Henry Lawson Drive Upgrade Stage 1A

Part 4 Environmental impact statement

July 2021

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Transport for NSW

Henry Lawson Drive Upgrade Stage 1A

Part 4 Environmental impact statement

July 2021

Prepared by Aurecon Australasia Pty Ltd and Transport for NSW
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Document controls

Approval and authorisation

Title	Henry Lawson Drive Stage 1A
Accepted on behalf of Transport for NSW by:	Sarah Abid Project Development Manager
Signed:	
Dated:	15/7/21

Executive summary

Acknowledgment of Country

Transport for NSW acknowledges the Traditional Custodians of the land on which the Henry Lawson Drive Upgrade is proposed.

We pay our respects to Elders, past and present and celebrate the diversity of the Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW on which we build infrastructure, deliver projects and serve Transport's customers.

What is proposed?

Transport for NSW is proposing to upgrade a 1.3 kilometre length of Henry Lawson Drive between Keys Parade, Milperra, to Tower Road, Bankstown Aerodrome (known as the Henry Lawson Drive Upgrade Stage 1A) (the overall proposal). The overall proposal would create two lanes in both directions along Henry Lawson Drive, including the duplication of the Henry Lawson Drive road bridge to the south of Auld Avenue (referred to as the Auld Avenue Bridge). Newbridge Road/Milperra Road intersection and the Tower Road intersection would be upgraded to provide additional right turn lanes. Auld Avenue intersection would be upgraded to a left-in, left-out arrangement.

The overall proposal is subject to assessment under two planning pathways, a review of environmental factors (REF) under Part 5 of *Environmental Planning and Assessment Act 1979* (EP&A Act) and an environmental impact statement (EIS) under Part 4 of the EP&A Act. The majority of the overall proposal is subject to Part 5 and a REF has been prepared separately. However, small parts of the overall proposal fall on land mapped under the State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP). As such that part of the proposal (referred to as the 'EIS proposal') is subject to approval under Part 4 of the EP&A Act and considered in this EIS.

This EIS proposal is comprised of three discrete areas. The key features of the EIS proposal includes:

EIS proposal area 1 – Henry Lawson Drive opposite Tower Road

The key features of EIS proposal area 1 are:

- Widening of Henry Lawson Drive northbound lanes
- Installing of fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure and water quality treatments
- Installing a vegetated channel along the toe of the new fill embankment
- Adjusting the existing shared path to suit the new re-alignment and to connect it back to the existing path
- Installing road furniture, including road safety barriers.

EIS proposal area 2 – Milperra Road opposite Bankstown Airport

The key features of the EIS proposal area 2 are:

- Installing a new bus stop relocated from its existing position on Milperra Road
- Installing a section of a new footpath to the bus stop (connecting to the remainder of the new path to Henry Lawson Drive – REF proposal)

- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure connecting to the outlet of the extended culvert
- Installing road furniture, including road safety barriers.

EIS proposal area 3 – Henry Lawson Drive opposite Auld Avenue

The key features of the EIS proposal area 3 are:

- Removing of existing ancillary structures
- Installing temporary fencing, flagging of exclusion boundaries and temporary erosion and sediment controls for use as an ancillary facility and construction area
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Stabilising the ground surface following the completion of construction to minimise erosion.

What are the project objectives?

The key objectives of the overall proposal include:

- Improve travel times, journey time reliability and road safety outcomes for all road users
- Improve freight efficiency and reduce vehicle operating costs on the road network
- Support new development in the precinct by improving traffic flow and connectivity to Bankstown Airport, Milperra Industrial Estate and proposed residential development in the area and the surrounding road network in the south west of Sydney
- Improve connectivity and safety for pedestrians and cyclists.

The EIS proposal would support these objectives as part of the overall proposal. The increased capacity of the overall proposal would result in significant improvements in traffic delay and traffic volume throughput at the Milperra/Newbridge Road and Tower Road intersections. In conjunction with other stages of the Henry Lawson Drive upgrade, would ease existing traffic congestion issues and improve freight access between the M5 Motorway and Hume Highway). Extension of pedestrian and shared paths would improve connectivity and safety for active transport users.

Why is it needed?

Without the development of the overall proposal, road and traffic conditions within the overall proposal area that would continue into the future include:

- Worsening congestion along the corridor causing frustrating and costly delays for all road users across spreading peaks
- Poor driver behaviour in an unforgiving road environment contributing to a high rate of casualty crashes.

