1 – Spring Farm Parkway. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the factors specified in the guidelines *Roads and Related Facilities EIS Guideline* (DUAP, 1996) and *Is an EIS required?* (DUAP, 1999) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000. The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix A.

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

6.1 Traffic and transport

A Traffic and Transport assessment was completed to identify the potential impacts from the construction and operation of the modified project on the traffic and transport network. The assessment is detailed in Appendix F of this document and is summarised below.

6.1.1 Methodology

The methodology for the traffic and transport assessment involved:

- A review of background information and previous traffic and transport assessments, including those outlined in the project REF
- SIDRA modelling of traffic at intersections for forecast scenarios in 2026 and 2036
- Identification of potential impacts on road network performance, public transport, as well as pedestrians and cyclists
- Identification of any mitigation or managements measures for the expected impacts.

The traffic modelling network assumptions used for this addendum Traffic and Transport assessment differ from the assumptions used in the project REF Traffic and Transport assessment due to an updated understanding of the projects to be delivered in future years.

A summary of the difference in the network assumptions used are outlined in Table 6-1 below.

Table 6-1 Network assumptions

Project	REF	Proposed modification	REF	Proposed modification
	2026		2036	
Stage 1 Spring Farm Parkway	✓	✓	✓	✓
North Facing Ramps	✓	✓	✓	✓
Stage 2 Spring Farm Parkway	✓	-	✓	✓
Widening Spring Farm Parkway to 3 lanes in each direction	-	-	✓	-
South Facing Ramps	-	-	✓	-
Connection to Appin Road	-	-	✓	-

Project	REF	Proposed modification	REF	Proposed modification
	2026		2036	
Hume Motorway 6 lanes	-	-	✓	-

Assessment criteria

The assessment of intersection performance is based on criteria outlined in and defined in the RMS (now Transport for NSW) *Traffic Modelling Guidelines* (Version 1.0, February 2013). The average delay assessed for signalised intersections is for all movements, and for priority (sign-controlled) intersections is for the worst movement and is expressed in seconds per vehicle.

Table 6-2 Traffic and Transport assessment criteria

LoS	Average delay per vehicle (seconds / vehicle)	Traffic signals and roundabouts	Give way and stop signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity, and accident study required
E	57 to 70	At capacity; at signals, incidents will cause delays. Roundabouts require other control mode	At capacity, requires other control mode
F	Over 70	Extra capacity required	Extreme delay, traffic signal or other major treatment required

In accordance with the guidelines, intersection performance of Level of Service (LoS) D or better was established as the target criteria. This constitutes an average delay per vehicle at an intersection between 43 and 56 seconds and the intersection is considered to be operating at near capacity.

6.1.2 Existing environment

The existing environment of the proposed modification is generally consistent with that outlined in the project REF. This is summarised below.

Land use

The site is located southwest of Sydney on the outskirts of the urban areas of Greater Sydney. The local land use is a mix of newly developed urban areas and rural properties, with much of the rural landscape adjacent to the site undergoing development to become urban areas.

The nearest township is Menangle Park which is located on Menangle Road and the southern rail line. West of the site are the newly developed areas of Glen Alpine and Rosemeadow. The nearest major retail centre to the site is the Macarthur Square shopping centre to the north-east. Broughton Anglican School is the closest development to the site and is located immediately south-east.

Road network

The site consists of part of the Hume Motorway and Menangle Road, as well as local streets within the Menangle Park township. The Hume Motorway is part of the national highway linking Sydney to Melbourne and Canberra. The section of the Motorway within the site consists of two lanes in both directions with a speed of 110 km/h on a divided carriageway. Menangle Road provides access to Menangle Park, Menangle townships and crossings of the southern railway and Hume Motorway. It consists of a single lane in both directions with a speed of 100 km/h.

Traffic volumes

The typical volumes for the Hume Motorway, obtained from the Transport for NSW permanent count station located near Menangle (ID 07737), show in that in 2017 there is an Average Annual Daily Traffic (AADT) of 52,000 vehicles per day. The peak weekday periods show that the volumes are quite balanced in the peak periods with equivalent amounts of traffic travelling northbound and southbound. Traffic associated with the weekends is higher than the weekday peaks and occurs on Friday afternoons and Sunday afternoons. These volumes are associated with more traffic leaving Sydney on Friday afternoon and returning on Sunday afternoon. It is assumed that these trips are associated a range of purposes such as recreational weekend trips, workers who commute to Sydney during the weekdays, and trips between Sydney, Canberra and Melbourne.

Public transport

Train services

The nearest train station to the site is Menangle Park which is serviced by the Southern Highlands Line with directed services between Campbelltown and Moss Vale. Services run at frequencies twice hourly during the peak periods and are limited to the short diesel Endeavour trains. Passengers that wish to continue their trip on the Sydney suburban rail network must change trains at Campbelltown.

Electric train services terminate at Macarthur Station.

Buses

The area is currently serviced by the 889 and 900 bus routes. The 889 connects Campbelltown Station to Menangle. This service runs infrequently at one (1) service per hour in the mornings and one (1) per hour in the evening peak. The 900 service connects Picton to Campbelltown with some four (4) services per day.

Active transport

The area is currently undeveloped and there are no pedestrian or bicycle facilities provided. The motorway allows for cyclists to ride in the shoulder though this is suitable for experienced road cyclists. Menangle Road has no provision for pedestrians or cyclists and the narrow road shoulders would be unsuitable for most cyclists.

6.1.3 Potential impacts

Construction

Construction access routes

As mentioned previously in Section 0, construction access routes to the proposed modification ancillary sites are via Menangle Road, Glenlee Road, Cummins Road and Fitzpatrick Street. The main arterial road of Menangle Road would be used as the primary route. Access to the north eastern side of the Hume Highway would be right-in, left-out via the Upper Canal Bridge/Mark Evans Bridge and local road of Glenlee Road. Access to the south eastern construction site would be right-in, left out via the local road of Cummins Road and Sydney Water Track.

Road network

Construction activities will generate traffic for both staff and truck haulage routes. Based on assessments of similar projects, the project may generate up to 60 truck trips per day and 180 light vehicles per day during peak construction days. Construction activities would occur primarily between 7:00am and 6:00pm from Monday to Friday and 8:00am to 1:00pm on Saturday, with some night work required to reduce impacts on the local road network. The volume of construction related vehicles is unlikely to impact the performance of the road network.

Construction of the new intersection may impact the road network on Menangle Road, as access would need to be maintained for Broughton College Anglican School. There may be some additional pressure at the Menangle Road/Glenlee Road intersection as well.

Informal rest area

The construction of the Hume Motorway on-ramp would require closure of the informal rest area, which is further discussed in Section 6.5. This is in order to improve the safety of the motorway network. Investigations and consultation with rest area users have found that closing the informal rest area would not impact the minimum Austroads rest area spacing and travel time requirements. Motorway users would also be encouraged to utilise the Pheasants Nest rest area which is currently being upgraded to cater for additional OSOM vehicles.

Public transport

Two bus stops on Menangle Road, near Broughton Anglican College, would be temporarily relocated during construction. Some delays may occur for the 889 and 900 bus route as a result of construction work along Menangle Road.

Operation

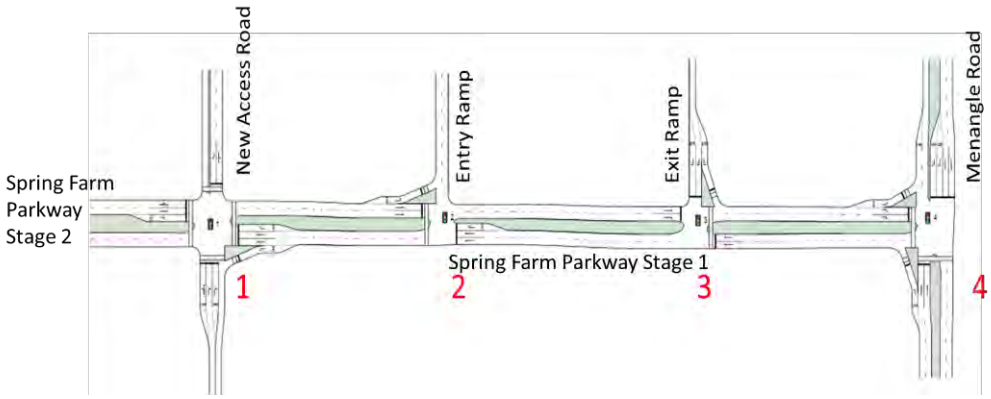
Intersection performance

The operational impact of the modified project on the intersection performance of the following were assessed for 2026 and 2036 scenarios:

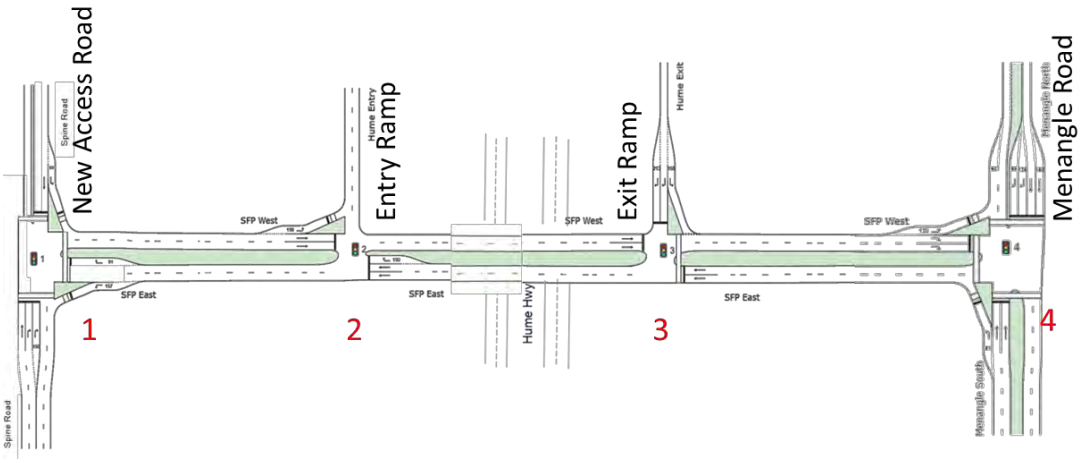
- Intersection 1: Spine Road
- Intersection 2: Entry ramp
- Intersection 3: Exit ramp
- Intersection 4: Menangle Road

The SIDRA modelling layout of the 2026 and 2036 modified site which was used for the assessment is show in Figure 6-1 and Figure 6-2. The previous (REF) modelling is also included for comparison.

The results of the modelling are outlined in Table 6-3 and Table 6-4 with the previous (REF) results for comparison.



2026 traffic modelling network configuration **– REF**



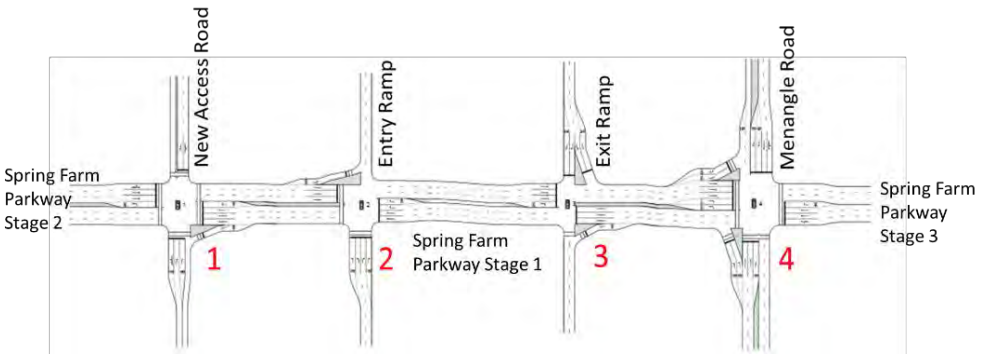
2026 traffic modelling network configuration – **Modified site**

Figure 6-1 2026 Intersection model layout REF and modified site

Table 6-3 2026 Intersection Level of Service for REF and modified site

2026	Intersection 1		Intersection 2		Intersection 3		Intersection 4	
	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of service	Average Delay (sec)	Level of service
REF								
Morning peak	29	C	16	B	13	A	21	B
Evening peak	31	C	9	A	27	B	26	B

2026	Intersection 1		Intersection 2		Intersection 3		Intersection 4	
	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of service	Average Delay (sec)	Level of service
Modified site								
Morning peak	33	C	14	A	12	A	31	C
Evening peak	23	B	7	A	21	B	31	C



2036 modelling network configuration – **REF**

2036 traffic modelling network configuration – **Modified site**

Figure 6-2 2036 Intersection model layout REF and modified site

Table 6-4 2036 Intersection Level of service for REF and modified site

2036	Intersection 1		Intersection 2		Intersection 3		Intersection 4	
	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of Service	Average Delay (sec)	Level of service	Average Delay (sec)	Level of service
REF								
Morning peak	55	D	33	C	19	B	37	C
Evening peak	40	C	17	B	66	E	64	E
Modified site								
Morning peak	33	C	8	A	14	A	34	C
Evening peak	37	C	14	A	17	B	56	D

It was found that the modified project 2026 intersection arrangement would achieve a Level of Service (LoS) greater than a D performance, which is consistent with the target criteria. The 2026 traffic modelling delay and level of service for all four intersections are similar to previous (REF) assessment.

The modified project 2036 intersection arrangement indicate the following trends:

- The modified site would generally experience improved intersection performances with the proposed modifications compared to the previous design as part of the REF. Delays at Intersection 1 would improve by up to 22 seconds. Delays at Intersection 2 would improve by up to 25 seconds. Delays at Intersection 3 would improve by up to 49 seconds. Delays at Intersection 4 would improve by up to 8 seconds.
- The proposed modified 2036 intersection arrangement would, in general, work satisfactorily from a traffic perspective (level of service D or better) under the given scenario combination and demand assumptions. However, the modelling results indicate that the northern approach (westbound) right turn on Menangle Road would operate at capacity by 2036.

6.1.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction traffic	Consistent with the project REF, a Traffic Management Plan (TMP) would be prepared and implemented as part of the CEMP. The TMP would be prepared in accordance with the Transport for NSW *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). In relation to the proposed modification, the TMP would include: • The temporary upgrade of the intersection at Menangle Road / Glenlee Road during construction in order to safely accommodate construction heavy vehicle movement.	Contractor	Construction	Additional safeguard

Other safeguards and management measures that would address impacts are identified in:

- Section 6.6 Noise and vibration

6.2 Non-Aboriginal heritage

A Statement of Heritage Impact (SoHI) was completed to identify the potential impacts to non-Aboriginal heritage items from the construction and operation of the proposed modification. The assessment is found Appendix E of this document and is summarised below.

6.2.1 Methodology

A search of federal, state and local non-Aboriginal heritage registers was undertaken on the 26 August 2021. The area searched included the study area of this assessment, which is comprised of the proposed modification area with an additional 50 metre buffer (refer to Figure 6-3), in order to demonstrate the heritage context of the proposed works, and to include those items that may be impacted visually by the proposal.

Previous heritage assessments relevant to the proposed modification were reviewed. These assessments include:

- Morris, C. and Britton, G. 2000. Colonial Landscapes of the Cumberland Plain and Camden, NSW
- Farina, 2018. Spring Farm Parkway Stage 1 Non-Aboriginal Assessment
- Edward Higginbotham & Associates Pty Ltd. 2002. Conservation Management Plan for the Upper Canal, Pheasant's Nest to Prospect Reservoir, NSW: Volume 1
- Public Works: Government Architect's Office. 2016. Upper Canal Pheasants Nest to Prospect Reservoir – Conservation Management Plan
- RTA Operations – Environmental Technology Branch. 2003. Statement of Heritage Impact: Proposed maintenance of 48 bridges on the Upper Canal, Upper Nepean Scheme, Pheasants Nest to Prospect Reservoir, NSW
- Water NSW. 2012. Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines.

Based on the findings of the desktop assessment and previous assessment reviews, known or potential heritage items were assessed for significance against the relevant criteria which are based on principles laid down in the Burra Charter.

6.2.2 Existing environment

This existing environment of the proposed modification area is consistent with the existing environment described in Section 6.9.2 of the project REF. This information is summarised below.

History of settlement in the study area

Table 6-5 Summary timeline of development in the study area

Year	Event
Pre-1788 to now	The Cowpastures area is the traditional land of the Gandangara Dharawal and Dharug people
1788-1795	First Fleet cattle escape and breed wild around the Nepean River. Settlement is prohibited on the river's western bank in order to protect the valuable livestock.

1804	The Privy Council overturned the Governor's settlement ban and a number of grants were established in the area.
1818-1856	The two predominant estates in the area were Glenlee and Sugarloaf Farm. Following 1856, Sugarloaf Farm was amalgamated into the Glenlee Estate
1869	Work is commenced on the Upper Nepean Scheme, which replaced Busby's Bore and pipeline, and the original usage of the Tank Stream for Sydney drinking water. The Upper Canal formed part of that scheme, comprising two diversion weirs linked by a gravity-fed canal and tunnels.

Heritage searches

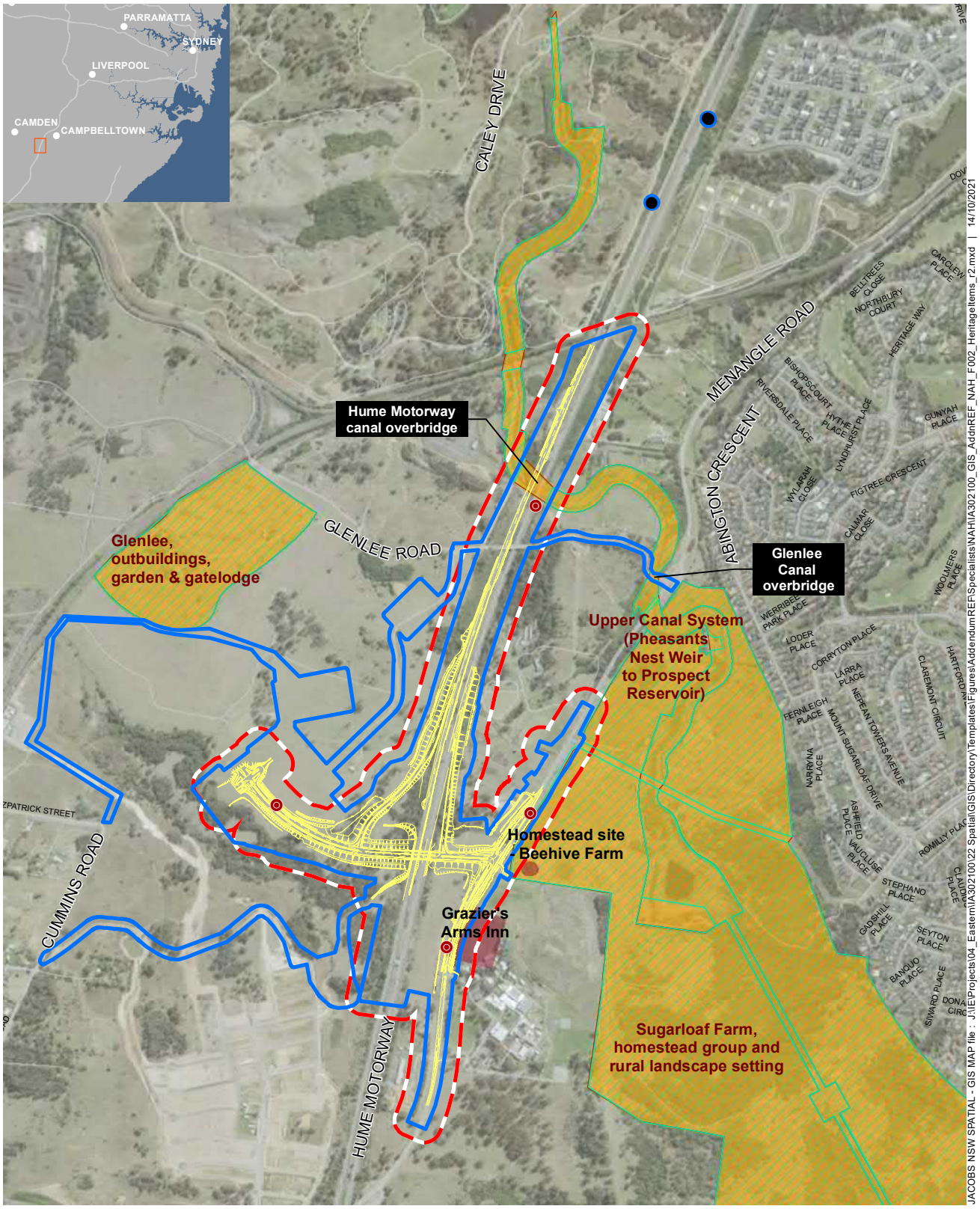
Table 6-6 Items of heritage significance within the study area

Item name	Heritage register	ID number	Distance from the proposed works
Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	SHR	01373	Intersecting
Sugarloaf Farm	SHR	01389	Adjacent

The works in proximity to Sugarloaf (SHR 01389) and the archaeological Homestead site – Beehive Farm (both shown in **Figure 6-3**) have not changed, and these were previously assessed in Section 6.9.3 of the project REF. These items are therefore not considered further in this assessment.

Previous assessments

The Grazier's Arms Inn site is an area of archaeological potential that was identified from previous assessments. This site has now been identified as occurring to the east of Menangle Road and would be intersected with the proposed widening works along Menangle Road.



Legend

- Proposed modification design (80% detail design)
- Proposed assessment modification area
- Heritage study area
- Potential archaeological items
- LEP heritage items
- State heritage items
- Proposal VMS locations
- Road guide signs

0 250 500 m
1:17,385 @ A4

N

OTE: Subject to detailed design

Figure 6-3 | Heritage items within the study area

6.2.3 Significance assessment

The following section presents heritage significance criteria and a significance assessment of the two heritage items identified within the vicinity of the study area. For the significance assessment of Sugarloaf Farm (SHR 01389) see section 5.2.2 of the project REF non-Aboriginal heritage assessment: *Spring Farm Parkway Non-Aboriginal Heritage Assessment* (Jacobs, 2019).

Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373)

The Upper Canal System is significant as a major component of the Upper Nepean Scheme. As an element of this Scheme, the Canal has functioned as part of Sydney's main water supply system since 1888. Apart from maintenance and other improvements, the Upper Canal has changed little.

The Canal is aesthetically significant, running in a serpentine route through a rural bushland setting as an impressive landscape element with sandstone and concrete-lined edges. There are numerous areas of significant plantings along the route of the Canal, particularly some avenues of pines dating to the construction of the Canal. The Canal corridor is known to contain a range of historical archaeological sites associated with the construction and operation of the Canal as well as Aboriginal sites that pre-date the Canal's construction. These sites may contribute knowledge about the local area and the lives of the construction workers not available from other sources.

The Canal is significant as it demonstrates the techniques of canal building, and evidence of engineering practice. Being the only extensive gravity fed water supply canal system to supply a large city and its population with fresh water from a distant source in the hinterland, this type of water supply system appears to be rare in Australia. The rarity of the Canal is enhanced by its integrity and its continuing operation largely using the original infrastructure built in the 1880s which still operates as originally intended. Such intact systems demonstrating an array of nineteenth century engineering techniques are rare.

As a key component in the Upper Nepean Scheme, the Upper Canal is related to the major NSW historic theme of utilities. The provision of potable water is a first priority in any settlement and influences the success of all settlement building endeavours. The Upper Canal supported the development and expansion of Sydney, NSW's largest and most important settlement, particularly during the late nineteenth and early twentieth centuries, a period of rapid population growth and industrial development.

Former Grazier's Arms Inn Site (unlisted, assessed as local significance)

The former Grazier's Arms Inn site is considered to be of local significance for its archaeological research potential and potential ability to demonstrate the past through archaeological remains, primarily related to its operation as a roadside inn and later a school. Following further investigation, it may also hold aesthetic or technical significance.

It is expected that the site would yield important historical and archaeological information, with the remains of an extended period of occupation and operation of both a 19th century roadside inn (c. 1856), and a 19th century school (c. 1870) over a time period of at least 14 years, with later operation as the property Charlesville. The site is likely to contain remains such as footings of the inn building, wells/cisterns, rubbish dumps, stabling and such.

It is unknown what method or degree of demolition was carried out at the site, and the integrity and intactness of the archaeological potential cannot currently be determined. Archaeological investigation or management such as test excavations may provide further information and allow a clear assessment of this criteria to be completed. As a result, this assessment concludes that the former Grazier's Arms Inn site is an area of archaeological potential and would qualify as an archaeological relic under Section 4(1) of the Heritage Act.

6.2.4 Potential impact

The proposed modification has the potential to impact two heritage items within the study area, the Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373) and former Grazier's Arms Inn site (unlisted, assessed as local significance). These impacts consist of:

- Widening into the Hume Motorway median across the canal overbridge (within the Upper Canal heritage curtilage)
- Increased impacts to an area of archaeological potential following amendments to the relocation of the former Grazier's Arms Inn site, now located directly within the proposed roadworks, and
- Consideration of the use of the Glenlee Road canal overbridge (within the curtilage of the Upper Canal) for construction access (upon client request).

The widening of Menangle Road would also require the compulsory acquisition of part of the previously assessed Sugarloaf Farm (SHR 01389).

The impacts to these heritage items are further discussed below.

Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373) – Canal Overbridge (Hume Motorway)

Widening into the Hume Motorway median across the canal overbridge (within the Upper Canal heritage curtilage) would involve resurfacing within the existing road corridor.

Figure 6-4 Median widening northbound (yellow)

The Hume Motorway canal overbridge is assessed to be of little value to the heritage significance of the canal system overall. The proposed works would remain within the road corridor and do not directly impact the fabric of the canal. Indirect impacts through construction vibration, however, could potentially impact the fabric of the canal. These impacts would be managed in accordance with the mitigation and management measures outlined in Section 6.2.5.

As the overbridge is an existing road infrastructure, no assessment of potential operational impacts has been completed. If the proposed modifications change subsequent to this assessment, additional consideration of impacts will be required.

Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373) – Glenlee Road Bridge

Construction access tracks for the construction works of the proposed modification would utilise Glenlee Road bridge, which may include the transport of heavy vehicles and/or construction plant.

The Glenlee Road bridge is considered a rare and exceptionally significant element to the heritage significance of the Upper Canal System overall. As such, direct and indirect impacts to the bridge are considered highly sensitive. The structural capacity of the bridge and requirements of its usage during construction must be established prior to the transportation of heavy vehicles or construction plant, and further specialist assessment is required. If the bridge is to be utilised as part of the construction access track, additional mitigation and permit approval would be required and is outlined in Section 6.2.4. Due to the sensitivity and heritage value of the bridge, consideration of alternative access is recommended.

As the overbridge is an existing road infrastructure, no assessment of potential operational impacts has been completed. If the proposed modifications change subsequent to this assessment, additional consideration of impacts will be required.

Former Grazier's Arms Inn site (unlisted, of local significance)

The proposed works within the vicinity of the Grazier's Arm site is comprised of road widening and realignment of Menangle Road to the east of its current footprint.

Legend

- Proposed modification design (80% detail design)
- Proposed modification assessment area
- Heritage study area
- Former building outline
- Archeological Potential Zone
  - High potential
  - Low potential

0 25 50 m
1:1,500 @ A4

N

NOTE: Subject to detailed design

Figure 6-5 | Proposed works in relation to the Graziers Arms Archaeological Potential Zone

The excavation associated with the proposed works would remove intact soil profile and any subsurface archaeological material within its footprint. This may include important features such as building footings, infrastructure, outbuildings, rubbish dumps and remnant historical plantings, which have the potential to provide information related to past operation of the site unavailable through documentary sources. Therefore, the proposed works would directly impact the area of archaeological potential

Considering the uncertainties related to archaeological material present, and the importance of the widening works for safe access to the Spring Farm Parkway bridge, this impact is unavoidable. In order to ascertain the presence or absence of archaeological material within the construction footprint, it is recommended that further investigation, including but not limited to test excavations, be completed at the site. This would provide further information relating to the item's significance and research potential and inform recommendations for further management.

Based on the historical aerials and site inspection, at least one tree visible on the historical aerials has survived to present, immediately adjacent east of the main building site. This vegetation may be of significance to the local community and opportunities for its retention should be explored.

Sugarloaf Farm (SHR 01389)

The proposed works would require the compulsory acquisition by the State government of the north western boundary of Sugarloaf Farm (SHR 01389) in order to widen Menangle Road. The area to be acquired is approximately 0.4 hectares, extending 490 metres along Menangle Road (refer to Figure 6-6).

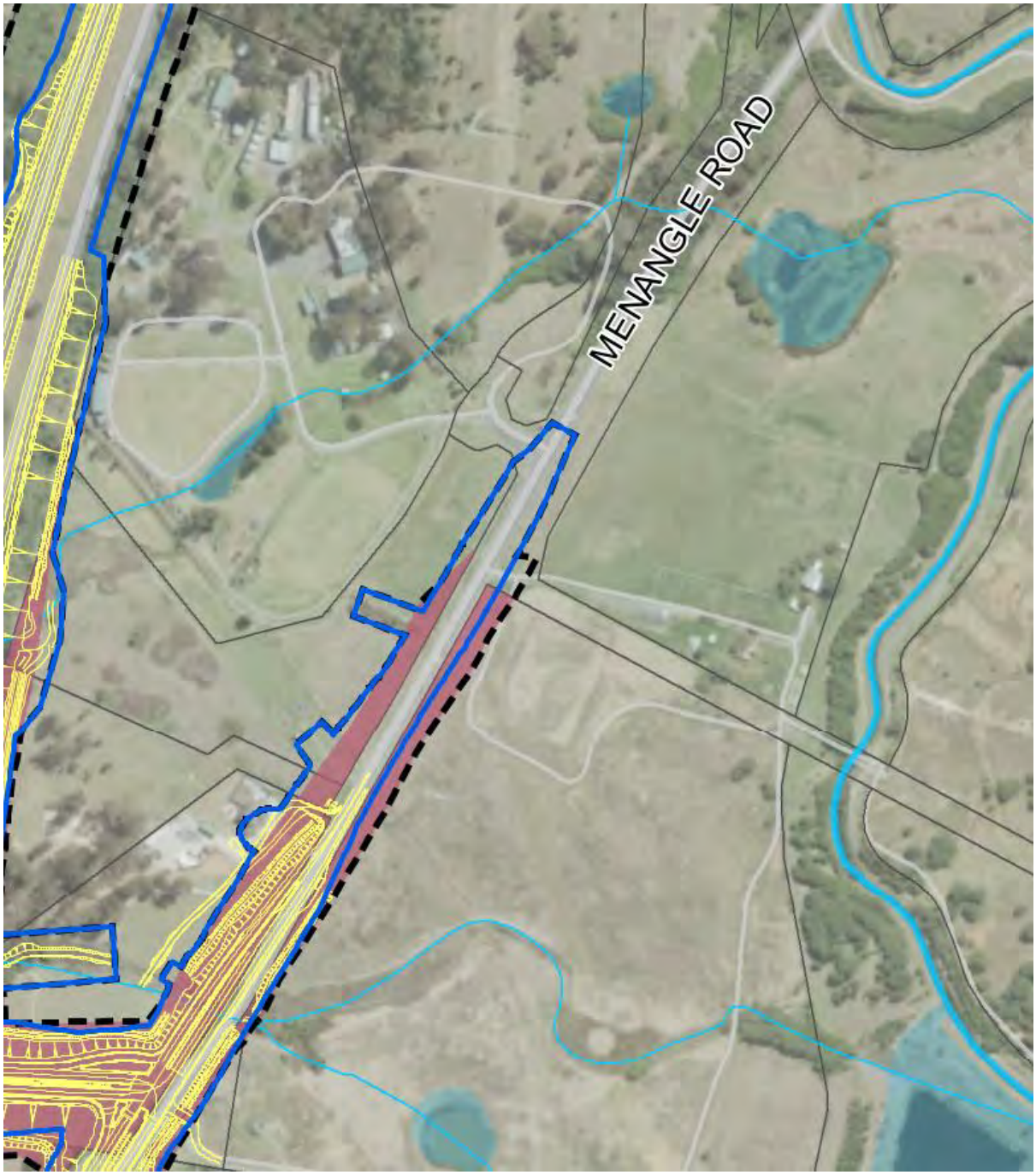


Figure 6-6 Land to be compulsorily acquired along Sugarloaf Farm's (SHR 01389) northwest boundary (shown in purple)

The widening of Menangle Road on its eastern side necessitates the acquisition of an area of land within the Sugar Loaf Farm heritage curtilage. This would require the removal of the rural boundary post-and-wire fencing along the Menangle Road frontage, directly impacting the heritage item, as the fence has a minor contribution to the overall early European occupation significance of the heritage item. The archaeological potential of this section of Sugar Loaf Farm is considered to be low.

The removal of the fence is considered a minor impact to the overall heritage value of the item, as it is physically distanced from the main building complex of the heritage item. Is recommended that this impact be managed by the installation of similar style, site appropriate rural fencing (i.e. like-for-like), or relocation and reinstallation of the existing fence material.

The proposed acquisition is considered to be generally sensitive to the heritage significance of Sugarloaf Farm (SHR 01389) and no other solutions have been considered. The works would not visually dominate the heritage item, and no potential archaeological deposits have been identified in the acquisition area.

The built fabric of the heritage item is not considered to be sensitive to potential (indirect) vibration impacts during construction due to its physical distance from the proposal. If there are changes to the footprint of the current scope of works, then potential impacts to the built fabric of this heritage item would need to be reassessed. Vibrational impacts would be managed with mitigation and management measures outlined in Section 6.6.3.

6.2.5 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Scope of works	It is noted that there are items of State heritage significance and archaeological potential in proximity to the proposed modification areas, and if the scope of works significantly change outside of the footprint currently presented, the impacts to these items would need to be reassessed.	Transport for NSW	Detailed design/Pre-construction	Additional safeguard
Unexpected finds	If items of potential heritage or archaeological significance are encountered during construction, the project CEMP and Transport for NSW's *Unexpected Finds Protocol* (Transport for NSW, 2019) would apply.	Contractor	Construction	As per project REF
Vibration impacts	For works in proximity to the Upper Canal and other WaterNSW lands, assets or infrastructure, the maximum allowable limit of vibration specified in DIN 1450 (Deutsches Institut für Normung 1999) should be applied.	Contractor	Construction	Additional safeguard
Impacts to Upper Canal System (Pheasants Nest Weir to Prospect	As per WaterNSW risk management guidelines (WaterNSW, 2020) the following documentation is required prior to construction: • Heritage Impact	Transport for NSW	Pre-construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
Reservoir) (SHR 01373)	- Heritage Impact Assessment (this assessment) - Unexpected Finds Protocol • Vibration - Assessment of the potential effects of vibration from the proposed works i.e. a dilapidation survey - Vibration monitoring plan (can be contained within the project CEMP) • Additional loads on WaterNSW structures – specific to Glenlee Road bridge - A structural engineers report - Geotechnical report - Drawings or plans.			
	Additional to WaterNSW' requirements, the structural engineering assessment of Glenlee Road bridge should be completed by a suitably qualified professional with heritage experience. A dilapidation survey should also be completed to identify any areas of weakness or instability, and if subsequently approved, monitoring of the bridge fabric should be completed during the duration of the construction access.	Transport for NSW	Pre-construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Following completion of the additional documentation and assessment, a revised assessment of impacts to the Glenlee Road bridge must be completed prior to its usage during construction in order to determine the suitability of proposed impacts and any requisite permit approvals.	Tansport for NSW	Pre-construction	Additional safeguard
Former Grazier's Arms Inn Site	A site inspection should be conducted prior to construction to determine levels of site disturbance and confirm levels of archaeological potential. Any historical vegetation on site should also be determined and, if required, advice should be sought from a suitably-qualified arborist.	Transport for NSW	Pre-construction	Additional safeguard
	Archaeological test excavations are to be completed at the site to identify the presence of any archaeological material within the construction footprint. This will completed with an excavation permit as per Section 140 of the Heritage Act. Further management measure recommendations can be added as appropriate and may, following the findings of the test excavation. These may include detailed recording or salvage of archaeological material from the site, prior to construction.	Transport for NSW	Pre-construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
Sugarloaf Farm (SHR 01389)	Following the removal of the existing rural boundary fence along Menangle Road, fencing of the expanded road corridor would be in keeping with the style and form which is currently present e.g. a like-for-like replacement, or installation of other low-height, timber and wire rural fencing. The reuse of existing material would not be possible due to current health and safety requirements and/or construction methodology.	Transport for NSW/Contractor	Construction	Additional safeguard
	The proposed acquisition of land within the Sugarloaf Farm (SHR 01389) SHR curtilage will require an application under Section 60 of the Heritage Act for the subdivision and change of ownership. Depending on the staging of acquisition and the road works a separate approval to undertake the works may also be required.	Transport for NSW	Pre-construction	Additional safeguard

Other safeguards and management measures that would address impacts are identified in:

- Section 6.1 Traffic and transport
- Section 6.6 Noise and vibration.

6.3 Aboriginal heritage

A Stage 3 PACHI (Transport for NSW Procedure for Aboriginal Cultural Heritage Consultation and Investigation) was undertaken and includes an updated Cultural Heritage Assessment Report (CHAR) of the potential construction and operational impacts from the proposed modification and project REF scope of works. The assessment is found in Appendix D and is summarised below in relation to the proposed modification.

6.3.1 Methodology

The Stage 3 PACHI methodology involved:

- Desktop investigation, including Native Title and Aboriginal Heritage Information System (AHIMS) database searches, as well as consideration of previous archaeological survey reports within and adjacent to the study area
- Consultation with Registered Aboriginal Parties (RAPs) and stakeholders.
- Review of the Cultural Heritage Assessment Report with Registered Aboriginal Parties (RAPs) and stakeholders.

6.3.2 Existing environment

The existing environment of the proposed modification area is consistent with the existing environment described in Section 6.8.2 of the project REF. This is summarised below.

Landscape context

The study area is located on the south eastern margin of the Cumberland Plain, a low lying and gently undulating subregion of the Sydney Basin. The underlying geology is predominantly Bringelly Shale (Rwb) while a small area of Quaternary Alluvium (Qal) is located in the western portion of the study area. Raw materials suitable for artefact manufacture occur widely across the Cumberland Plain, in the form of rock outcrops, large cobbles and various river gravels, with cobbles and clasts deposited across the landscape by the complex network of stream channels.

Land use history

European settlement of the region began in the in the early 19th century with several land grants made along the Nepean River including a grant of 5,000 acres, known as ‘Camden Park’ made to John Macarthur in 1805 approximately three kilometres south of the current study area.

The distribution of native vegetation within the proposal area has been affected by historic and contemporary European land use practices in the region. Prior to 1788, a mixture of native vegetation communities would have extended across the entirety of the Cumberland Plain. The wide variety of native vegetation and sources of permanent water would have made the region an attractive locale for past Aboriginal people. The variety of habitats would also have encouraged a diverse population of fauna.

The clearance of native vegetation across much of the study area by European settlers has left pockets of native vegetation in the vicinity of creeks.

AHIMS search results

A search of AHIMS was conducted on 17 August 2021 to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area. A total of 43 Aboriginal archaeological sites and one area of potential archaeological deposit (PAD) have been previously registered within the search area. Five of the Aboriginal archaeological

sites are within the study area. The search results are shown in **Figure 6-7 AHIMS search results**

below.

A search for Aboriginal heritage with other sources of information including heritage registers and lists was also conducted for the vicinity of the study area. No items were found.

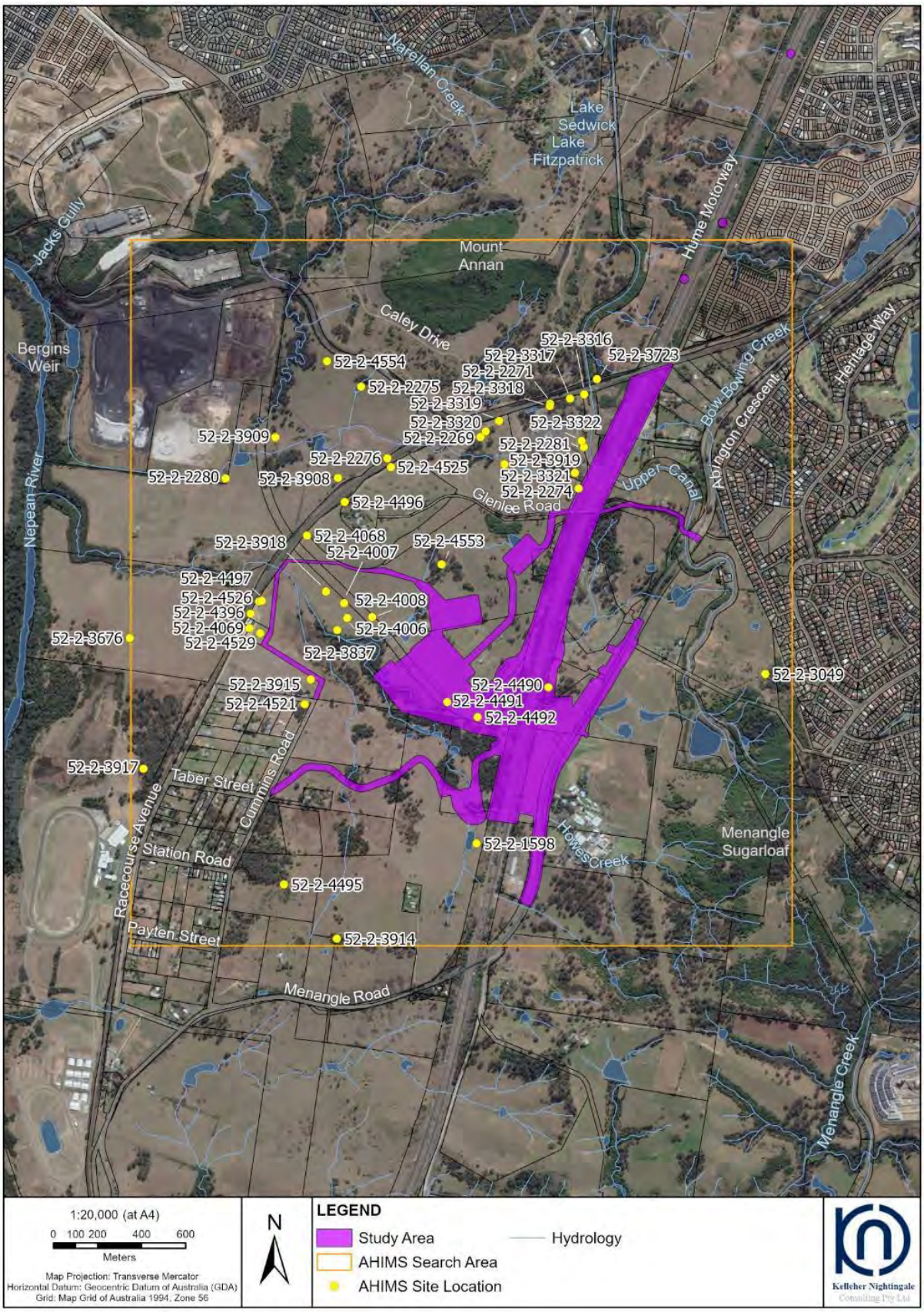


Figure 6-7 AHIMS search results

PACHI Stage 3 investigations

Review of background information, Aboriginal community consultation and archaeological assessment has resulted in the identification of one additional Aboriginal archaeological site (comprising of two AHIMS registrations) to the Aboriginal heritage items outlined in Section 6.8.2 of the project REF. This site is registered under AHIMS as MPRP Menangle Park Rezoning Project 8. A portion of this site also has a duplicate registration under AHIMS as Menangle Park Subdivision Artefact Scatter 01.