How would the project satisfy this need?

The overall proposal would provide:

- Increased capacity to alleviate congestion and provide additional capacity to address future development. The overall proposal would provide two lanes in both directions and additional turn lanes at the Newbridge Road/Milperra Road intersection and Tower Road intersection.
- Improved road environment to assist in the reduction of safety incidents. This includes provision of a concrete median separating opposing traffic direction.

The EIS proposal is needed as an integral part of the overall proposal. Without the EIS proposal, the overall proposal would not be able to be constructed.

Why is it a Part 4 project?

A small part of the proposal (0.285 hectares) falls on land mapped under the Coastal Management SEPP. As such, that part of the proposal is deemed designated development and is subject to approval under Part 4 of the EP&A Act. The EIS proposal requires consent from Canterbury Bankstown City Council and an EIS is required to be submitted as part of a Crown development application.

This EIS has been prepared to address the requirements issued by the Secretary of the NSW Department of Planning, Industry and Environment (DPIE) on 8 April 2020 and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

What alternatives were considered?

A range of strategic options were developed in response to the existing challenges on Henry Lawson Drive. Non-infrastructure and infrastructure solutions were identified and assessed through an Investment Logic Mapping (ILM) workshop conducted in November 2018. Of the strategic options, the 'increase supply' option (ie increase capacity of the road) was selected as it would best address the identified challenges experienced on Henry Lawson Drive.

Following the selection of the 'increase supply' strategic option, a range of strategic options were investigated. In developing and investigating these options, it was identified that that the overall proposal site is highly constrained. These constraints have been considered and include coastal wetlands, threatened ecological communities, residential and commercial/retail properties, properties identified as Airport Land under Commonwealth ownership, and properties subject to Aboriginal land claims. Due to these constraints, total avoidance of impacts to coastal wetlands was not possible. A series of workshops were held to consider and compare three alternatives for the upgrading of Henry Lawson Drive. These included:

- Alternative 1 – four lane widening (two lanes either direction)
- Alternative 2 – four lane with a widened median to allow for six lanes in the future (two lanes either direction and allowance for a future third lane to be constructed within a widened central median)
- Alternative 3 – six lane widening (three lanes either direction).

The workshop concluded that Alternative 1 was the preferred option as traffic modelling showed it would sufficiently address the congestion problem within the foreseeable future. The selection of the preferred option is justified for the following main reasons:

- Reduced acquisition impacts of residential properties compared to the other options.
- Reduced impacts on utilities along the western side of Henry Lawson Drive south of Newbridge Road.
- Improved geometry along Henry Lawson Drive compared to the other options.
- The alignment would allow for future proofing of Henry Lawson Drive at the intersection with Newbridge Road and Milperra Road. This option allows for an additional through lane along Henry Lawson Drive northbound in the future with limited strip property acquisitions.

Biodiversity assessments and comparative analysis between the four lane and six lane strategic options was undertaken. This showed that Alternative 1 (four lane widening) would have the least impact on threatened ecological communities and coastal wetlands.

During this options process, where possible, the EIS proposal footprint has been developed to minimise environmental impacts to the coastal wetlands. The overall proposal layout for the preferred option has been optimised to achieve a balance between all the above mentioned constraints whilst meeting the overall proposal objectives.

How were the community involved in the proposal development?

Transport for NSW has involved the community during the proposal development, including from the early concept design, concept design planning phase and the REF and EIS preparation phase of the overall proposal.

In February 2020, Transport for NSW undertook community consultation on the concept design for the overall proposal. This allowed Transport for NSW to understand community views and values so that feedback could be considered in further development of the concept design. Community consultation also aimed to seek comments, feedback, ideas and suggestions on the proposed early concept design features. It also helped to identify and contact any potentially affected residents and stakeholders, and to build a comprehensive database of any interested and concerned community members.

Throughout the consultation period, there was a community update that occurred via a letterbox distribution to 5500 local properties. During this period there were 78 comments/submissions received.

Feedback from the community consultation did not raise any issues about coastal wetlands. The key issues raised on the overall proposal related to the following:

- The scope of the Henry Lawson Drive Stage 1A upgrade and proposed widening
- Design alterations/options including consideration of an underpass or overpass
- Changes to Auld Avenue
- Access to properties as well as other design suggestions for consideration.

What are the main beneficial outcomes expected?

The EIS proposal forms a critical part of the overall proposal and the benefits from the overall proposal cannot be realised without the completion of the EIS proposal. The main beneficial outcomes from the overall proposal are:

- Improvement to travel times resulting from the alleviation of congestion along the corridor that causes frustrating and costly delays for all road users across spreading peaks.
- Improvement to road safety through the increased intersection capacity and smoother operation of the network in general, and provision of concrete medians between opposing direction of travel.
- Improvements to traffic flow, connectivity and safety for pedestrians and cyclists would support the three large-scale traffic generating developments proposed around the overall proposal area.
- Increased travel efficiency for local road users, through the provision of greater capacity which would provide benefits for future growth and development within the broader study area.
- Benefits to commercial operations and businesses within and travelling through the direct study area through increased road capacity and improved travel times.
- Provision of new footpaths to connect the bus stops on Milperra Road to the Henry Lawson Drive/Milperra Road/Newbridge Road intersection would improve connectivity for public transport users.
- Motorists, active transport users, businesses, freight operators and buses would benefit from the increased road capacity which would make it easier for people to move around.

The specific benefits where the EIS proposal contributes to the overall proposal includes:

- Use of land subject to the voluntary purchase scheme for a temporary ancillary compound, where upon proposal completion, the property would be returned to a state suitable for its recreational zoning
- Improved accessibility to the bus stop on Milperra Road from a new pedestrian path
- Appropriate urban design and landscaping.

What are the main adverse outcomes expected?

The main adverse outcomes are expected to include:

- Unavoidable encroachment into coastal wetlands as the existing Henry Lawson Drive already sits within or immediately adjacent to the areas mapped under the Coastal Management SEPP.
- Impacts on biodiversity, largely due to the 0.25 hectares removal of vegetation that is the habitat to several native plant communities, Threatened Ecological Communities, flora and fauna species.
- High likelihood of impacts on groundwater dependent ecosystems (GDEs) and coastal wetlands due to the direct loss of habitat caused by excavation and disturbance.
- The potential to adversely impact on soils and water quality. There is the potential for the excavations to intercept groundwater and waterlogged soils. EIS proposal area 1 is in an area of high risk of encountering acid sulfate soils (ASS). Downstream impacts of contaminated soils on aquatic ecology is also a potential outcome.

How will the likely impacts be managed?

The key environmental management measures which correspond to the main adverse outcomes summarised above include:

- Habitat removal will be minimised through detailed design processes where possible.
- Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011) and the proposal's Landscaping Plans.
- Direct and indirect impacts to biodiversity will be managed through ensuring that construction is carried out in accordance with best practice guidelines including minimising vegetation impacts, pre-clearing surveys, Microbat management plans and implementation of an unexpected finds procedure.
- Interruptions to groundwater flows associated with GDEs will be minimised through the evaluation and assessment of construction methodologies and implementing required management measures.
- A Construction Environmental Management Plan (CEMP) will be prepared and implemented to minimise the potential environmental impacts during construction.
- Additional management plans will be prepared and implemented, including:
    - Acid Sulfate Soil Management Plan
    - Clearing and Grubbing Plan
    - Community Liaison Plan
    - Contaminated Land Management Sub-Plan
    - Flora and Fauna Management Plan
    - Construction Flood Management Sub-Plan
    - Microbat Management Plan
    - Noise and Vibration Management Plan
    - Construction Soil and Water Management Plan, including erosion and sediment control plans
    - Traffic Management Plan
    - Unexpected Finds Protocol
    - Construction Work Health and Safety Plan
    - Site Specific Emergency Spill Plan.

The overall proposal would also be carried out in accordance with any additional measures in the conditions of approval.

How can I comment on the proposal and/or the environmental impact statement?

The EIS is on display for comment between Wednesday 4 August 2021 and Friday 17 September 2021. You can access the document on the Canterbury Bankstown Council website: haveyoursay.cbcity.nsw.gov.au

(To request a printed version of the document, contact the Henry Lawson Drive upgrade project team by telephone on 1800 951 218 or email henrylawsondrive@transport.nsw.gov.au)

Feedback on the EIS proposal must be sent to Canterbury Bankstown Council. Please send your written comments to:

By post:
Mr Matthew Stewart
General Manager
City of Canterbury Bankstown
PO Box 8
Bankstown NSW 1885

By email:
haveyoursay@cbcity.nsw.gov.au

Please note: To ensure your submission on the EIS is considered, it must be submitted to Canterbury Bankstown City Council, which manages the EIS process.
Transport for NSW **cannot** accept EIS submissions.