MPRP 8 Menangle Park Rezoning Project 8

Site MPRP 8 Menangle Park Rezoning Project 8 represents a commonly occurring type of site in the region, consisting of an open artefact scatter of low to moderate density on a flat landform adjacent to a watercourse. The artefacts are typical of the region in terms of type and raw material. The test excavation program at site MPRP 8 Menangle Park Rezoning Project 8 demonstrated that the site contained several focal areas indicating that subsurface disturbance in these areas was limited. It is likely that further investigation could contribute to our understanding of Aboriginal landscape use in the region. Based on the intactness, representativeness and research potential of the site, MPRP 8 Menangle Park Rezoning Project 8 is determined to have **moderate** archaeological significance. The current study area partially overlaps the mapped extent of this site.

6.3.3 Potential impact

Construction

The entirety of the study area would be impacted by construction and associated works. In addition to the Aboriginal heritage items outlined in Section 6.8.3 of the project REF, a total of one Aboriginal archaeological site would be impacted as a result of the proposed modification (refer to Table 6-7**Figure 6-7 AHIMS search results**

).

Table 6-7 Proposed impact to Aboriginal archaeological sites within the study area

Site name	AHIMS ID	Type of harm	Degree of harm	Consequence of harm	Significance of harm
MPRP 8 Menangle Park Rezoning Project 8	52-2-3915	Direct	Partial	Partial loss of value	Moderate

Several impacted portions of the site are within areas covered by existing Aboriginal Heritage Impact Permits (AHIP 4648 and AHIP C0005561). Impacted portions outside these AHIP areas would require an AHIP prior to commencement of work. Suitable recommendations for the identified impact to the site has been developed based on the environmental context and condition, background research, and consultation with stakeholders.

Operation

The operation of the proposal would not result in any further impacts to Aboriginal heritage.

6.3.4 Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Impact to Menangle Park Rezoning Project 8	The proposed works are within the AHIP 4648 and AHIP C0005561 and may be completed under the existing AHIPs, provided that works are undertaken in accordance with the AHIP conditions. An AHIP is required prior to commencement of work affecting the site outside existing AHIP areas.	Transport for NSW	Pre-construction	Additional safeguard
	An application for an AHIP should be made under section *90A of the National Parks and Wildlife Act 1974* for the land and associated objects within the within the boundaries of the proposal area, excluding the areas within the boundaries of existing AHIPs. The AHIP would also be sought for the specified Aboriginal sites and objects contained within the sites listed in Table 6 of the CHAR (Appendix D). The AHIP would include provision for impact mitigation through archaeological salvage excavation. Salvage excavation must be completed prior to any activities (including pre-construction activities) which may harm Aboriginal objects at these locations.	Transport for NSW / Contractor	Pre-construction	
	Barrier fencing to be erected on the AHIP boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the impact area. Portion of site area outside of impact area should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact.	Contractor	Construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Workers should be inducted as to appropriate protection measures for Aboriginal heritage.	Contractor	Construction	Additional safeguard

Other safeguards and management measures that would address impacts are identified in:

- Section 6.1 Traffic and transport
- Section 6.6 Noise and vibration.

6.4 Flooding

A Flooding assessment was completed to identify the potential impacts to flooding from the construction and operation of the proposed modification. The assessment is found Appendix G of this document and is summarised below.

6.4.1 Methodology

The methodology for the flooding assessment involved:

- A review of background information and previous flooding assessment, including those outlined in the project REF
- A review of the proposed modification and performance objectives relevant to drainage and flooding
- Flood modelling to characterise existing flooding conditions and drainage patterns at the proposed modification sites, and to quantify flood behaviour and potential flood impacts of the operational phase
- Identify and qualitatively assess potential upstream / downstream flood impacts for the construction phase
- Modelling of climate change to quantify changes to flood behaviour with increased rainfall for the operational phase
- Review and identify the need for mitigation measures.

6.4.2 Criteria

The flood planning level for the modified project has been determined by aiming to achieve a flood immunity for the road in the 1% AEP in due consideration of adjacent infrastructure.

The adopted criteria for the project is shown in Table 6-8 below. The flooding criteria have been adopted based on current practices for similar infrastructure projects in an urban setting aiming to minimise impacts on surrounding properties.

Table 6-8 Flood design criteria

Item No.	Flooding characteristic	Criteria
1	Duration of flooding	No limit on duration increase
2	Maximum increase in flood level at habitable buildings where floor levels are already flooded in 1% AEP	10mm
3	Maximum increase in flood level at properties (private land parcels) where habitable floor levels are not flooded in proposed 1% AEP (within 10m of habitable buildings)	50mm

4	Maximum increase in flood level at properties (private land parcels) where habitable floor levels are not flooded in proposed 1% AEP (beyond 10m of habitable buildings)	300mm
5	Maximum increase in flood level on Agricultural land	300mm
6	Maximum increase in flood level on Rural land	300mm
7	Maximum increase in flood level on other open space including the following land types defined in the Campbelltown LEP: Land Type RE1 (Public Recreation) SP2 (Infrastructure), RU2 (Rural Landscape) , R5 (Large Lot Residential), E3 (Environmental Management) and RU6 (Transition) where there is no habitable building. It is noted that project impacts on the SP2 (infrastructure) land type relates to the corridor allocated to the Spring Farm Parkway Stage 2 project. The discharge through this area will be picked up by the SFPS2 project once it is developed.	300mm
8	Increase in discharge	No net increase in discharge at downstream end of site relative to existing (at Spine Road)
9	Flood hazard categories (H1 to H6)	Minimise changes in hazard categories. Criteria adopted will be based on an assessment of risk with a focus on land use and sensitively of location.
10	Increase in flood level in TfNSW land	No limit providing the 1% AEP flood immunity is provided on through lanes, and does not impact private land holdings

6.4.3 Existing environment

The existing environment of the proposed modification is generally consistent with that outlined in Section 6.5.2 of the project REF. This is summarised below.

Local context

The proposed modification site and associated study area are located within the catchment area of the Hawkesbury-Nepean River catchment. The Hawkesbury-Nepean catchment covers an area of more than 22,000km^2. An arm of the Nepean River runs in a northerly direction about 1.7km to the north-west of Spring Farm Parkway. The in-bank area of the creek and its immediate overbank area are densely vegetated, while the broader floodplain has generally been cleared for agricultural purposes. The proposed modification area remains relatively unaffected by 100-year annual recurrence interval (ARI) and 20-year ARI flood events.

Local catchments of the project site are generally undulating to hilly and consist of a mixture of grazing land and remnant bushland. The catchment generally slopes in a westerly direction toward the Nepean River. There are few minor tributaries which collect flood water in and around the project site and combine into a single tributary and run towards the Nepean River. The single tributary runs about 700m to cross the Main Southern Railway Line and runs another 800m before discharge into the Nepean River. The Main Southern Railway runs from south to north to the west of the project site.

Local catchments within study area

There are four transverse drainage structures located along Menangle Road within the study area, and they are generally reinforced concrete pipes (RCPs) or culverts between 750 millimetres and 1800 millimetres in diameter. These structures control runoff which originates from the largely underdeveloped rural area that lies to the east of Menangle Road. Several farm dams and wide grass swales are present within the catchments that lead to the existing drainage structures. Once crossing Menangle Road, flows continue west until reaching the Hume Motorway.

At the Hume Motorway, there are a further three transverse drainage structures (which are also large diameter RCPs) that control flows from east of the motorway. These flows from the structures are conveyed in a series of semi-natural channels which combine into a single channel about 100-200 metres downstream of the Hume Motorway.

A tributary of the Nepean River controls runoff from the flows under the Hume Motorway and runs in a westerly direction crossing the proposed Spring Farm Parkway alignment. The tributary is a combination of grass lined channels, minor depressions and more densely vegetated drainage lines.

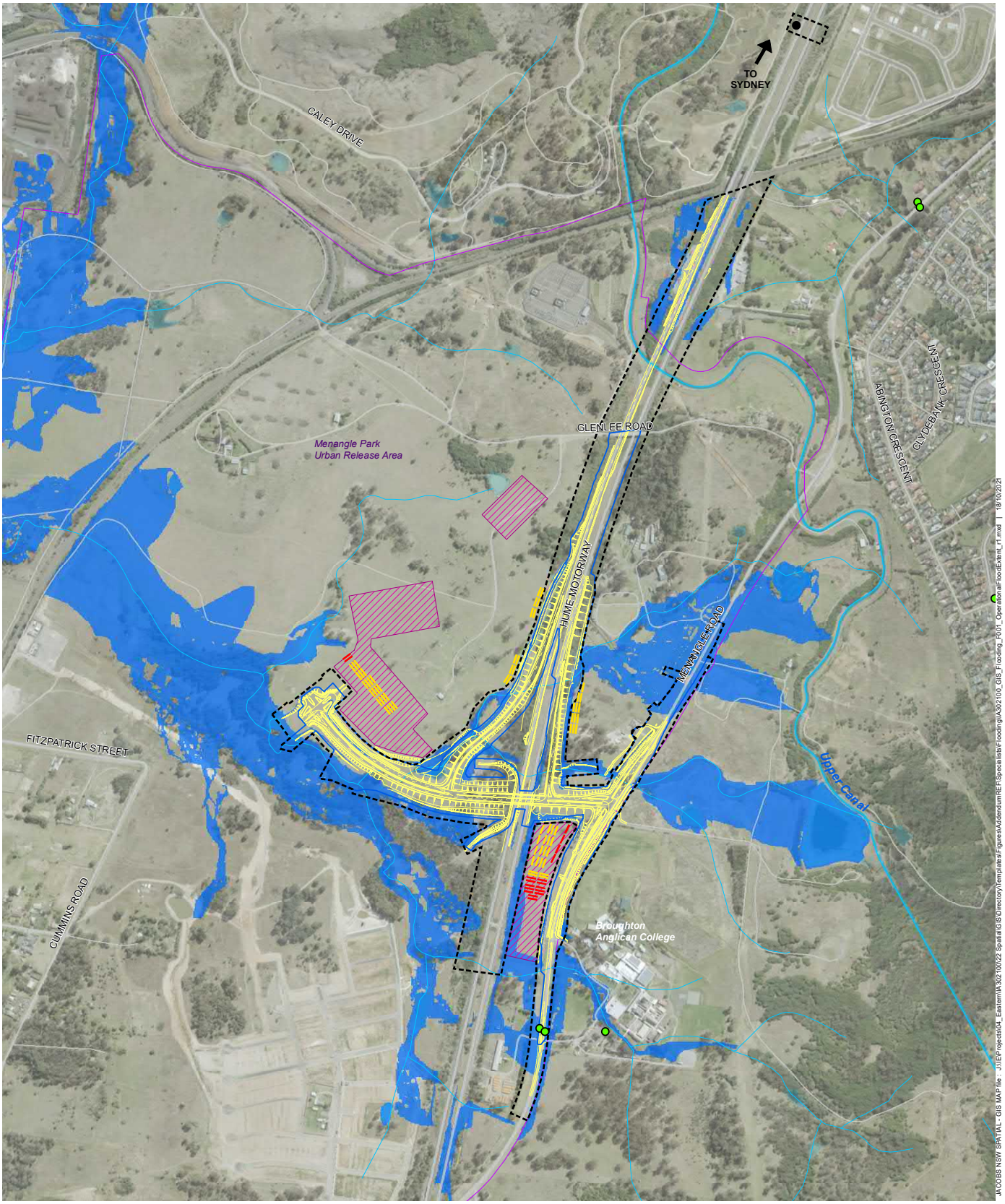
TUFLOW modelling of Menangle Road, the Hume Motorway and the proposed Spring Farm Parkway alignment shows that, for the existing conditions, these roads generally meet a 100-year ARI hydrological standard, In accordance with Roads and Maritime standards. Small sections of Menangle Road are less than the 100-year ARI standard.

6.4.4 Potential impact

Construction

The construction sites and temporary material stockpiles (shown in Figure 6-8) have been tentatively identified and are located outside of the operation phase 1% AEP flood extent. Construction phase temporary works are not expected to impose any additional obstruction to flooding on top of the permanent works.

Given that the construction sites and temporary stockpile areas will be situated outside the 1% AEP flood extent and no additional flood obstruction from early and temporary works, there would be no resulting impacts on flooding in the construction phase.



Legend

- Proposed modification design (80% detail design)
- Construction sites
- Project REF proposal area
- Operational road corridor
- Waterway
- Bus stop
- Road guide signs
- 1% AEP Operational Flood Extent

Spoil locations

- Topsoil site
- Unsuitable site

0 200 400m

N

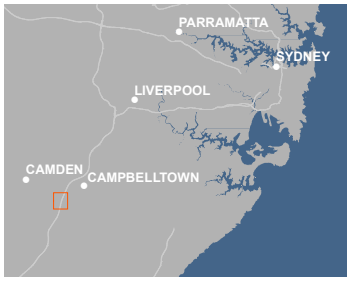


Figure 6-8 | Locations of construction sites and temporary stockpiles

Operation

Flood immunity

Flood immunity at the Hume Motorway and the proposed road is 1% AEP design event except at two locations, where the flood immunity is less than the 5% AEP design event. These locations include:

- The southern tie in of the proposed Menangle Road to the existing road where there is flooding over the road in the existing case, with depths up to 0.03 metres over a distance of 130 metres
- The Spring Farm Parkway/Spine Road intersection where local road runoff causes a maximum flood depth of 0.14 metres.

No mitigation measures for these locations are proposed as at Menangle Road, the flow depths are relatively shallow, and at the Spring Farm Parkway/Spine Road intersection the maximum flood depth remains with the drainage design criteria.

Change in velocity and scour risk

An increase in flow velocity greater than 10 per cent of the existing case at a 1% AEP event, was identified in an existing drainage swale on Menangle Road. As a result, there has been the inclusion of a riprap apron in the design in order to mitigate this.

Change in flood hazard category

There is no significant change in 1% AEP flood hazard categories due to the modified project.

In the PMF event, flood hazard category of Menangle Road has not changed. There is also no significant change in flood hazard category for the Hume Highway, although there is a reduction in the high hazard extent under and north of the proposed Spring Farm Parkway overbridge. Flood hazard of a residential building and few tin sheds/farmhouses become H3 (unsafe for vehicles, children and elderly; noting that it is at the upper range of H3 which is almost unsafe for all people) which was H1 (generally safe) in existing case. A few tin sheds/farmhouses become newly flooded with flood hazard H3

Climate change impacts

Flooding impacts as a result future climate change effects of increased rainfall intensity would be limited to localised increases in depths of up to 500mm within, and adjacent to, drainage infrastructure and minor extension of areas of flood, with no new areas of flood overtopping of proposed and existing roads.

6.4.5 Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Construction flood impacts	A Flood Management Plan should be prepared by the contractor during construction planning phase to outline procedures for managing construction site operations and personnel safety in the event of a flood.	Contractor	Pre-construction	Additional safeguard

	Access for emergency services will be retained throughout construction and the construction contractor would consult with emergency services prior to construction.			
Operational flood impacts	Development of an evacuation plan will be undertaken. The evacuation plan will be consulted with the resident of the impacted dwelling.	Transport for NSW	Post-construction	Additional safeguard

6.5 Socio-economic

6.5.1 Methodology

The methodology for the socio-economic assessment includes:

- A review of the previous assessment outlined in the project REF
- A review of internal consultation documents undertaken by Transport for NSW for the closure of the informal rest area.

6.5.2 Existing environment

The existing environment of the modified project is generally consistent with that outlined in Section 6.10.2 the project REF. The existing environment is summarised in the following categories:

- **Study area** – The study area encompasses the Australian Bureau of Statistics (ABS) Statistical Areas Level (SA2) geography of Rosemeadow – Glen Alpine, within the Campbelltown LGA.
- **Land use** - Existing land use within the study area comprises mainly of rural use, with some new residential development occurring west of the Hume Motorway.
- **Demography** - The demography of the study area comprises of a relatively young population (in comparison to Greater Sydney) with a lower median age, higher proportions of children and working aged people and lower proportions of older people aged 65 years or over. More than 90 per cent of households own two or more vehicles. Individual and household incomes in the study area are below the Greater Sydney average.
- **Business and industry** - There are no businesses located within**,** or immediately surrounding**,** the proposed modification area. An AGL gas well (MP11) is located near the modified project, west of the Hume Motorway.
- **Social infrastructure –** Social infrastructure is limited to Broughton Anglican College and Campbelltown Steam and Machinery Museum are located on Menangle Road.
- **Transport and access** - Major roads within the modified project include the Hume Motorway and Menangle Road. Smaller roads within the modified project include Glenlee Road and Cummins Road.

  An informal rest area is located adjacent to the northbound lane of the Hume Motorway. The rest area is used by approximately 0.58 per cent of northbound traffic on the Hume Motorway daily. Of this, the main users OSOM followed by heavy vehicles and a small number of light vehicles. There are no rest area facilities such as toilets, shelters and picnic areas at this site.

6.5.3 Potential impacts

Construction

Land use

Construction of the modified project would require the temporary lease of land to accommodate for additional ancillary facilities. These properties are described in Section 3.6. Consideration of the noise impacts from these compounds are described in Section 6.6 and visual impacts from these compounds are described in Section 6.9

Following construction, the land occupied by construction work is not required for the ongoing operation of the proposal would be reinstated to its pre-construction use. The

impact associated with the temporary lease of land would be short-term and is not expected to be significant.

Transport and access

During construction, two bus stops on Menangle Road located opposite Broughton Anglican College would require temporary relocation due to works. This may result in short term delays and disruptions for bus commuters, especially commuters to and from Broughton Anglican College. Consultation would be undertaken with the local bus operator and Broughton Anglican College prior to construction regarding the temporary relocation of the bus stops.

The additional construction access tracks, as indicated in Section 0, may result in temporary amenity impacts to local residents and the community as a result of the increased noise and dust from heavy construction vehicles using these tracks. Affected residents include rural properties on Glenlee Road, Cummins Road and Fitzpatrick Street. Impacts to these residents would be managed with safeguards and management measures detailed in Section 6.6 (Noise and vibration) and in Section 6.11 (Air quality) of the project REF.

Operation

Transport and access

The operation of the modified project would involve the closure of the informal rest area. Considering the small number of users, the impacts from its closure are not expected to be significant. Light vehicles travelling on the Hume Motorway have an option to rest at Pheasants Nest rest area, located 26 kilometres south of the informal rest area, or at other rest area opportunities present in the region, such as petrol stations or cafes. OSOM vehicles travelling from Illawarra/Port Kembla have an option to use Cataract Rest Area, 31 kilometres south of the informal rest area, on Picton Road. Both the Pheasants Nest rest area and the Cataract rest area are equipped with basic rest area facilities and safety features and are generally considered better alternatives to the informal rest area. Other OSOM users who are not travelling from the Illawara/Port Kembla region would be able to use the Pheasant's Nest rest area upon the informal rest area's closure. Pheasants Nest rest area is currently undergoing redevelopment and would be able to safely accommodate up to twenty four OSOM vehicles, from south of Picton Road intersection, once redevelopment is complete. This is expected to occur prior to the closure of the informal rest area.

The operation of the modified project is not expected to impact other socio-economic values.

6.5.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Closure of the informal rest area	Ongoing consultation will be carried out with users of the informal rest area regarding the timing of it's closure.	Transport for NSW	Pre-construction	Additional safeguard

Other safeguards and management measures that would address impacts are identified in:

- Section 6.1 Traffic and transport
- Section 6.6 Noise and vibration

6.6 Noise and vibration

A Construction Noise and Vibration Assessment (Jacobs, 2021) and an Operational Noise and Vibration Assessment (SLR, 2021) was completed for the modified project to determine noise and vibration impacts to nearby sensitive receivers. Both assessments are detailed in full in Appendix H, and are summarised below.

6.6.1 Construction noise and vibration

Methodology

The methodology for the construction noise and vibration assessment involved:

- A review of background information and previous noise and vibration assessments, including those outlined in the project REF
- Modelling of construction noise and vibration and operation noise for modified project
- Assessment of noise predictions against relevant construction noise criteria, including sleep disturbance
- Identification of mitigation measures for any construction noise impact identified as per the *Transport for NSW Noise Mitigation Guideline* (NMG)
- Identification of feasible and reasonable environmental management measures.

Existing environment

Noise sensitive receivers

Noise and vibration sensitive receivers have previously been assessed in the project REF for part of the modified project study area. The modified project study area now includes additional sensitive receivers to the north of the previously assessed area in order to accommodate for new noise source locations. The additional receivers include residential receivers on the eastern section of the Hume Motorway and commercial receivers on the western section of the Hume Motorway.

It is expected that additional noise sensitive receivers will come online with the Menangle Park Development. Stage 1 of the Menangle Park Development, south west of Spring Farm Parkway, has commenced construction which involves development of 300 residential lots. If these buildings are occupied during construction, they become noise sensitive receivers which are to be considered for mitigation measures. These Stage 1 residential lots have been assessed for operational impacts as detailed in the OTNAR.

The revised study area is shown in Figure 6-9 below. The total number of noise sensitive receivers and receiver type are detailed in Table 6-9.

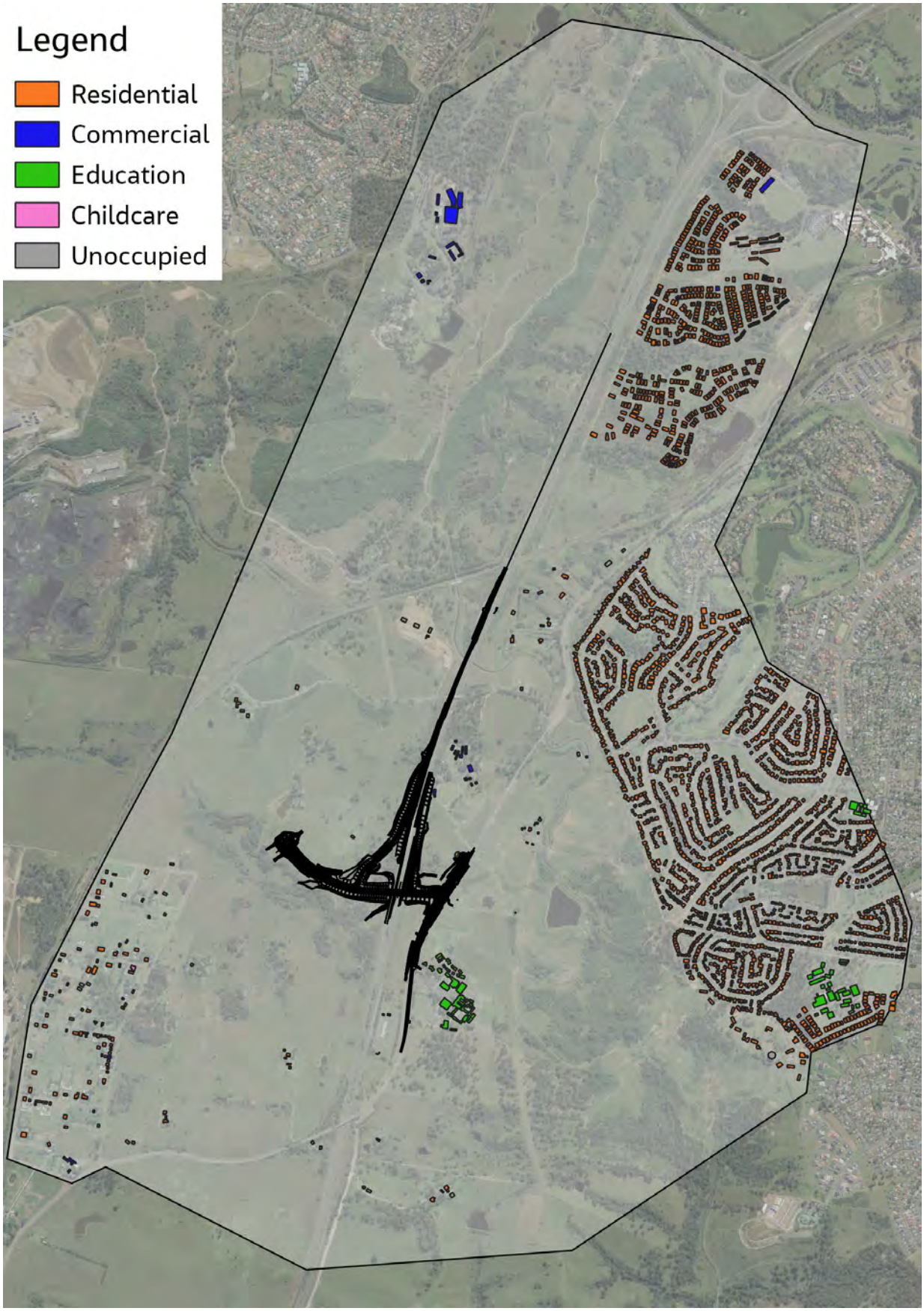


Figure 6-9 Noise and vibration study area

Table 6-9 Noise sensitive receiver count

Receiver Type	Number of Buildings	Number of Receivers
Residential	2474	11,233
Commercial	22	103
Educational	67	67
Childcare Centres	1	1
Total	2564	11,404

Noise Catchment Area (NCA)

Five Noise Catchment Areas (NCAs) were established in the project REF. Noise catchments, NCA 1 and NCA 5, were extended northwards to order to accommodate the additional noise sensitive receivers for the modified project.

The revised NCAs are shown in Figure 6-10 below.

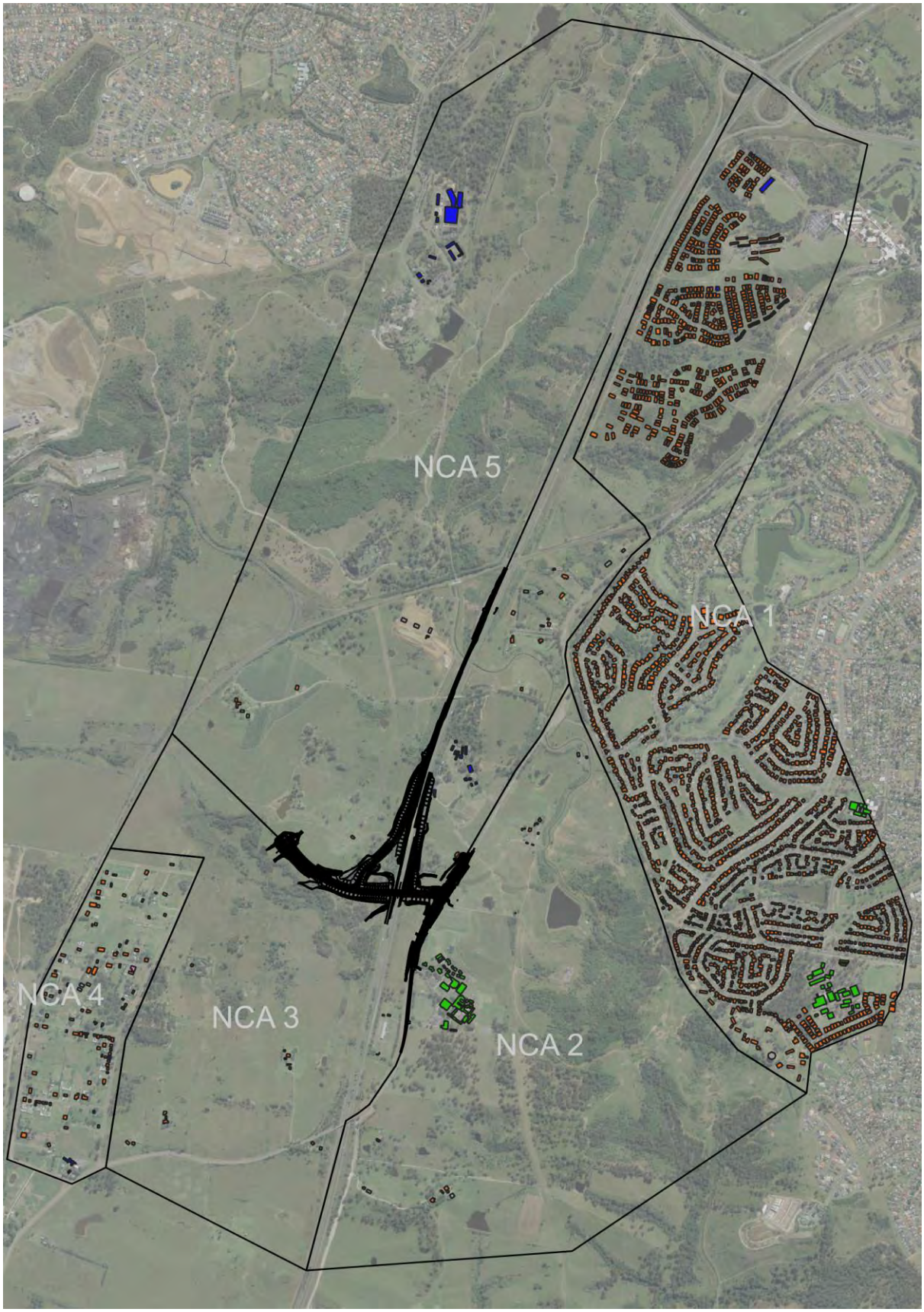


Figure 6-10 Noise Catchment Areas

Ambient noise sources

Background, unattended noise monitoring was undertaken for the project REF between 25 June 2018 and 2 July 2018. Results of this background noise monitoring have been used to inform Noise Management Levels (NMLs) and sleep disturbance criterion for this assessment. Background noise monitoring locations are shown in Figure 6-11, and monitoring results are summarised in Table 6-10 below.

Table 6-10 Results of long term, unattended noise monitoring

Longer Location (ID and Address)	Measured Rating Background Level (dB(A))		
	Standard Hours	Out Of Hours 1 (OOH1)	Out Of Hours 2 (OOH2)
1 – 120 Abington Rd, Glen Alpine	35	42	38
2 – 33 Medhurst Rd, Menangle Park	43	44	39
3 – Menangle Rd, 900m west of Hume Motorway	42	45	37
4 – 45 Fitzpatrick Rd, Menangle Park	40	42	42
5 – 60 Menangle Rd (Glenlea House), Menangle Park	37	39	38
6 – 116 Menangle Rd, Menangle Park	54	55	46
7 – Lot 8, Menangle Rd, Menangle Park	63	58	49

Note: Standard Hours = Mon – Fri 7am – 6pm, Sat 8am – 1pm
OOH1 = Mon – Fri 6pm – 10pm, Sat 7am – 8am & 1pm – 10pm
OOH2 = Mon – Fri 10pm – 7am, Sat 10pm – 8am, Sun 6pm – 7am

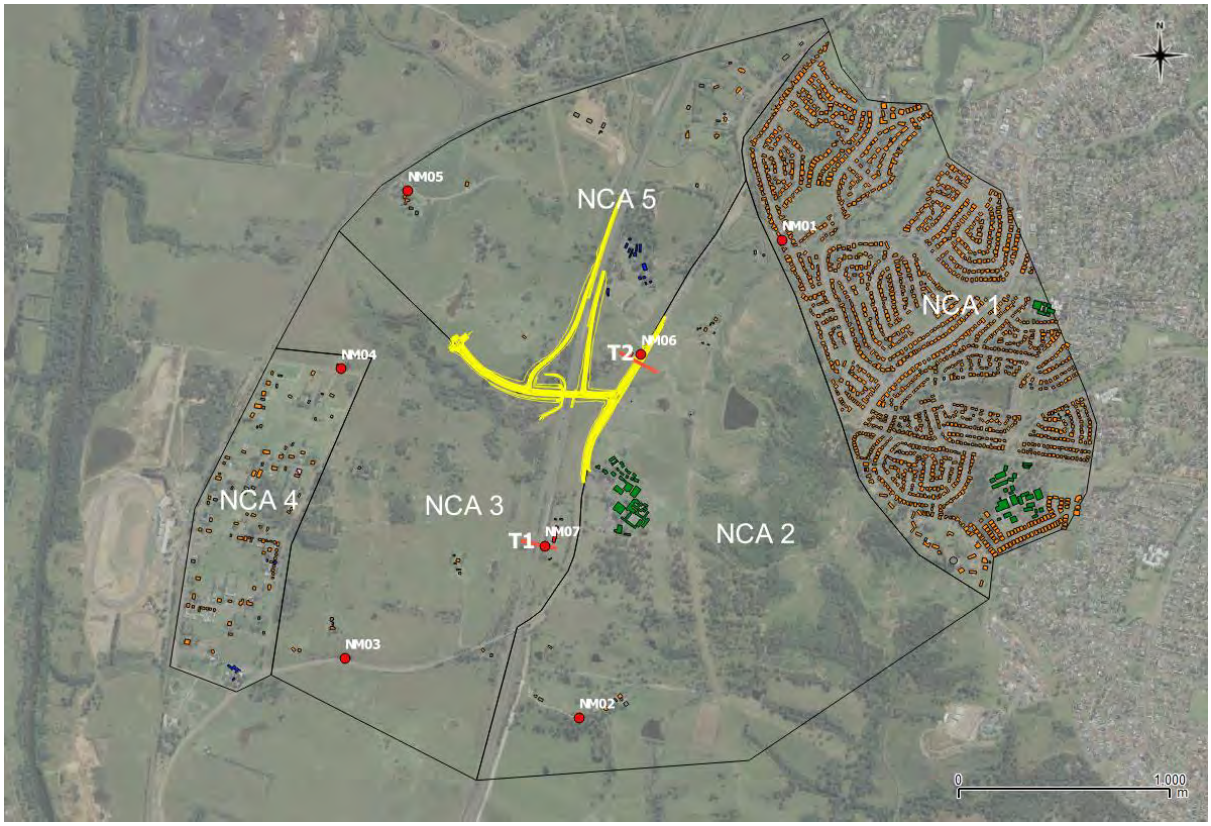


Figure 6-11 Noise monitoring locations

Vibration sensitive receivers

Whilst all receivers and surrounding structures are sensitive to vibration impacts, heritage items are typically more susceptible and are subject to more stringent criteria.

Table 6-11 below lists heritage structures identified within the vicinity of the modified project.

Table 6-11 Vibration sensitive receivers

Aboriginal / non-Aboriginal	Details	Nearest distance from the Project (metres)
Non-Aboriginal	Upper Canal (along Glenlee Rd and within the Hume Highway Alignment)	0m (within project boundary)
Non-Aboriginal	Potential Graziers Inn	0m (within project boundary)
Non-Aboriginal	Glenlee House and outbuildings, garden and gate lodge	0m from heritage area boundary, 150m from nearest building in heritage area
Non-Aboriginal	Sugarloaf Farm homestead group and rural landscape setting	0m from heritage area boundary (within project boundary), 180m from nearest building in heritage area

Modified construction noise assessment scope of works

Details of construction hours, derivation of noise management levels and modelling assumptions have been addressed in Section 5 of the Project REF.

The addendum works will be primarily undertaken within the same project boundary as assessed in the project REF, with some works extending outside the project REF boundary.

Works at the ancillary sites, access tracks and the northern median all take place within or near the Project REF works locations, and are displayed in Figure 6-12. Additionally, works will take place at two crossovers, both of which will feature minor truck movements, with the northern crossover requiring additionally upgrades and amendments. The crossover locations relative to the other works are detailed in Figure 6-12.

Table 6-12 below provides and overview of the addendum REF scope of works assessed for construction noise impacts.

Table 6-12 Modified construction noise assessment scope of works

Stage number	Scope of work	Change from Project REF
1	Ancillary facility establishment	Slight change to extent and location, additional use of equipment
2	Ancillary facility operations	Revised equipment list
3	Ancillary facility material handling	New scenario to cater for ongoing material handling operations within the ancillary facility sites
4	Median strip extension works	New works extending of north of the project REF within the Hume Motorway
5	Northern crossover construction works	New works north of the project REF within the Hume Motorway to facilitate oversized deliveries
6	Access road establishment works	Additional access roads from project REF
7	Access road traffic	New scenario for use of the access roads

Modelling assumptions

Construction vehicles on the access routes would involve approximately 60 trucks and 180 light vehicles as per the project REF. Noise from these vehicles have been assessed as it's own stage (Stage 7).

At the crossovers, it was predicted that an average of two trucks would turn at the crossover daily. Considering the exceedingly low number of trucks turning at these locations and the existing traffic noise on the Hume Motorway, it was determined that trucks at the crossover would have a negligible noise impact and were not considered for further assessment.

Figure 6-12 Modified ancillary facilities, access tracks and cross overs

Construction noise management levels and criteria

Noise management levels and sleep disturbance criterion have been derived from background noise levels detailed in Table 6-10. NMLs and sleep disturbance criterion for residential receivers are detailed in Table 6-13 below.

Table 6-13 Construction NMLs and Sleep Disturbance Criterion for residential receivers

NCA	Background Noise Level (RBL dB(A))			Noise Management Levels $L_{Aeq(15\ minute)}$ dB(A)			Sleep Disturbance Screening Criterion L_{Max} dB(A) (RBL + 15dB(A))
	Standard Hours	OOH1	OOH2	Standard Hours (RBL + 10dB)	Out of Hours (OOH) (RBL + 5dB)		
				Day	OOH1	OOH2	
1	35	42	38	45	40	40	50
2	43	44	39	53	48	44	54
3	42	45	37	52	47	42	52
4	41	42	42	51	46	46	57
5	37	39	38	47	42	42	53

Note 1: The OOH NMLs and sleep disturbance screening criterion for NCA1 have been determined based on the RBL for Standard Hours rather than the OOH2 RBL as a conservative measure

Noise criteria for non-residential receivers were outlined in project REF and can be applied to this assessment. NMLs for non-residential receivers are detailed in Table 6-14 below.

Table 6-14 Construction NMLs for non-residential land uses

Non-Residential Land Use	Noise Management Level $LA_{eq(15\ minute)}$ dB(A)	Time when NML is active
Commercial premises	70	When in use
Education	55 (external) 45 (internal)	
Childcare	55 (external) 45 (internal)	

Noise levels for the modified project were based on equipment usage. The equipment to be used in each stage and the associated noise levels are detailed in Table 6-15 below.

Table 6-15 Equipment noise levels

Stage	Works	Equipment	Equipment Sound Power Levels (dB(A))		Stage Sound Power Levels (dB(A))	
			$L_{Aeq(15\ minute)}$ dB(A)	L_{Max} dB(A)	$L_{Aeq(15\ minute)}$ dB(A)	L_{Max} dB(A)
Stage 1	Ancillary Establishment	Excavator (tracked) 35t	112	120	115	123
		Dump Truck	110	118		
		Generator	103	111		
		Electric Hand Tools	102	110		
		Franna Crane	98	106		
		HIAB Truck	98	106		
		Light Vehicles	91	99		
Stage 2	Ancillary Operation	Generator	103	111	107	115
		Electric Hand Tools	102	110		
		Franna Crane	98	106		
		HIAB Truck	98	106		
		Light Vehicles	91	99		
Stage 3	Ancillary Material Handling	Excavator (tracked) 35t	112	120	118	126
		Dump Truck	113	121		
		Front End Loader (Large)	112	120		
		Bulldozer	110	118		
Stage 4	Median Strip Works	Concrete Saw	123	131	125	133
		Pavement Laying Machine	114	122		

		Front End Loader (Large)	112	120		
		Dump Truck	116	124		
		Concrete Truck	109	117		
		Roller*	109	122		
		Asphalt Paver	108	116		
		Smooth Drum Roller*	112	120		
		Asphalt Truck and Sprayer (Large)*	111	119		
		Asphalt Truck and Sprayer (Small)*	108	116		
		Front End Loader (Small)	91	99		
Stage 5	Northern Crossover Works	Concrete Saw	123	131	125	133
		Pavement Laying Machine	114	122		
		Front End Loader (Large)	112	120		
		Dump Truck	116	124		
		Concrete Truck	109	117		
		Roller*	109	122		
		Asphalt Paver	108	116		
		Smooth Drum Roller*	112	120		
		Asphalt Truck and Sprayer (Large)*	111	119		
		Asphalt Truck and Sprayer (Small)*	108	116		
		Front End Loader (Small)	91	99		

Stage 6	Access Track Works	Excavator (tracked) 35t	112	120	117	125
		Dump Truck	110	118		
		Front End Loader (Large)	112	120		
		Bulldozer	110	118		
		Grader	113	121		

Equipment denoted with a * have received a 5 dB(A) penalty for annoying noise characteristics.

Potential noise impacts

A summary of worst-case noise levels at each receiver has been displayed in Table 6-16. The table outlines the greatest noise levels within each NCA per stage of construction of works during standard hours and OOH periods.

The highlighted cells in the table reflect where the noise levels have exceeded the NMLs. The qualitative descriptions of the noise level exceedances (as defined in the CNVG) are the following:

- Construction noise levels are predicted to be 1 dB to 10 dB above the NML. In these cases, construction noise levels would be clearly audible to almost all receivers;
- Construction noise levels are predicted to be 11 dB to 20 dB above the NML. Construction noise levels would typically be perceived as being moderately intrusive;
- Construction noise levels are predicted to more than 20 dB above the NML. In these circumstances, construction noise would typically be perceived as being highly intrusive

Construction noise levels at most of the remaining receivers are expected to be lower than the worst case noise levels reported in Table 6-16. Results are presented in this manner to provide overview of the likely highest level of noise mitigation required for the construction of the modified project.

Table 6-16 Predicted worst case noise levels for each Stage of works

NCA	NML dB(A)	S1	S2	S3	S4	S5	S6	S7
		Ancillary Establishment	Ancillary Operations	Ancillary Material Handling	Median Strip Extension Works	Northern Crossover Works	Haulage Road Establishment Works	Haulage Road Traffic
STANDARD HOURS								
Residential								
NCA 1	45	44	36	47	62	75	62	33
NCA 2	53	45	37	48	53	37	49	28
NCA 3	52	45	37	48	43	31	66	40
NCA 4	51	45	37	48	45	33	75	40
NCA 5	47	74	66	77	73	45	87	53
Commercial								
NCA 1	70	28	20	31	43	55	32	13
NCA 4	70	34	26	37	38	20	38	20
NCA 5	70	52	44	55	67	39	59	33
Childcare Centre								
NCA 4	55	40	32	43	41	30	66	34
Education								
NCA 1	55	33	25	36	42	37	38	18
NCA 2	55	69	61	72	48	33	55	31
OUT OF HOURS 1								
NCA 1	40	44	36	47	62	75	62	33
NCA 2	44	45	37	48	53	37	49	28
NCA 3	42	45	37	48	43	31	66	40
NCA 4	46	45	37	48	45	33	75	40
NCA 5	42	74	66	77	73	45	87	53
OUT OF HOURS 2								
NCA 1	40	44	36	47	62	75	62	33
NCA 2	44	45	37	48	53	37	49	28
NCA 3	42	45	37	48	43	31	66	40

NCA	NML dB(A)	S1	S2	S3	S4	S5	S6	S7
		Ancillary Establishment	Ancillary Operations	Ancillary Material Handling	Median Strip Extension Works	Northern Crossover Works	Haulage Road Establishment Works	Haulage Road Traffic
NCA 4	46	45	37	48	45	33	75	40
NCA 5	42	74	66	77	73	45	87	53
SLEEP DISTURBANCE								
NCA 1	50	52	44	55	70	83	70	47
NCA 2	54	53	45	56	61	45	57	36
NCA 3	52	53	45	56	51	39	74	54
NCA 4	57	53	45	56	53	41	83	62
NCA 5	53	82	74	85	81	53	95	75

Table 6-17 below provides a count of receivers at which NML exceedances levels are predicted for each works scenario. The counts include all receiver types (e.g. residences, commercial and school buildings etc) and are incremented in accordance with the noise impact bands defined in the CNVG (e.g. 0-10dB exceedance above the NML; 11-20 dB above the NML and so on).

Table 6-17 Number of receivers with NML exceedances

ID	Works	Highly Noise Affected (>75 dB(A))	Count of Receivers (all receiver types within all NCAs)													
			Standard Hours			Out of Hours										
			Exceeds NML by			OOHW1 Exceeds NML by				OOHW2 Exceeds NML by				Exceeds Sleep Disturbance by		
			1-10 dB	11-20 dB	>20 dB	1-5 dB	6-15 dB	16-25 dB	>25 dB	1-5 dB	6-15 dB	16-25 dB	>25 dB	1-10 dB	11-20 dB	>20 dB
Stage 1	Ancillary Establishment	0	22	1	1	89	3	0	1	93	3	0	1	32	1	1
Stage 2	Ancillary Operation	0	3	1	0	0	1	1	0	0	1	1	0	1	0	1
Stage 3	Ancillary Material Handling	1	54	4	1	209	31	1	1	215	33	1	1	157	1	1
Stage 4	Median Strip Works	0	546	142	4	655	544	142	4	656	544	142	4	877	206	6
Stage 5	Northern Crossover Works	1	219	100	10	430	219	100	10	430	219	100	10	397	131	28
Stage 6	Access Track Works	2	214	54	3	304	213	53	3	305	216	53	3	306	101	4
Stage 7	Ancillary Establishment	2	2	0	0	0	2	0	0	0	2	0	0	2	1	1

The prediction of construction noise levels presented in Table 6-17 indicate that the highest NML exceedances at receivers are predicted to result from: Stage 3, Stage 5 and Stage 6, with maximum predicted noise levels of 77 dB(A), 75 dB(A) and 87 dB(A), respectively.

Noise impacts were generally spatially influenced, and also dependant on the time of works. Generally, NCA 5 experienced noise exceeding the relevant residential NMLs during all stages of work (barring Stage 6) during all times of day. Conversely, during Stage 6, noise impacts were highest at the nearby receivers in NCA 1. Stage 5, which was located more centrally among the noise catchment areas, had exceedances at NCA 1, NCA 2 and NCA 5.

Table 6-17 also indicates that two receivers will be "Highly Noise Affected" (HNA) during the works. These are residences at which construction noise levels of $L_{Aeq,15min}$ 75 dB(A) or higher are predicted

Construction noise impacts would be minimised where possible and managed in accordance with the mitigation and management measures outlined in Section 6.2.6 of the project REF.

Construction vibration

Setback distances

The setback distances for vibration intensive equipment have been established in the project REF and can be applied to this assessment. No vibration intensive equipment would be used outside Stage 4 and Stage 5 of the construction works. The setback distances for construction of the modified project is detailed in Table 6-18 below.

Table 6-18 Setback distances

Stage	Works	Safe working distance for		
		Structural integrity of buildings	Human comfort	Protection of heritage items
Stage 4	Median Strip Works	15m	100m	30m
Stage 5	Northern Crossover Works	15m	100m	30m

Potential vibration impacts

The Noise Catchment Areas as well as the number of buildings within the vibration impact distances are detailed in Table 6-19 below.

Table 6-19 Noise catchment area within vibration impact distances

Stage	NCA	Safe working distance for				
		Structural integrity of buildings (15m)		Human comfort (100m)		Protection of heritage items (30m)
		Residential	Commercial	Residential	Commercial	
Stage 4	NCA 1	0	0	0	0	0
	NCA 2	0	0	0	0	0
	NCA 3	0	0	0	0	0

Stage	NCA	Safe working distance for				
		Structural integrity of buildings (15m)		Human comfort (100m)		Protection of heritage items (30m)
		Residential	Commercial	Residential	Commercial	
	NCA 4	0	0	0	0	0
	NCA 5	0	0	0	1	0
Stage 5	NCA 1	0	0	5	0	0
	NCA 2	0	0	0	0	0
	NCA 3	0	0	0	0	0
	NCA 4	0	0	0	0	0
	NCA 5	0	0	0	0	0

The construction vibration assessment indicates the vibration limits and five residencies, and one commercial premise would be exceeded.

Construction vibration would be minimised where possible and managed in accordance with the mitigation and management measures outlined in Section 6.2.6 of the project REF.

Construction traffic noise

Construction traffic noise criteria

Construction activities would result in additional heavy and light vehicle movements on public roads. An initial screening test has been provided in the CNVG in line with screening method addressed in the *NSW Road Noise Policy* (DECCW, 2011) (RNP) which states the following:

For Roads and Maritime projects an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2 dB(A) due to construction traffic or a temporary reroute due to a road closure. Where increases are 2 dB(A) or less then no further assessment is required.

Where noise levels increase by more than 2 dB(A) (less than 2.1 dB(A)) further assessment is required using Roads and Maritimes Criteria Guideline.

Consideration should be given under the direction provided in the *Roads and Maritime Noise Criteria Guideline* (Roads and Maritime 2015) to determine whether the construction traffic or temporary reroute triggers the new road criteria due to changes in road category. Where exceedance due to construction traffic has been determined, corresponding noise mitigation as outlined in Appendix B and Appendix C of CNVG and the CNVG application notes should be considered. Potential mitigation options have also been provided in Section 6.6.4.

Traffic levels

As stated previously, approximately 180 light vehicles and 60 trucks may use the project roads daily.

The access tracks have been identified as being accessed from three roads: the Hume Motorway, Menangle Road and Cummins Road.

Existing traffic volumes on the Hume Motorway were obtained from the nearest Transport for NSW (TfNSW) permanent classifier station (ID BRGSTC) located approximately 30 km south of the works location. Traffic counts for Menangle Road were derived from the Spring Farm Parkway Stage 1 Operational Traffic Noise Report (SLR, 2021), while the traffic levels for Cummins Road were derived from the Menangle Park Planning Proposal Transport Impact Assessment (GTA, 2018). The traffic counts are provided in Table 4-6 in Appendix H.

Predicted Construction Traffic Noise Impacts

Traffic noise levels have been derived from the traffic counts using the TfNSW Construction and Maintenance Noise Estimator Tool. It was assumed that each vehicle made a return trip (i.e., 180 light vehicles and 60 heavy vehicles travelling in the northbound direction AND 180 light vehicles (LVs) and 60 heavy vehicles (HVs) travelling in the southbound direction).

Additionally, as details of the timing of construction vehicle movements and the utilisation of the three roads were not available, construction traffic noise was assessed on a worst case basis, meaning:

- The assessment assumed that each of the three roads would host all 180 LV and 60 HV vehicles
- The assessment assumed that all construction vehicle movements were made during the day for the assessment of the day period, and that all construction vehicle movements were made during the night for the assessment of the night period.

Due to the pre-existing heavy traffic on the Hume Motorway, the additional traffic construction traffic increases traffic noise by only 0.1 dB(A) during the day and 0.3 dB(A) during the night, well below the 2dB(A) increase criteria. Likewise, at Menangle Road during the day, traffic noise would only increase by 0.4 dB(A).

Construction traffic on Cummins Road during both the day and night would increase traffic noise by over 2 dB(A). This is a result of Cummins Road's generally low overall traffic. At Menangle Road, as the night period features significantly lower traffic compared to the day period, the construction traffic would also lead to traffic noise increasing by more than 2 dB(A).

Mitigation measures to address the construction traffic noise impact at Cummins Road during the evening peak period have been detailed in Section 6.6.4.

The traffic noise levels are displayed in Table 6-20.

Table 6-20 Road Noise Traffic as a result of proposed modification

Road	Existing Noise Level (dB(A))		Increase in Noise Level (dB(A))		Total Noise Level (dB(A))		Need for Further Management?	
	Day	Night	Day	Night	Day	Night	Day	Night
Hume Motorway	64.7	62.8	0.1	0.3	64.8	63.1	No	No
Menangle Road	62.5	57.4	0.4	2.5	62.9	59.9	No	Yes
Cummins Road	55.7	58.7	3.9	4.2	59.5	63	Yes	Yes

6.6.2 Operational noise

Operational noise criteria

The noise impact predicted during operation of the modified project is considered a long-term impact as it would occur for the lifetime of the modified project.

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

- Trigger 1 - the predicted 'Build' noise level exceeds the NCG controlling criterion and the noise level increase due to the project (ie the noise predictions for the 'Build' minus the 'No Build') is greater than 2.0 dB
- Trigger 2 - the predicted 'Build' noise level is 5 dB or more above the NCG controlling criterion (ie exceeds the cumulative limit) and the receiver is significantly influenced by project road noise, regardless of the incremental impact of the project
- Trigger 3 - the noise level contribution from the road project is acute (daytime $LA_{eq(15hour)}$ 65 dBA or higher, or night-time $LA_{eq(9hour)}$ 60 dBA or higher) even if noise levels are controlled by a non-project road.

The requirement for the project is to provide feasible and reasonable additional mitigation to eligible receivers with the aim of meeting the NCG controlling criterion.

Residential receivers

The predicted operational road traffic noise levels at residential receivers are summarised in Table 6-21 for the 2026 at-opening and 2036 future design scenarios. The table shows the worst-case impacts in each NCA, which are typically experienced by the nearest receivers.

Table 6-21 Predicted road traffic noise levels at most-affected residential receivers in each NCA

NCA	Predicted Noise Level (dBA)[1]								Number of triggered buildings			
	At opening (2026)				Future design (2036)							
	No build (without project)		Build (with project)		No build (without project)		Build (with project)					
	Day	Night	Day	Night	Day	Night	Day	Night	Trigger 1 >2.0 dB	Trigger 2 Cumulative	Trigger 3	Total
NCA 1	67	63	67	59	68	60	68	60	-	-	-	-
NCA 2	68	65	66	61	69	63	67	61	-	1	1	1
NCA 3	67	63	66	62	66	62	65	60	-	-	-	-
NCA 4	55	51	55	50	55	51	55	50	-	-	-	-

NCA	Predicted Noise Level (dBA)[1]								Number of triggered buildings			
	At opening (2026)				Future design (2036)							
	No build (without project)		Build (with project)		No build (without project)		Build (with project)					
	Day	Night	Day	Night	Day	Night	Day	Night	Trigger 1 >2.0 dB	Trigger 2 Cumulative	Trigger 3	Total
NCA 5	68	64	68	64	68	64	67	63	-	5	4	5
											Total	**6**

Note 1: Daytime and night time are LAeq(15hour) and LAeq(9hour) noise levels, respectively.

The above results for residential receivers show that:

- The nearest receivers to the project are subject to relatively high existing road traffic noise levels, which already exceed the NCG criterion in many cases.
- The project is not predicted to significantly alter operational road traffic noise levels for receivers in the study area. Noise levels are predicted to reduce in locations south of the project, where the traffic is expected to decrease.
- Exceedances of the NCG cumulative limit criteria (ie 5 dB or more above the NCG controlling criterion) are predicted at the nearest receivers in NCA02 and NCA05.
- Receivers adjacent the alignment in NCA02, NCA05 are also predicted to be subject to acute noise levels (ie daytime noise levels are 65 dBA or higher, or night-time noise levels are 60 dBA or higher).
- In summary, the project is predicted to result in:
- No residential receivers experiencing increases in traffic noise of greater than 2.0 dB
- Six residential receivers experiencing noise levels above the cumulative limit criteria
- Five residential receivers experiencing acute noise levels
- In total, six residential receivers are considered eligible for consideration of additional noise mitigation, as per the operational road traffic noise criteria.

Other sensitive receivers

'Other sensitive' receivers that are predicted to have exceedances of the trigger levels are shown in Table 6-22.

Table 6-22 Other sensitive receivers triggered

NCA	Receivers	Number of NMG Triggered Buildings		
		Trigger 1 >0.2dB	Trigger 2 Cumulative	Trigger 3 Acute
NCA02	Broughton Anglican College	0	8	0

The above assessment shows a total of eight 'other sensitive' receiver buildings are predicted to have exceedances of the operational road traffic noise criteria at Broughton Anglican College.

It is noted that the criteria for certain ‘other sensitive’ receivers (i.e. schools) are specified as internal noise levels. As the noise model predicts external noise levels, assumptions have been made regarding the likely facade performance of these receivers. ‘Other sensitive’ receivers have been conservatively assumed to have openable windows, which corresponds to a 10 dB outside-to-inside reduction in noise through the building facade.

The impacts at ‘other sensitive’ receivers will be reviewed as the project progresses as part to determine the eligibility of each receiver for noise mitigation measures. The eligibility would be based on further inspections of each receiver to confirm the assumptions made in the noise modelling.

Receivers eligible for at property mitigation

The receivers eligible for consideration of additional mitigation are summarised in Table 6-23.

Table 6-23 At property mitigation summary

NCA	ID	Floor	Predicted 2033 noise level (dBA) (Day/Night)		Exceeds NCG criteria		At-property treatment package[1] (exceedance)	Comments
			REF	Modified project	REF	Modified project		
NCA02	NCA02.RES.0013	Ground	67/61	67/61	✓	✓	2 (7 dB)	Previously identified in the project REF as an educational receiver at Broughton Anglican College. Confirmed to be the caretaker's residence.
	NCA02.OED.0017-0041,0048	Ground	64 (Day)	65 (Day)	NA	✓	TBC	Up to eight buildings at Broughton Anglican College are predicted to exceed the trigger levels. Counted as one building in this assessment pending further investigation.
NCA05	NCA05.RES.0037	Ground	67/63	66/62	-	✓	2 (7 dB)	Properties triggered in Detailed Design due to the change in classification of the Hume Highway to a project road.
	NCA05.RES.0038	Ground	69/65	67/63	-	✓	2 (8 dB)	
	NCA05.RES.0039	Ground	64/59	64/59	-	-	-	

		First	65/60	65/60	-	✓	1 (5 dB)	
	NCA05.RES.0043	Ground	65/60	66/58	-	✓	2 (6 dB)	Property triggered in Detailed Design due to the change in classification of the Hume Highway to a project road, changes in surface corrections and HV corrections.
		First	NA	67/60	-	✓	2 (7 dB)	
	NCA05.RES.0045	Ground	65/61	66/62	✓	✓	2 (7 dB)	Property identified in the REF, but the building identified was a shed. Notwithstanding, this property is understood to be acquired as part of a future residential development (not currently approved).
Total buildings					2	8[2]		

Note 1: At-property treatment package types are defined in the Roads and Maritime (now TfNSW) At-Receiver Treatment Guideline (Draft, June 2017). See Appendix H.
Note 2: The buildings at Broughton Anglican College are counted as one building pending further investigation.

The assessment shows that six residential receivers and eight buildings within the Broughton Anglican College are eligible for consideration of at-property treatment, which is an increase from the project REF. This is primarily due to the changes made to the road surface corrections, changes in project/non-project road classifications and heavy vehicle corrections due to the high percentage of heavy vehicles on the Hume Highway. The impacts at Broughton Anglican College will be reviewed and based on further inspections to confirm the assumptions made in the noise modelling.

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Vibration impact on Upper Canal (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373)	When vibration intensive works are to take place near the Upper Canal heritage item, a certified engineer should inspect the structure for visual damage prior to and during the works taking place.	Transport for NSW	Pre-construction/Construction	Additional safeguard
	If new visual impacts are identified as a result of the works by a certified engineer, works would be stopped and reviewed. Any new visual impacts should then be suitably repaired.	Transport for NSW/Contractor	Construction	Additional safeguard
	A vibration monitoring device should be installed and operated by a suitably qualified specialist for the duration of	Transport for NSW/Contractor	Pre-construction/Construction	Additional safeguard

	the vibration intense works. Where vibration reaches levels, which may result in damage to the structure, works should be ceased and revised to minimise vibration impacts.			

6.7 Biodiversity

A Biodiversity assessment was completed to identify the potential biodiversity impacts to from the construction and operation of the modified project. The assessment is found in Appendix C of this document and is summarised below.

6.7.1 Methodology

The methodology for the biodiversity assessment involved:

- A review of background information and previous biodiversity assessments, which include:
  - Menangle Park Planning Proposal (Dahua Group (Aust) Pty Ltd 2018)
  - NSW BioNet Vegetation Classification Database (2021)
  - Remnant Vegetation Mapping of the Cumberland Plain (DPIE 2018)
  - Project REF
- An updated search of spatial records for threatened flora and fauna within a 10 kilometre radius of the study area
- A field survey undertaken on 20 and 26 August 2021.

6.7.2 Existing environment

The existing environment of the modified project is outlined below.

Vegetation mapping

Previous vegetation mapping identified three vegetation types to occur in the study area. The vegetation mapping was ground truthed during the field surveys to validate the vegetation. The three vegetation types include:

- Freshwater wetlands
- Exotic vegetation and cleared land
- Cumberland Plain Woodland (Shale Plains Woodland).

Freshwater wetlands

The diagnostic species *Typha orientalis* (Broadleaf Cumbungi) and *Juncus usitatus* belonging the Plant Community Type (PCT) 1071 – *Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion* were found along the waterway. The condition of this PCT 1071 was found to be severely degraded, with an abundance of exotic species including *Olea europaea subsp. cuspidata* (African Olive), *Rubus fruticosus sp. agg*. (Blackberry), *Eragrostis curvula* (African Lovegrass) and *Chloris gayana* (Rhodes Grass).

PCT 1071 aligns to Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions and the Sydney Freshwater Wetlands in the Sydney Basin Bioregion, both listed as an Endangered Ecological Communities (EEC) under the *Biodiversity Conservation Act 2016* (BC Act).

Exotic vegetation and cleared land

Exotic vegetation was found in sections surrounding buildings, tracks, and on Hume Motorway medians, however, large patches of grassland were mapped as derived native grassland (DNG). Native grass species mapped as DNG include *Sporobolus creber* (Slender

Rat's Tail Grass), *Themeda australis* (Kangaroo Grass) and *Imperata cylindrica* (Blady Grass), recorded exotic species include *Eragrostis curvula* (African lovegrass), *Soliva sessilis* (Bindyi), *Senecio madagascariensis* (Fireweed) and *Plantago lanceolata* (Lamb's Tongues).

The DNG in the study area is derived from the surrounding woodland, which is mapped as PCT 850 – *Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion low condition*. DNG of PCT 850 aligns to the Critically Endangered Ecological Community (CEEC) Cumberland Plain Woodland listed under the BC Act. The does not align to the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act) listing of the community.

Shale Plains Woodland

The timbered areas of the study area have been mapped as Shale Plains Woodland, however, given the presence of *Acacia implexa* (Hickory Wattle) the vegetation better aligns to PCT 850 – *Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion* in low condition.

PCT 850 aligns to the BC Act listing of the CEEC Cumberland Plain Woodland. However, given the highly degraded nature of the vegetation, it does not align to the EPBC Act listing of the community.

Threatened flora

An updated search of threatened flora and fauna spatial records returned no additional species to the original search undertaken in the project REF. However, given the degraded nature and the limited amount of woodland or riparian forest in the study area, only two species have a moderate chance of occurring in the study area:

- *Marsdenia viridiflora* subsp. *viridiflora,* listed as an Endangered Population under the BC Act
- *Pimelea spicata* (Spiked Rice-flower), listed as Endangered under the BC and EPBC Acts.

Marsdenia viridiflora subsp. *viridiflora* is a conspicuous species and would likely have been recorded during the field survey, therefore likelihood of impact to the Endangered Population is low and no further assessment is needed.

Pimelea spicata is considered an inconspicuous species and has been previously recorded in the study area. Additionally, *Pimelea spicata* has been known to occur in highly degraded areas that no longer support Cumberland Plain Woodland. Therefore, *Pimelea spicata* has been considered for further assessment.

Threatened fauna

No threatened fauna species are likely to have potential breeding or limiting foraging habitat within the study area. The degraded nature is unlikely to provide adequate foraging habitat for any threatened species likely to occur or pass through study area. No threatened fauna species were observed during the field survey.

One hollow bearing tree was recorded on Glenlee Road. The tree did not have any overhanging limbs over Glenlee road, and therefore is not required to be trimmed. Breeding habitat for any hollow dependant species will not be impacted by the proposed works.

A small bridge crossing running water was identified during the field survey at the western end of the study area, and was assessed for potential microbat habitat. Crevices and gaps

present on the underside of the bridge may provide habitat for microbat species that are known to roost in man-made structures. Species include:

- Southern Myotis (*Myotis Macropus*), listed as Vulnerable under the BC Act.
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*), listed as Vulnerable under the BC Act
- Little Bent-winged Bat (*Miniopterus australis*), listed as Vulnerable under the BC Act
- Large-eared Pied Bat (*Chalinolobus dwyeri*) listed as Vulnerable under the BC and EPBC Act.

The proposed modification works would only use this bridge for construction site access, therefore, the proposal will only have indirect impacts on any potential bats using the bridge.

Aquatic habitat

The proposal is located approximately two kilometres to the east of the Nepean River. Within the study area there is one unnamed ephemeral waterway forming a first order stream, a third order waterway and a fourth order stream.

The first order waterway was observed to be dry and did not contain any standing pools of water. No submerged or semi-emergent aquatic vegetation was detected. The field survey was conducted two days after a rain event (BoM 2021a); however, there was no evidence of previous or current water flow indicating that there is potential for water to flow in this drainage line after heavier and more prolonged rain events only. Based on the above, the unnamed waterway does not meet the criteria for Key Fish Habitat Type and meets Class 4 unlikely key fish habitat as defined in the *Policy and guidelines for fish habitat conservation and management* (2013 update) (DPI 2013).

No aquatic fauna, including frogs, were detected within the unnamed waterway. Due to the recent rain event, it would be expected to hear frog calls if any were present; therefore, it is highly unlikely that frogs utilise this waterway on a regular basis. Given the ephemeral nature of this drainage line, it is not likely to provide specialised habitat beyond the surrounding terrestrial vegetation.

Stagnant and shallow water with a high level of sedimentation was observed in the third order stream. Flora species associated with aquatic habitats, such as *Typha orientalis* and *Juncus usitatus*, were recorded along this waterway, as were *Crinia signifera* (Common eastern froglet) calls.

A second unnamed waterway forming a fourth order stream (Strahler 1957) is located in the west of the study area. During the field survey moving water was observed in this stream, and *Crinia signifera* calls were heard. A small bridge has been historically constructed for crossing this waterway, therefore the proposal is unlikely to impact the waterway.

6.7.3 Potential impacts

Construction

Proposed activities

In relation to the Project REF, the proposed modification works would include areas within the road verge in the northern end of the study area as well as south of Broughton Anglican College on Menangle Road. The works involve the creation of access tracks, compound sites, trimming of vegetation, installation of two poles and two crossovers on the Hume Motorway. The nature of impacts in the study area are temporary, as it will not be converted to hardscape and post construction the study area will be left to naturally regenerate. However, it is important to note that development is expected to occur in this area in the

future and for the purpose of this, a conservative approach has been assumed meaning that the additional access tracks and compound sites are considered direct impacts.

Vegetation impacts

The majority of vegetation that would be impacted by the construction of the modified project comprises non-native exotic vegetation (pasture grasses and exotic vegetation dominated by *Olea europaea subsp. cuspidata* (African Olive)). However, a small amount of native vegetation would be impacted. This vegetation includes:

- 5.51 ha (5.38 ha comprising DNG and 0.13 ha comprising low condition woodland) of PCT 850 DNG will be impacted as a result of the proposed access tracks and site compounds
- 0.85 ha of PCT 850 in low condition, will be modified (trimming) along Glenlee Road to allow large construction vehicle access.

The vegetation in the study area will be left to naturally regenerate once the construction works have concluded.

A summary of each vegetation community type to be impacted is detailed in Table 6-24 below. Vegetation mapping is shown in Figure 6-13 and Figure 6-14 below.

Table 6-24 Construction impacts to vegetation

Plant Community Type (PCT)	Condition	Threatened Ecological Community	BC Act	Area of impact (ha)	Area to be modified (trimmed) (ha)	Area to be modified (trimmed) (ha)
PCT 850 - *Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion*	DNG (Low)	Cumberland Plain Woodland	CEEC	Does not meet the listing	5.38	-
PCT 850 - *Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion*	Low	Cumberland Plain Woodland	CEEC	Does not meet the listing	0.13	0.85
Exotic grassland	Low	-	-	-	6.87	-
Exotic vegetation	Low	-	-	-	0.10	-

Plant Community Type (PCT)	Condition	Threatened Ecological Community	BC Act	Area of impact (ha)	Area to be modified (trimmed) (ha)	Area to be modified (trimmed) (ha)
				Total	**12.48**	**0.85**

Source: Niche 2021

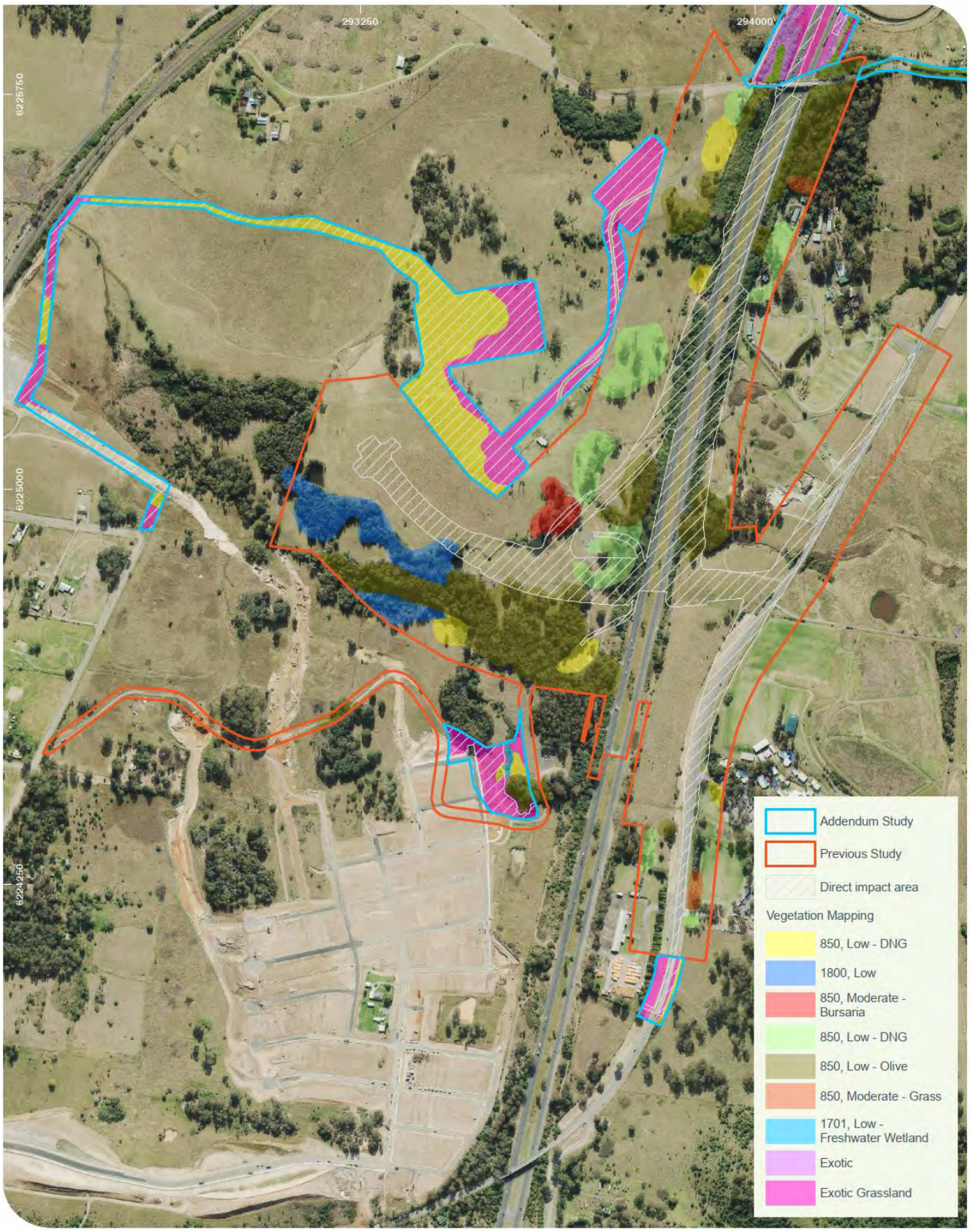


Figure 6-13 Vegetation mapping (1 of 2)

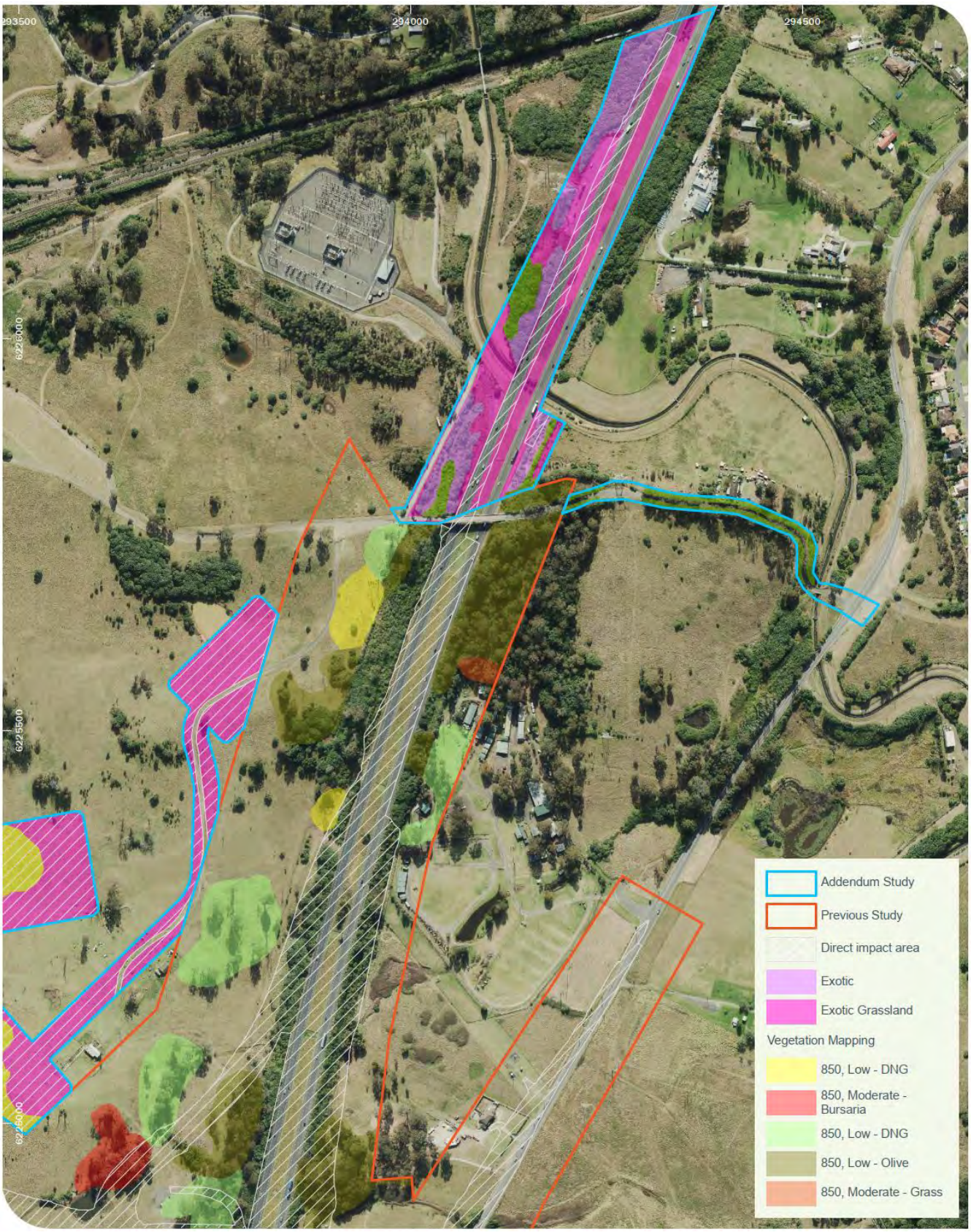


Figure 6-14 Vegetation mapping (2 of 2)

Threatened flora

The proposal will result in clearing of up to 5.38 ha of potential habitat in a low condition for *Pimelea spicata.* Whilst this species was not found during the field survey, impacts to it could not be excluded due to its inconspicuous nature. As a result, further assessment was undertaken via an Assessment of Significance (AoS) (refer to Appendix C) which found that significant impacts to this species as a result of the proposed modification works were unlikely.

Threatened fauna

The degraded nature of the study area is unlikely to provide foraging habitat for any threatened species likely to occur or pass through the study area. Therefore, the proposed works are not likely to directly impact any threatened fauna.

The bridge in the western portion of the study area provides potential habitat for threatened microbat species. Heavy vehicles accessing parts of the site via the bridge may cause an indirect impact in the form of vibrations. Given this potential, further assessment via an AoS for potential microbat species was undertaken (refer to Appendix C) which found significant impacts as a result of the proposed modification works were unlikely.

Aquatic habitat

As outlined in the project REF, construction in proximity to watercourses could impact on water quality due to the disturbance of the bed and banks resulting in erosion and sedimentation and alteration of downstream flows. This may result in the temporary displacement of aquatic fauna (such as frogs and tadpoles) and temporary changes to the turbidity and sedimentation of waterways. To mitigate and manage these impacts, safeguards and management measures mentioned in Section 6.7.4 as well as Section 6.6 of the Project REF would be implemented.

Operation

The operational impacts of the proposed modification are consistent with the impacts outlined in Section 6.7.4 of the project REF.

Conclusion on significance of impacts

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

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

6.7.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Removal of native vegetation	Exclusion zone around the Freshwater Wetlands adjacent to the impact area to reduce the risk of accidental impacts.	Contractor	Construction	Additional safeguard
	The compound sites and access tracks will be left to regenerate post construction work	Contractor /TfNSW	Post construction	Additional safeguard

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aquatic impacts	Works in the vicinity of the unnamed first order ephemeral waterway and third order waterway will occur during dry periods where possible to prevent soil compression, bank slumping, soil erosion and sediment laden runoff from entering the waterway.	Contractor	Construction	Additional safeguard
	Sediment and erosion controls will be installed around the perimeter of all soil disturbance and the proposed waterway crossing to reduce potential soil erosion and sediment laden runoff from entering the waterway or affecting nearby native vegetation.	Contractor	Construction	Additional safeguard
Fauna impacts	If microbats are encountered or spotted during construction, a stop works and further assessment procedure (by an ecologist) should be implemented.	Contractor	Construction	Additional safeguard
Invasion and spread of weeds and pests	Ensure machinery is clean and free of introduced plant seeds prior to activities on site. *Under Biosecurity Act 2015* there are recommended measures for removal of weed species within the Greater Sydney region Woody weed species require removal from site and are not to be mulched onsite.	Contractor	Construction	Additional safeguard
	Measures to prevent the spread of Chytrid fungus would be employed in accordance with the *Hygiene protocol for the control of disease in frogs* (DECC 2008).	Contractor	Construction	Additional safeguard

6.7.5 Biodiversity offsets

Given the low condition of PCT 850 DNG in the study area, additional biodiversity offsets in accordance with *TfNSW Guidelines for Biodiversity Offsets* (TfNSW 2016) are not required for the modified project.

6.8 Contamination

This section outlines the potential impact of the proposed modification on contaminated land and is informed by the *Spring Farm Parkway Stage 1 Detailed Design ACM (Asbestos Containing Material) Assessment* (Jacobs, 2021).

6.8.1 Methodology

The methodology of the ACM assessment involved:

- A photogrammetry survey of the construction footprint utilising historical and current aerial photography/imagery to ascertain changes in site levels over time and indicate areas of potential filling or stockpiling
- A site walkover conducted across the project footprint in order to ground-truth the results of the photogrammetry survey
- Surface samples identified on site walkover were collected and submitted to a National Association of Testing Authorities (NATA)
- Soil samples collected from test pits within areas of historic fill (identified by photogrammetry survey) were collected and submitted to a NATA

6.8.2 Existing environment

The existing environment of the modified project is generally consistent with that outlined in Section 6.6.2 the project REF. This is summarised below.

Acid Sulfate Soils (ASS)

Acid sulfate soils (ASS) are soils and sediments containing iron sulphides that, when disturbed and exposed to oxygen, generate sulphuric acid and toxic quantities of aluminium and other heavy metals. The majority of ASS are formed by natural processes under specific environmental conditions. A review of the online ASS maps (CSIRO, 2006) for the area surrounding the proposal site indicates that there are no known occurrences of ASS within the proposal footprint, with areas of low to high potential further to the west associated with the Nepean River.

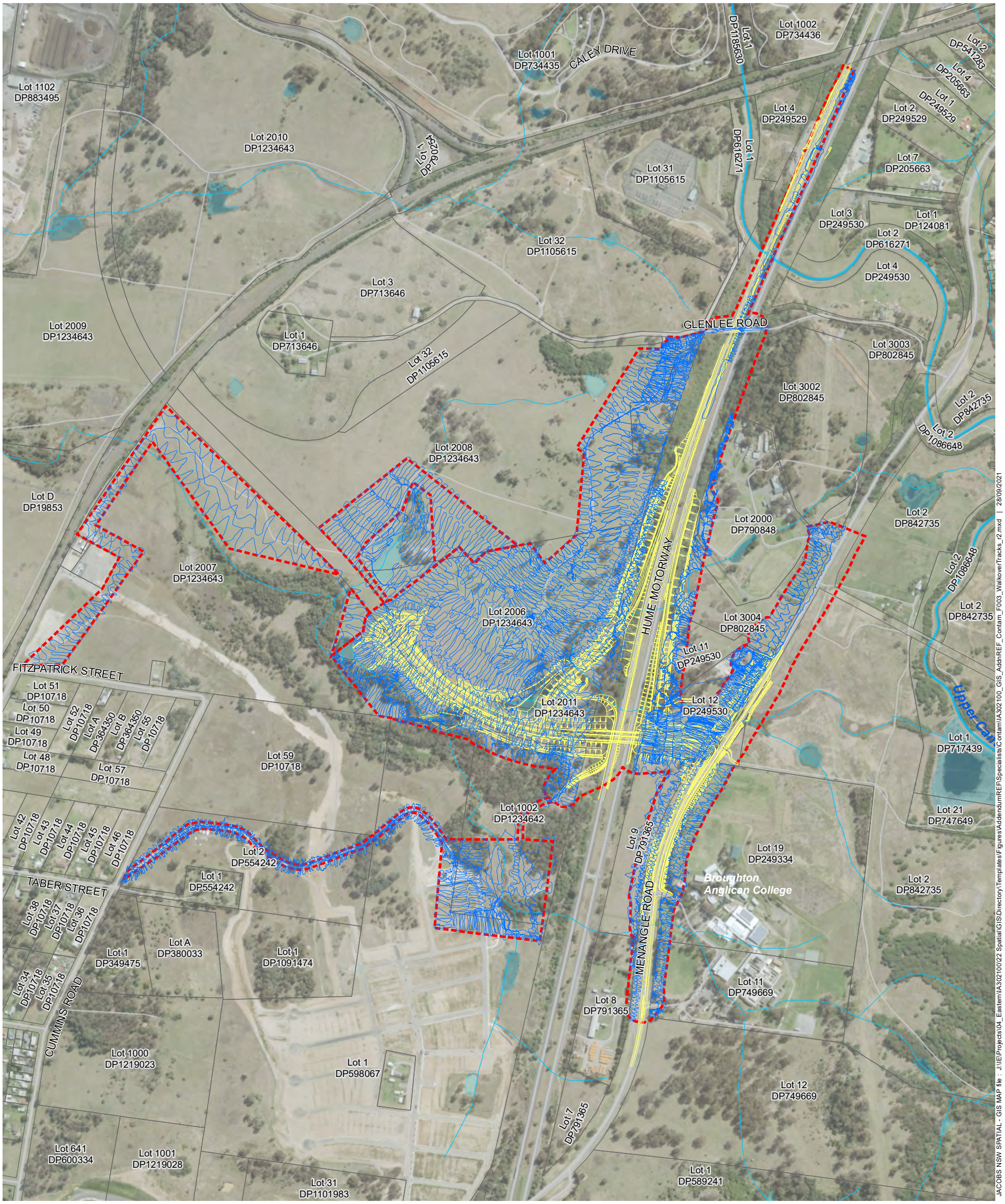
No ASS testing has been carried out and is not considered a risk for the proposed modification.

Salinity

An assessment of the soil salinity hazard map for western (DIPNR, 2002) indicates that the site is located within an area of ‘moderate’ soil salinity potential. An area of ‘high’ salinity potential associated with the creek line is mapped along the western side of the proposal area. No specific salinity testing or assessment has been carried out as part of the investigations and it is unlikely that soil salinity would pose any specific design constraints for the major structures, other than provision of appropriate durability allowances.

Site inspection

A site inspection was undertaken between 5 May 2021 and 8 July 2021 to ground truth finding from the photogrammetry survey. A small portion of the study area was unable to be inspected due to property access restrictions. The areas that were covered by site inspection are shown in Figure 6-15 below.



JACOBS NSW SPATIAL - GIS MAP file : J:\IE\Projects\04_Eastern\IA302100\02 Spatial\GIS\Directory\Templates\Figures\AddendumREF\Specialists\Contam\IA302100_GIS_AddnREF_Contam_F003_WalkoverTracks_r2.mxd | 28/09/2021

Legend

- Project corridor
- ACM walk tracks
- Waterway

Figure 6-15 | Site Walkover

Areas of Environmental Interest (AEI)

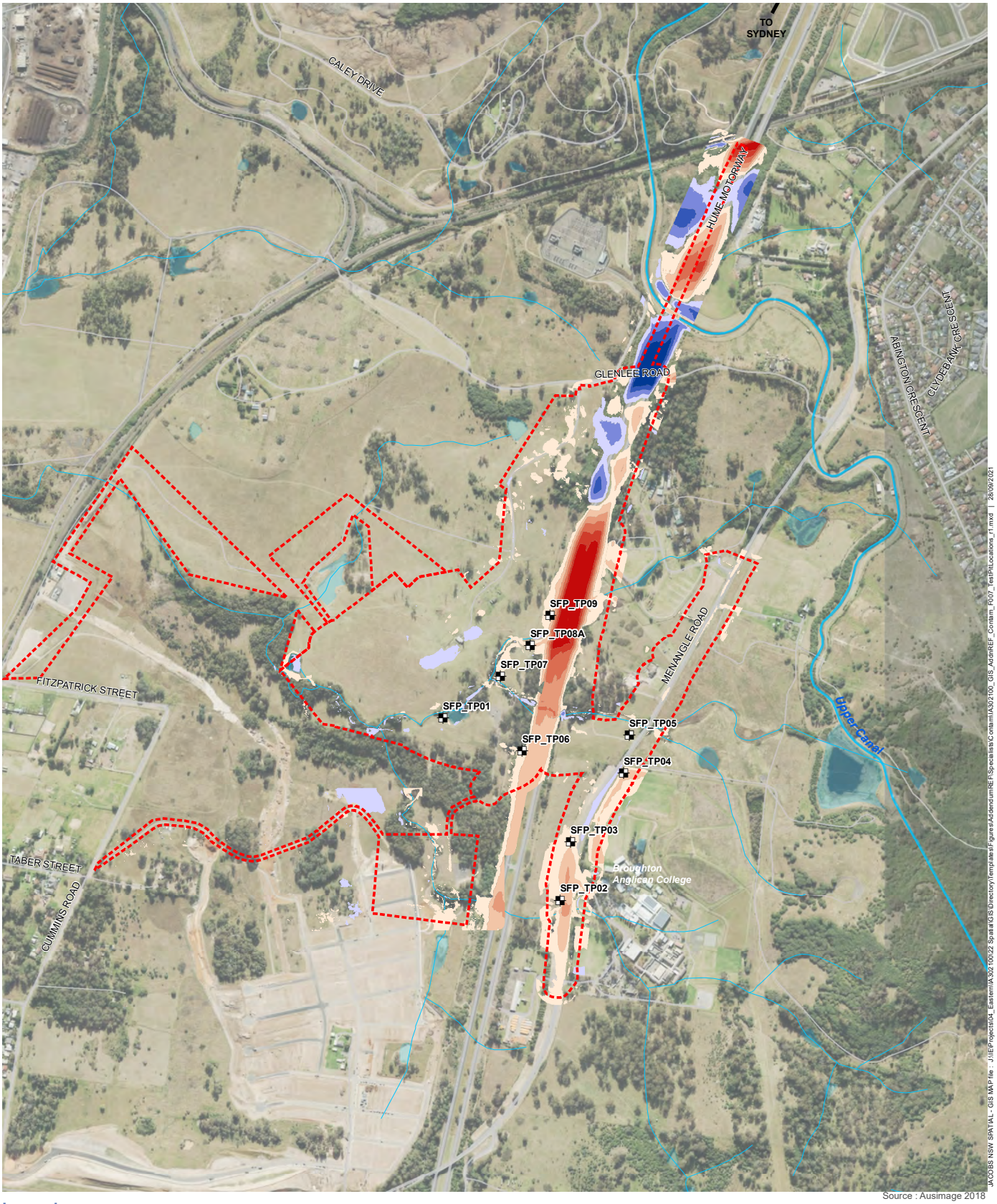
Based on the photogrammetry survey, the section of the Hume Highway south of Lot 3002/DP802845 (which was unable to be accessed during this investigation) may form an area of environmental interest (AEI) as it is an area of historic filling. The risk associated with not accessing this area from an ACM perspective is moderate, given that ACM is a potential contaminant of concern that could be associated with historical fill.

Test Pit investigation

Test pit investigations were conducted to provide observations of sub-surface conditions and characterise potential contamination in areas of filling identified by photogrammetry survey.

A total of eight test pits were advanced into fill material using a 3.5 tonne excavator to a maximum depth of 1.5 meters below ground level (mBGL) or until excavation method refusal (whichever was shallower). One test pit (SFP-TP06) was advanced using a hand auger.

The location of the test pits/hand auger samples are shown in Figure 6-16 below.



Source : Ausimage 2018

JACOBS NSW SPATIAL - GIS MAP file : J:\IE\Projects\04_Eastern\IA302100\22 Spatial\GIS\Directory\Templates\Figures\Addendum\REF\Specialists\Contam\IA302100_GIS_AddnREF_Contam_F007_TestPitLocations_r1.mxd | 28/09/2021

Legend

- Project corridor
- Waterway
- Test Pit Locations

Elevation Difference (m)
2019 DEM - 1956 DEM

- -8m - -6m
- -6m - -4m
- -4m - -2m
- -2m - -0.5m
- 0.5m - 2m
- 2m - 4m
- 4m - 6m
- 6m - 8m
- 8m - 10m
- 10m - 12.5m

0 200 400m

1:10,000 @ A3

N

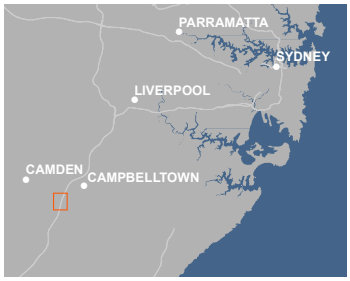


Figure 6-16 | Test Pit Locations

6.8.3 Potential impacts

Construction

Contamination

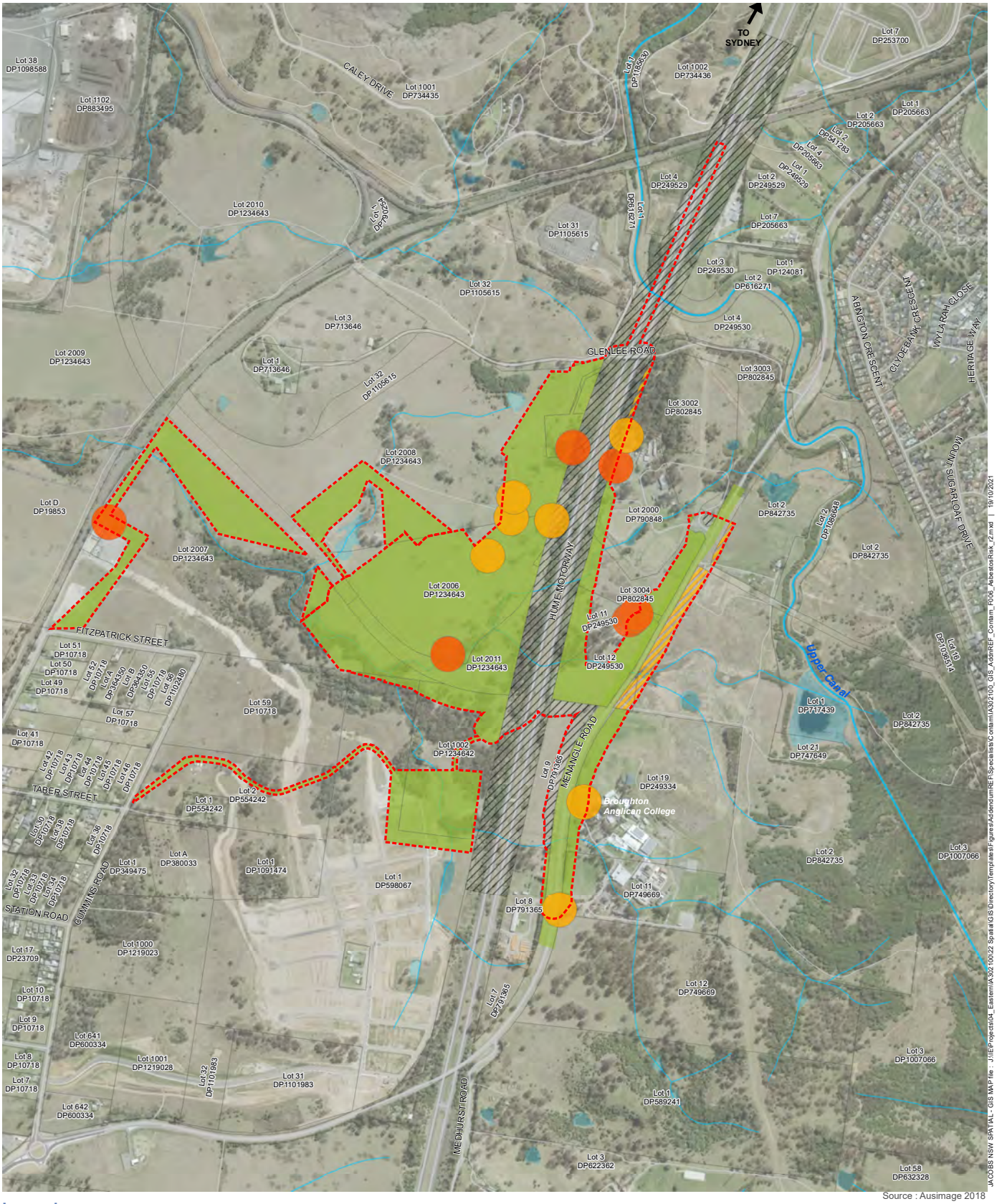
Excavation has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. The exposure of contaminants could also pose an environmental risk if they were to enter nearby waterways through the stormwater infrastructure. These impacts would be managed in accordance with the Soil and Water Management Plan which will be collated prior to construction.

The assessment concluded that contamination was not found at levels above the adopted site assessment criteria in the soil samples collected. No visual indicators of contamination were observed in the materials excavated from the test pit/hand auger locations or at site surfaces within approximately five metres from these locations. It should be noted that these locations were terminated in fill materials, and there is potential for contamination to present in fill materials beyond the locations assessed in this assessment. It is recommended that further investigations are to be undertaken prior to construction to assess areas which were not accessible during this investigation.

Asbestos Containing Material (ACM)

There is a moderate to high potential of encountering surficial ACM and historical fill in the Hume Highway corridor. There is a low to moderate potential for encountering surficial ACM and historical fill in the Menangle Road corridor. Areas that were unable to be investigated have a moderate potential of encountering surficial ACM due to its aforementioned presence elsewhere in the construction footprint. As mentioned previously, further investigations would need to be undertaken prior to construction to ground truth potential ACM in areas which were not accessible during this investigation. Mitigation measures to manage Asbestos Containing Material are outlined in Section 6.8.4.

Areas of potential ACM within the study area are shown in Figure 6-17 below.



Legend

Project corridor

Waterway

Asbestos potential

- Low, localised occurrences of moderate/high
- Moderate (unable to access portion of lot)
- Moderate (unable to access lots)
- Moderate
- High

Note: localised occurrences of ACM/PACM have been marked with a 50m buffer of high/moderate risk respectively

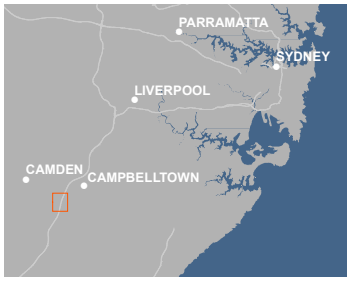


Figure 6-17 | Areas of potential ACM

Operation

The operation of the proposed modification would be managed under similar practices that are used at present to prevent any spillage or contaminant risk. As such, there is expected to be no additional operational impacts from the modified project during operation of the road.

6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Contamination	A Remediation Action Plan (RAP) and an Unexpected Find Protocol (UFP) will be prepared and implemented to manage the potential for soil or water quality contamination during construction of the proposal. The RAP will evaluate potential remedial options and recommend a preferred option to manage the ACM during the construction of the road upgrades. The RAP should include a Long-Term Environmental Management Plan for the ACM material (should it remain in the proposal alignment). The RAP should include a preliminary plan to manage potential risks to human health and the environment during the remediation activities. The RAP will form a part of the overall CEMP.	Contractor	Pre-Construction	Additional safeguard

6.9 Other impacts

6.9.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Landscape character and visual amenity	The existing environment is consistent with that outlined in Section 6.3.2 of the project REF.	Construction impacts of the proposed modification would generally be consistent with that described in Section 6.3.4 of the project REF. The ancillary facilities as outlined in Section 3.4, are located as per the following: **Compound** 1 - south of the eastern side of Menangle Road, within a clear paddock opposite Broughton Anglican College. **Compound 2** –to the west of the Hume Motorway, on the northern boundary of Spring Farm Parkway. **Compound 3 -** – is located site on the western side of the Hume Motorway and has shifted from adjacent to the northbound entry ramp to be closer to Glenlee Road. The landscape character impacts would be consistent with the impacts identified in the project REF (Section 6.3.4). The viewpoint at Glenlee Road Bridge over the Hume Motorway would now include the extension of the northbound entry ramp to the Glenlee Road Bridge, however the visual impact would remain from low to moderate due to the field of view being already dominated by the motorway. The viewpoint at the private rural residential property and at the road verge/agricultural land on Menangle Road may now include a permanent Variable

		Messaging Sign. This would increase the visual impact to high and moderate respectively. The viewpoint at the verge opposite Broughton Anglican College on Menangle Road would now include extension of the road line marking and inclusion of raised medians at entry and exit points of the college. This would increase the visual impact at this viewpoint to moderate. The visual impact at all other viewpoints would be consistent with the project REF.

All other environmental factors of the modified project would be consistent with its existing environment and potential impacts outlined in the project REF.

6.10 Cumulative impacts

6.10.1 Other projects, proposals and developments

A cumulative impact occurs when two or more projects are carried out concurrently and in proximity to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was carried out in isolation.

In addition to the projects outlined in Section 6.14.2 of the Project REF, the project outlined in Table 6-25 below can potentially result cumulative impacts with the modified project.

Table 6-25 Other projects and developments within proximity of the modified project

Project	Construction impact	Operation impact
Menangle Park Development Dahua Group (Aust) Pty Ltd propose to construct a master planned community at Menangle Park Urban Release Area (URA) which involves: • Approximately 5,250 dwellings in a range of densities and lot sizes • The relocation and expansion of the town centre compromising 30,000m2 of retail and employment Gross Floor Area • The introduction of a new neighbourhood centre with approximately 3,500m2 of retail floor space • A new 7.6-9.6 metre wide north-south green active transport link • 134.81 hectares of parks and sporting fields • 43.96 hectares of land for environmental conservation • Two primary schools • One hectare of open space.	The proposal would result in up to 57.25 ha of native vegetation removal which would include Shale Hills Woodland, Shale Hills Woodland Derived Native Grassland and Acacia Regrowth. There will be some removal of fauna habitat features such as hollow-bearing trees, coarse woody debris and blossom producing trees and shrubs as well. Construction of the proposal would result in noise exceedances of NSW Road Noise and Policy day and night-time criteria for residential receivers located adjacent to the Hume Motorway and Menangle Road.	Operation of the proposal would result in ongoing economic activity through direct turnover generated by retail, commercial and industrial operational activities. The proposal envisages a larger population base which would inevitably support greater levels of economic activity on the site, and the broader Campbelltown LGA.

6.10.2 Potential impact

Construction

The modified project and the Menangle Park Development are likely to have their construction timeframes occur concurrently. The most direct cumulative impact may be from construction noise levels affecting nearby sensitive receivers. Noise mitigation measures have been put in place for both projects, which would manage these impacts. Noise levels should be continuously monitored at affected sensitive receivers to determine whether further mitigation is needed.

Traffic management issues may also occur during the construction of both projects. A TMP should be implemented for both project and should be coordinated through the TMC.

Operational

The modified project would work beneficially with the Menangle Park Development as it would cater for the future traffic growth expected from the operation of the Development. Both projects would provide opportunities for future economic growth for the Menangle Park area.

7 Environmental management

7.1 Environmental management plans

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

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures for the modification of Spring Farm Parkway Stage 1 are summarised in Table 7-1. Additional safeguards and management measures identified in this addendum REF are included in italicised font and include an 'A' in their number. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, the CEMP and the PEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

Safeguard ***italicised and in bold*** are in addition to the safeguards detailed in the project Ref.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport					
TT1	Traffic and transport	A Traffic Management Plan (TMP) would be prepared and implemented as part of the CEMP. The TMP would be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP would include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local	Contractor	Detailed design / Pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		community of impact on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms.			
TT2	Road damage	Undertake a pre-construction dilapidation survey of local roads used for construction. Defects caused by construction activities would be rectified prior to completion of construction.	Contractor	Construction	Project REF
TT3	Property access	Access to properties along Menangle Road would be maintained during construction. The need for any alternative and/or temporary access arrangements would be agreed with affected property managers/owners.	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
TT4	Broughton Anglican School access	Access to Broughton Anglican School would be maintained during construction. The need for any alternative and/or temporary access arrangements would be agreed with affected property managers/owners.	Contractor	Construction	Project REF
TT5	Traffic and transport – bus services	Interaction between commuters accessing Menangle Park Station across Racecourse Avenue, and construction traffic would be managed to ensure safety for road users as part of the construction traffic management plan.	Contractor	Construction	Project REF
TT6	Traffic and transport – bus services	The final location of temporary bus stops would be confirmed based on consultation with the bus route operator (Picton Buslines).	Contractor	Construction	Project REF
TT7	Traffic and transport – cycling facilities	Alternative routes would be identified as part of the construction traffic management plan which may require closure of the motorway to cyclists between Picton Road and Narellan Road.	Contractor	Construction	Project REF
TT8	***Construction traffic***	***In relation to the proposed modification, the TMP would include:*** ***The temporary upgrade of the intersection at Menangle Road/Glenlee Road during construction in order to safely accommodate construction heavy vehicle movement.***	***Contractor***	***Construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration					
NV1	Noise and vibration	A Noise and Vibration Management Plan (NVMP) would be prepared and implemented as part of the CEMP. The NVMP would generally follow the approach in the Interim *Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • all potential significant noise and vibration generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, process and principles* (Roads and Maritime, 2014). • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours 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.	Contactor	Detailed design / pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV2		Viable mitigation measures that would be expected to be deployed by the construction contractor once the final construction sequencing and scheduling is known include: • Restricting work to standard construction hours as far as practicable, considering safety and traffic management requirements • Selecting quieter plant and equipment • Erecting temporary acoustic hoarding to reduce noise form work within a confined area • Deploying mobile hoardings (eg, acoustic screen curtains mounted on a wheeled trailer) to track moving, but tightly-contained processes • Maximising offset distances between receivers and noisy plant or activities • Orientating plant and processes away from residences, where reasonably practicable • Scheduling work for times outside of heightened sensitivity for the impacted receiver, eg, outside of school hours; • Scheduling respite periods for noise-intensive processes undertaken near receivers, eg.	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		limiting operation of pavement sawing to three hours at a time • Planning any out-of-hours work (OOHW) so that noisier work is carried out in the earlier part of the evening or night-time • Minimising the number of consecutive nights of work adjacent to any particular set of receivers • Restricting heavy vehicle movements, heavy deliveries and loading and unloading processes to daytime periods and to areas well away from receivers • Regularly maintaining and monitoring plant and equipment to ensure that their noise emissions are not excessive • Minimising the annoyance from reversing alarms by either fitting closed circuit monitors or non-tonal reversing alarms (“quackers”) on vehicles or deploying ‘spotters’ to oversee reversing movements • Reducing throttle settings and switching off equipment when it is not being used.			
NV3	Noise and vibration	All sensitive receivers (eg schools, local residents) likely to be affected would be notified at least [insert no. of days] prior to commencement of any work associated	Contactor	Detailed design / pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		with the activity that may have an adverse noise or vibration impact. The notification would provide details of: • the project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information.			
NV4	Construction noise	Consider respite periods and verification for receiver identified as being eligible for additional mitigation in accordance with CNVG.	Contractor	Construction	Project REF
NV5	Construction traffic	Schedule construction of the Hume Motorway deceleration late and northbound access ramp as early as practicable to limit construction traffic impacts to residents of Menangle Park.	Contractor	Pre-construction /	Project REF
NV6	Construction vibration	Where vibration intensive plant such as vibratory rollers, rock hammers or bored piling rigs are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Specific measures to manage the potential for vibration impacts would be determined as part of the CNVMP developed at the detailed design stage once the specific	Contractor	Pre-construction/Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		equipment schedule and localised geotechnical conditions are known.			
NV7	Construction vibration	CNVMP should consider implementing the following measures to limit construction vibration levels: • Use lower vibration generating items of excavation plant and equipment, such as smaller capacity rockbreakers or concrete crushers/pulverisers in place of rockbreakers, where feasible. • Suitably program the hours of operation of major vibration generating plant and equipment; • Minimise consecutive work in the same locality; • Use dampened rockbreakers and/or “city” rockbreakers; • Undertake attended vibration monitoring where vibration-intensive work is required to be undertaken within the safe working distances; • Complete building condition surveys before and after vibration-intensive work to identify existing damage and any damage due to the works.	Contractor	Pre-construction	Project REF
NV8	Operational noise – at	Determine the specific form of acoustic building treatment required to meet the necessary noise reductions of internal	Transport for NSW	Pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
	property treatment	noise levels at least 10 dB(A) below external noise goals, with regard for the existing construction of the building, and in consultation with the landowner.			
ANV9	Vibration impact on Upper Canal (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373)	When vibration intensive works are to take place near the Upper Canal heritage item, a certified engineer should inspect the structure for visual damage prior to and during the works taking place.	Transport for NSW	Pre-construction/Construction	Additional safeguard
ANV10		If new visual impacts are identified as a result of the works by a certified engineer, works would be stopped and reviewed. Any new visual impacts should then be suitably repaired.	Transport for NSW/Contractor	Construction	Additional safeguard
ANV11		A vibration monitoring device should be installed and operated by a suitably qualified specialist for the duration of the vibration intense works. Where vibration reaches levels, which may result in damage to the structure, works should be ceased and revised to minimise vibration impacts.	Transport for NSW/Contractor	Pre-construction/Construction	
Non-Aboriginal heritage					
HH1	Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid	Contactor	Detailed design / pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		and mitigate impact to Non-Aboriginal heritage.			
HH2	Non-Aboriginal heritage – unexpected finds	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contactor	Detailed design / pre-construction	Project REF
HH3	Sugarloaf Farm	Work associated with the widening of Menangle Road would limit incursions into the curtilage of Sugarloaf Farm as far as practical and in accordance with the Conservation Management Plan (Graham Brooks & Associates, 2001).	Contractor	Construction	Project REF
HH4	Impact to areas of archaeological potential	If relics of the Sugarloaf Farm, Glenlee or Grazier's Arms Inn are identified during works then the Roads and Maritime *Standard Management Procedure: Unexpected Heritage Items* (Roads and Maritime Services 2015) should be followed. This should include consideration of, and management of potential vibration related impacts.	Contractor	Construction	Project REF
AHH6	***Scope of works***	***It is noted that there are items of State heritage significance and archaeological potential in proximity to the proposed modification areas, and if***	***Transport for NSW***	***Detailed design/Pre-construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the scope of works significantly change outside of the footprint currently presented, the impacts to these items would need to be reassessed.			
AHH7	***Vibration impacts***	***For works in proximity to the Upper Canal and other WaterNSW lands, assets or infrastructure, the maximum allowable limit of vibration specified in DIN 1450 (Deutsches Institut für Normung 1999) should be applied.***	***Contractor***	***Construction***	***Additional safeguard***
AHH8	***Impacts to Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373)***	***As per WaterNSW risk management guidelines (WaterNSW, 2020) the following documentation is required prior to construction:*** • ***Heritage Impact*** - ***Heritage Impact Assessment (this assessment)*** - ***Unexpected Finds Protocol*** • ***Vibration*** - ***Assessment of the potential effects of vibration from the proposed works i.e. a dilapidation survey*** - ***Vibration monitoring plan (can be contained within the project CEMP)*** • ***Additional loads on WaterNSW structures – specific to Glenlee Road bridge***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		- *A structural engineers report* - *Geotechnical report* - *Drawings or plans.*			
AHH9		***Following completion of the additional documentation and assessment, a revised assessment of impacts to the Glenlee Road bridge must be completed prior to its usage during construction in order to determine the suitability of proposed impacts and any requisite permit approvals.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
AHH10	***Former Grazier's Arms Inn Site***	***A site inspection should be conducted prior to construction to determine levels of site disturbance and confirm levels of archaeological potential. Any historical vegetation on site should also be determined and, if required, advice should be sought from a suitably-qualified arborist.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
AHH11		***Archaeological test excavations are to be completed at the site to identify the presence of any archaeological material within the construction footprint. This will be completed with an excavation permit as per Section 140 of the Heritage Act.*** ***Further management measure recommendations can be added as***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		appropriate, following the findings of the test excavation.			
Aboriginal heritage					
ABH1	Impact to known Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and Maritime, 2012) and Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015) and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented for managing impact on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Contactor	Detailed design / pre-construction	Project REF
ABH2	Impact to known Aboriginal heritage	An AHIP for the proposal would be obtained prior to construction, and any salvage would be undertaken in accordance with the proposed salvage methodology and any conditions of approval (if granted).	Transport for NSW and contractor	Pre-construction and construction	Project REF
ABH3	Finding unexpected artefacts	*The Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction.	Contactor	Pre-construction and construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
AABH4	***Impact to Menangle Park Rezoning Project 8***	***The proposed works are within the AHIP 4648 and AHIP C0005561 and may be completed under the existing AHIPs, provided that works are undertaken in accordance with the AHIP conditions.*** ***An AHIP is required prior to commencement of work affecting the site outside existing AHIP areas.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
AABH5	***Impact to Menangle Park Rezoning Project 8***	***Barrier fencing to be erected on the AHIP boundary for the extent of the site to ensure that no construction impact extends into the portion of the site outside the impact area. Portion of site area outside of impact area should be identified on the Construction Environmental Management Plan (CEMP) as environmentally sensitive no-go zone to ensure no impact.***	***Contractor***	***Construction***	***Additional safeguard***
AABH6	***Impact to Menangle Park Rezoning Project 8***	***Workers should be inducted as to appropriate protection measures for Aboriginal heritage.***	***Contractor***	***Construction***	***Additional safeguard***
Flooding					
AF1	***Construction flood impacts***	***A Flood Management Plan should be prepared by the contractor during construction planning phase to outline procedures for managing construction site operations and personnel safety in the event of a flood.***	***Contractor***	***Pre-construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Access for emergency services will be retained throughout construction and the construction contractor would consult with emergency services prior to construction.			
AF2	***Operational flood impacts***	***Development of an evacuation plan will be undertaken. The evacuation plan will be consulted with the resident of the impacted dwelling.***	***Transport for NSW***	***Post-construction***	***Additional safeguard***
Biodiversity					
BD1	Removal of native vegetation	Native vegetation removal will be minimised through detailed design.	Transport for NSW	Detailed design	Project REF
BD2		Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Pre-construction	Project REF
BD3		Vegetation removal will be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Construction	Project REF
BD4		Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		managing biodiversity on RTA projects (RTA 2011).			
BD5		The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	Contractor	Construction	Project REF
BD6		Clearing limits and exclusion zones clearly identified prior to work within/adjacent Cumberland Plain Woodland and Swamp Oak Floodplain Forest.	Contractor	Construction	Project REF
BD7		A Flora and Fauna Management Plan will be prepared in accordance with Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Requirements set out in the Landscape Guideline (RTA, 2008) • Pre-clearing survey requirements	Contractor / Transport for NSW	Detailed design / pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) • Protocols to manage weeds and pathogens.			
BD8	Removal of threatened species habitat and habitat features	Habitat removal will be minimised through detailed design.			Project REF
BD9		Habitat removal will be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Transport for NSW	Detailed design	Project REF
BD10		Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011). This will include installation of nest boxes to replace lost hollows and salvage and re-use/installation of hollows from hollow-bearing trees that are removed.	Contractor	Construction	Project REF
BD11		The unexpected species find procedure is to be followed under Biodiversity	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site.			
BD12		Important habitat features such as woody debris and bushrock would be re-used in suitable locations nearby, in accordance with Roads and Maritime Biodiversity Guidelines - Guide 5 (Re-use of woody debris and bushrock.	Contractor	Construction	Project REF
BD13	Removal of threatened plants	Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Construction	Project REF
BD14		Clearing limits and exclusion zones clearly identified prior to work within the vicinity of the population of Pimelea spicata to ensure no impacts to the population.	Contractor	Construction	Project REF
BD15	Aquatic impacts	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (DPI (Fisheries NSW) 2013).	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BD16	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Contractor	Construction	Project REF
BD17	Fragmentation of identified habitat corridors	Connectivity measures will be implemented in accordance with the Wildlife Connectivity Guidelines for Road Projects (RTA 2011).	Transport for NSW	Detailed design	Project REF
BD18		Any connectivity measures implemented will be designed and installed under the supervision of an experienced ecologist.	Transport for NSW	Detailed design / operation	Project REF
BD19		Wildlife signage, street lighting and appropriate vehicle calming devices will be considered in areas with a history of fauna vehicle strike.	Contractor / Transport for NSW	Detailed design / pre-construction	Project REF
BD20		Consider installation of glider poles and/or rope crossings to assist fauna to cross the road safely.			Project REF
BD21	Edge effects on adjacent native vegetation and habitat	Exclusion zones will be set up at the limit of clearing in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Construction	Project REF
BD22		Clearing limits and exclusion zones clearly identified prior to within/adjacent Cumberland Plain Woodland and Swamp Oak Floodplain Forest.	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BD23	Injury and mortality of fauna	Fauna will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor / Transport for NSW	Detailed design / pre-construction	Project REF
BD24		Implementation of two stage clearing process to allow fauna to disperse from habitat voluntarily; inspection of hollows by experienced ecologist/fauna spotter/catcher prior to and after clearing of hollow-bearing trees/stags to safely remove and relocate any injured /displaced fauna.			Project REF
BD25	Invasion and spread of weeds	Weed species will be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor / Transport for NSW	Detailed design / pre-construction	Project REF
BD26		Establishment of clearing limits and exclusion zones within/adjacent to Cumberland Plain Woodland and Swamp Oak Floodplain Forest.			Project REF
BD27		To prevent the spread of weed seed, all weed material removed will be disposed of in a suitable waste facility and not mulched on site. This is to avoid the reintroduction and further spread of weeds in the area.	Contractor	Construction	Project REF
BD28	Invasion and spread of pests	Pest species will be managed within the proposal site.	Contractor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BD29	Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Contractor	Construction	Project REF
BD30	Noise, light and vibration	Shading and artificial light impacts will be minimised through detailed design.	Contractor	Construction	Project REF
BD31	***Removal of native vegetation***	***Exclusion zone around the Freshwater Wetlands adjacent to the impact area to reduce the risk of accidental impacts.***	***Contractor***	***Construction***	***Additional safeguard***
BD32		***The compound sites and access tracks will be left to regenerate post construction work.***	***Contractor / Transport for NSW***	***Post-construction***	***Additional safeguard***
BD33	***Aquatic impacts***	***Works in the vicinity of the unnamed first order ephemeral waterway and third order waterway will occur during dry periods where possible to prevent soil compression, bank slumping, soil erosion and sediment laden runoff from entering the waterway.***	***Contractor***	***Construction***	***Additional safeguard***
BD34		***Sediment and erosion controls will be installed around the perimeter of all soil disturbance and the proposed waterway crossing to reduce potential soil erosion and sediment laden runoff from entering the waterway or affecting nearby native vegetation.***	***Contractor***	***Construction***	***Additional safeguard***

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
BD35	***Fauna impacts***	***If microbats are encountered or spotted during construction, a stop works and further assessment procedure (by an ecologist) should be implemented.***	***Contractor***	***Construction***	***Additional safeguard***
BD36	***Invasion and spread of weeds and pests***	***Ensure machinery is clean and free of introduced plant seeds prior to activities on site. Under Biosecurity Act 2015 there are recommended measures for removal of weed species within the Greater Sydney region*** ***Woody weed species require removal from site and are not to be mulched onsite.***	***Contractor***	***Construction***	***Additional safeguard***
BD37		***Measures to prevent the spread of Chytrid fungus would be employed in accordance with the Hygiene protocol for the control of disease in frogs (DECC 2008).***	***Contractor***	***Construction***	***Additional safeguard***
Socio-economic					
SEC1	Property acquisition	All property acquisition will be carried out in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2012) and the *Land Acquisition (Just Terms Compensation) Act 1991.*	Roads and Maritime project manager	Pre-construction and construction	Project REF
SEC2	Socio-economic	A Communication Engagement and Stakeholder Management Plan (CESMP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community	Contactor	Detailed design / pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. The CESMP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008)			
SEC3		Ongoing consultation will be carried out with managers and users of potentially affected social infrastructure (for example Broughton Anglican College, Campbelltown Steam and Machinery Museum, and Bellbirds Early Learning Centre) regarding the timing, duration and likely impact of construction activities.	Contactor	Construction	Project REF
SEC4		Consideration will be given to the timing of construction activities near to social infrastructure in relation to key usage times of social infrastructure (for example, open days at Campbelltown Steam and Machinery Museum).	Contactor	Construction	Project REF
SEC5	Access and connectivity	Communication will be carried out with the Broughton Anglican College about the	Contactor	Construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		timing of haulage activities and potential changes to road conditions.			
SEC6	Property acquisition	Awareness programs will be carried out for construction workers and transport operators for the proposal about potential road safety risks, including near to Broughton Anglican College and Bluebells ELC.	Contactor	Construction	Project REF
ASEC7	***Closure of the informal rest area***	***Ongoing consultation will be carried out with users of the informal rest area regarding the timing of its closure.***	***Transport for NSW***	***Pre-construction***	***Additional safeguard***
Contamination					
C1	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or EPA.	Contractor	Detailed design / Pre-construction	Project REF
C2	Accidental spill	A site specific emergency spill plan will be developed, and include spill management measures in accordance with the Roads and Maritime Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The plan will address	Contractor	Detailed design / Pre-construction	Project REF

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Roads and Maritime and EPA officers).			
AC3	***Contamination***	***A Remediation Action Plan (RAP) and an Unexpected Find Protocol (UFP) will be prepared and implemented to manage the potential for soil or water quality contamination during construction of the proposal. The RAP will:*** • ***evaluate potential remedial options and recommend a preferred option to manage the ACM during the construction.*** • ***include a Long-Term Environmental Management Plan for the ACM material (should it remain in the proposal alignment).*** • ***include a preliminary plan to manage potential risks to human health and the environment during the remediation activities.*** ***The RAP will form a part of the overall CEMP.***	***Contractor***	***Pre-construction***	***Additional safeguard***

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the proposed modification of Spring Farm Parkway Stage 1 and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are italicised.

Table 7-2 Summary of licensing and approval required

Instrument	Requirement	Timing
Heritage Act 1977	*Section 140 to conduct test excavations within Grazier's Arms Inn curtilage*	*Pre-construction*
	Section 60 for the subdivision and change of ownership for acquisition of Sugar Loaf Farm (SHR 01389) curtilage	*Pre-construction*
National Parks and Wildlife Act 1974	*AHIP for impact mitigation through archaeological salvage excavation for objects within the within the boundaries of the proposed modification area, excluding the areas within the boundaries of existing AHIPs (see Table 6 of Appendix D)*	*Pre-construction*
Protection of the Environment Operations Act 1997	Environment Protection Licence for the scheduled activity of road construction, as the proposed modification falls under the definition in s156.	Prior to start of the activity.
Coal Mine Subsidence Compensation Act 2017	Approval to alter or erect improvements or to subdivide land within a mine subsidence district from the Mine Subsidence Board.	Prior to start of the activity
Roads Act 1993	Road occupancy licence to dig up, erect a structure or carry out work in, on or over a road	Prior to the start of the activity.

8 Conclusion

8.1 Justification

The progression of the detail design from the concept design (as assessed in the project REF) and ongoing stakeholder consultation has resulted in a number of design refinements across the Spring Farm Parkway Stage 1 (Jacobs, 2019). These design refinements, as well as additional ancillary facilities and construction access tracks, have been assessed as the proposed modification in this addendum REF. The proposed modification would provide improved constructability and additional long-term operational benefits to Spring Farm Parkway Stage 1. These long term benefits include:

- Improved future intersection performance for Spring Farm Parkway Stage 1
- Improved safety for users of the northbound Hume Motorway entry ramp
- Improved connectivity of Spring Farm Parkway Stage 1 to future stages.

There would be some short-term impacts from the proposed consistent modification which include traffic, noise, and amenity-based impacts, which are generally consistent with the impacts outlined in the project REF, however, impacts form the proposed modification would impact a wider area and an additional number of people. These impacts would not be extensive and would be managed with the safeguards and mitigation measures outlined in this addendum REF.

There would be some additional permanent impacts to biodiversity and non-Aboriginal heritage as a result of the proposed modification. These impacts include the removal of 5.51 hectares of PCT 850 DNG, and impacts to the curtilage of Sugar Loaf Farm and Graziers Arms Inn. These impacts are not considered significant and safeguards and mitigation measures recommended by technical specialists would be implemented to manage these impacts.

The operation of the modified project would improve accessibility by allowing additional road capacity and efficiency, which will further facilitate the wider development of the area.

Overall, the proposed modification is considered to be justified. It has been developed to best meet the proposal objectives, whilst minimising the construction and operational impact.

8.2 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The modified project would manage, develop and conserve natural and other resources appropriately and result in social and economic benefit to the community. The modified project would assist in providing the infrastructure for the new Menangle Park land release area and provide residents with access to and from the Hume Motorway and Menangle Road. The modified project would not impact the social and economic welfare of the community.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Section 8.3 below.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification would support the development of the Menangle Park land release area, and in the longer term supports the wider objectives of the Greater Macarthur Growth Area, by providing opportunities for future road widening and tie-in connections for stage 2 of Spring Farm Parkway. Spring Farm Parkway would ultimately support the future residential development within Spring Farm, Elderslie, Menangle Park and Mount Gilead.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Opportunities to minimise the footprint of the proposed modification have been considered where possible to reduce the potential environmental impact. The process of selecting the additional construction access routes and site compounds considered ways to avoid and minimise the impact to the environment, by

	maximising the use of existing road corridor and access tracks where possible, and realigning the these routes where environmental impact would have been significant.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The modified project would result in a minor impacts to non-Aboriginal heritage through the acquisition of an area of Sugarloaf Farm and excavation on the Grazier's Arms Inn site for the widening of Menangle Road. Temporary construction works may also impact two overbridges that form part of the Upper Canal System. An assessment of these impacts are provided in Section 6.2. The modified project would potentially impact one Aboriginal archaeological site. Several impacted portions of the site are within areas covered by existing Aboriginal Heritage Impact Permits. Impacted portions outside these AHIP areas would require an AHIP prior to commencement of work. An assessment of this impact is provided in Section 6.3.
1.3(g) To promote good design and amenity of the built environment.	The design and placement of roadside furniture including bridge design, signage and shared paths were considered in the modified project.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the project.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Relevant consultation with stakeholders has occurred and is outlined in Section 5.

8.3 Ecologically sustainable development

8.3.1 The precautionary principle

Principle 15 of the United Nations Conference on Environment and Development 1992 (the Rio Summit) defined the precautionary principle: “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”. In 2000, a European Union communication further refined the definition to account for action where scientific evidence is “insufficient, inconclusive or uncertain”. Also realised was the responsibility placed on the developer to prove their actions as being safe and act in instances where there is uncertainty.

In all cases impact assessment is a subjective process. It relies on professional judgement and interpretation. Consequently, precaution has been built into the assessment carried out and reported in this Addendum REF. This includes adopting a number of worst-case assumptions, such as all noise-generating equipment operating at its maximum output at the same time in the same location, or the assumption of the worst-case vegetation impact within the proposal area.

This Addendum REF has been prepared using the precautionary principle and appropriate mitigation measures are outlined to address all of the potential impact identified for the modified project.

Additional environmental assessment would be carried out where there is an identified inconsistency with this Addendum REF as well as the project REF. This again would ensure that uncertainty is identified, addressed and resolved throughout the project’s design lifecycle by implementing precaution at all stages.

8.3.2 Intergenerational equity

Intergenerational equity refers to the principle that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

The proposal would not impact on the health, diversity and productivity of the local environment or communities in a way that would disadvantage future generations.

8.3.3 Conservation of biological diversity and ecological integrity

Preserving biological diversity and ecological integrity requires that ecosystems, species, and biological diversity are maintained and improved to ensure their survival. It is accepted that this proposal would result in the loss of about 5.51 hectares of PCT 850 and the trimming of 0.85 hectares of this PCT.

Assessments of significance were carried out for the following threatened species under the BC Act that were considered to potentially occur in the study area:

- *Pimelea spicata* (Spiked Rice-flower)
- Southern Myotis (*Myotis Macropus*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*).

These assessments, which are reported in Appendix C, conclude that the impact is not significant. Providing the safeguard measures in Section 6.7.4 are implemented, the proposal would not have a material or significant impact on biological diversity and ecological integrity.

8.3.4 Improved valuation, pricing and incentive mechanisms

The pricing of environmental resources involves placing a monetary value on natural assets and services. The principle suggests that Transport for NSW should:

- Bear reasonable costs to avoid pollution risks (the 'polluter pays principle') and implement controls to contain or reduce pollution should it occur
- Consider the lifecycle environmental, social and economic costs of building, operating and maintaining the proposal
- Implement the proposal's environmental goals by enabling specialists to identify the most cost-effective safeguards and management measures to respond to its predicted environmental impact.

As outlined in Section 8.2.4 of the Project REF, Transport for NSW will continue adhere to this principle for the modified project.

8.4 Conclusion

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

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

A number of potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in the addendum REF best meets the project objectives, but would still result in some impacts on non-Aboriginal heritage and noise and vibration. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also improve safety, improve driving condition and reduce travel times for Stage 1 of Spring Farm Parkway. On balance the proposed modification is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

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

Significance of impact under Australian legislation

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

9 Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed modification.

Damien Wagner

Principal Environmental Manager

Jacobs

Date: 16/11/2021

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

Ragavan Vythilinkam

Project Manager - Western Sydney Project Office Infrastructure and Place

Transport for NSW

Date: 16/11/2021

10 References

Australian Institute of Disaster Resilience (2017) *Guideline 7-3. Flood Hazard*

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) (2019) *Australian Rainfall and Runoff: A Guide to Flood Estimation*. Commonwealth of Australia

British Standards Group (1993) *British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration*. BSI Group, London, UK

British Standards Group (2009). *British Standard BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*. BSI Group, London, UK

Bureau of Meteorology (2003) *Generalised Short-Duration Method* (GSDM)

Dahua Group (Aust) Pty Ltd (2018) *Menangle Park Planning Proposal*

Department of Primary Industries (2013) *Policy and Guidelines for Fish Habitat Conservation and Management* (Update 2013). Department of Primary Industries.

Department of Primary Industries (2016) *NSW WeedWise, Priority weeds for the Greater Sydney*. Department of Primary Industries

Farina, D. (2018)*Spring Farm Parkway - Non-Aboriginal Heritage Assessment*, Report for Roads and Maritime Service.

German Institute for Standardisation (1999) *DIN 4150-3 Structural vibration Part 3: Effects of vibration on structures* [DIN 4150-3:2016].

GTA Consultants (2018) *Menangle Park Planning Proposal Transport Impact Assessment*. GTA. Sydney, NSW

Higginbotham, E. (2002) *Conservation Management Plan for the Upper Canal, Pheasants Nest to Prospect Reservoir, NSW: Volume 1 History, Survey and Significance*, Report to Sydney Catchment Authority.

Jacobs & Roads and Maritime (2019). *Spring Farm Parkway Stage 1 Review of Environmental Factors.* Jacobs, North Sydney, NSW

Lyall & Associates (2017) *Spring Farm Parkway Flooding and Drainage Investigation.*

Morris, C. and G. Britton (2000) *Colonial Landscapes of the Cumberland Plain and Camden, NSW. A survey of selected pre-1860 Cultural Landscapes from Wollondilly to Hawkesbury LGAs.* National Trust of Australia (NSW), Sydney, NSW.

NSW Department of Environment and Climate Change (2009) *Interim Construction Noise Guideline*. DECC, Sydney South, NSW

NSW Department of Environment and Conservation (2006) *Assessing Vibration: a technical guideline*. DEC, Sydney South, NSW

NSW Department of Environment, Climate Change and Waste (2011) *NSW Road Noise Policy*. DECCW, Sydney South, NSW

NSW Government (2005) *Floodplain Development Manual, the management of flood liable land*

NSW Public Works Government Architect's Office (2016) *Upper Canal Pheasants Nest to Prospect Reservoir. Conservation Management Plan*, A report to Water NSW.

Roads and Maritime Services (2013) *Standard Management Procedure: Unexpected Archaeological Items*. Sydney: NSW Roads and Maritime Services.

Roads and Maritime Services (2016) *Construction Noise and Vibration Guideline*. RMS, North Sydney, NSW

Roads and Traffic Authority (RTA) (2011) *Biodiversity Guidelines: Protecting and managing biodiversity on RTA proposals.*

SLR Consulting (2021) *Spring Farm Parkway Stage 1 Operational Traffic Noise Assessment Report*. SLR, North Sydney, NSW

Standards Australia (2006) *Explosives – Storage and use Part 2: Use of explosives*. AS 2187.2 – 2006. Standards Australia, Sydney, NSW

Standards Australia (2010) *Australian Standard 2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites*. Standards Australia. Sydney NSW

Standards Australia (2018) *Australian Standard AS1055:2018 Acoustics – Description and measurement of environmental noise Part 1: General procedures*. Standards Australia. Sydney NSW

Transport for NSW (2016) *Guideline for Biodiversity Offsets*. Transport for New South Wales, November 2016.

Transport for NSW (2019) *Unexpected Heritage Finds Guideline*. Sydney: Government of New South Wales.

Transport for NSW (2021) *NSW Roads Traffic Volume Counts API (online)*. Received Oct 28 2021 from: https://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=6

11 Terms and acronyms used in this addendum REF

Term / Acronym	Description
AusLink	Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions
BC Act	*Biodiversity Conservation Act 2016* (NSW).
CEMP	Construction / Contractor's environmental management plan
DPIE	Department of Planning, Industry and Environment
EIA	Environmental impact assessment
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994* (NSW)
Heritage Act	*Heritage Act 1977* (NSW)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all function are now managed by Transport for NSW
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.

SEPP 14	State Environmental Planning Policy No.14 – Coastal Wetlands