Transport for NSW will accept submissions on the review of environmental factors (REF), which is being displayed at the same time as the EIS. For information on how to make a submission to the REF, you can visit the project webpage and follow the submission instructions – nswroads.work/henrylawsondrive.

REF submissions must be received by 17 September 2021. Submissions will be managed in accordance with the Transport for NSW Privacy Statement which can be found at transportnsw.info/about-us/privacy.

What happens next?

After the close of the public consultation period, Canterbury Bankstown City Council will provide Transport for NSW with copies of each submission. Transport for NSW will collate and consider the submissions and prepare a Submissions Report for Council's assessment. This report will be considered by Council in making its decision on the proposal and in developing conditions of consent.

Under Part 5 of the EP&A Act, Transport for NSW will also capture the feedback submitted on the REF Proposal and provide responses in the Submissions Report. As a determining authority for the REF, Transport for NSW will consider all submissions, as well as the Council's decision and any conditions of consent to determine whether or not the project should proceed as proposed. If the proposal is determined to proceed, Transport for NSW will inform the community and stakeholders of this decision and will continue to consult with the community and stakeholders during the detailed design phase, and prior to and during construction.

Contents

Executive summary ..... **i**
Contents ..... **vii**
Glossary of terms and abbreviations ..... **xv**
1 Introduction **1**
1.1 Overview 1
1.2 Key features of the EIS proposal 5
1.3 The overall proposal 5
1.4 Relationship of the REF and EIS 6
1.5 Purpose and structure of this environmental impact statement 7
2 Site context and description **8**
2.1 Location 8
2.2 Ownership 8
2.3 Zoning 12
2.4 Surrounding land uses 12
2.5 Site description 12
3 Statutory framework and approval requirements **13**
3.1 Approval framework 13
3.2 Environmental Planning and Assessment Act 1979 15
3.3 State environmental planning policies 16
3.4 Local Environmental Plans 19
3.5 Development control plans and other policies 20
3.6 Other relevant NSW legislation 21
3.7 Commonwealth legislation 24
4 Strategic justification and project need **25**
4.1 NSW and Australian strategic planning and policy framework 25
4.2 Project need 30
4.3 Project objectives 32
4.4 Statement of strategic need 34
5 Project development and alternatives **35**
5.1 Strategic response options 35
5.2 Strategic alternatives 35
5.3 Henry Lawson Drive Stage 1A options 36
5.4 Design refinements 38
6 Project description **40**
6.1 Overview of the proposal 40

6.2 Design 44
6.3 Design criteria 47
6.4 Construction works 49
6.5 Staging 54
7 Stakeholder and community engagement 55
7.1 Consultation objectives and strategy 55
7.2 Consultation process and activities to date 56
7.3 Summary of issues raised 59
7.4 Future consultation 60
8 Assessment of key issues 62
8.1 Biodiversity 62
8.2 Aboriginal cultural heritage 82
8.3 Non-Aboriginal cultural heritage 85
8.4 Contamination and soil quality 89
8.5 Hydrology, flooding and coastal processes 102
8.6 Land use and development 118
8.7 Groundwater and surface water 127
8.8 Visual 148
9 Assessment of other issues 164
9.1 Traffic and transport 164
9.2 Noise and vibration 180
9.3 Socio-economic 191
9.4 Air quality 200
9.5 Risk/hazard 203
9.6 Cumulative impacts 206
10 Summary of environmental management measures 215
10.1 Environmental management plans (or system) 215
10.2 Summary of safeguards and management measures 216
10.3 Licensing and approvals 236
11 Project justification and conclusion 237
11.1 Justification 237
11.2 Conclusion 246
12 References 247

Tables

Table 3-1 Section 4.15 matters for consideration 15
Table 3-2 Coastal Management SEPP Matters for consideration 17
Table 3-3 Consistency of EIS proposal with LEP zones 19
Table 4-1 Urban design objectives for the overall proposal 32

Table 5-1 Option 1 advantages and disadvantages 37
Table 5-2 Option 2A advantages and disadvantages 37
Table 6-1 Property acquisition 46
Table 6-2 Overall proposal design criteria 47
Table 6-3 Proposed methodology for each construction activity 49
Table 6-4 Indicative list of plant and equipment 52
Table 7-1 Consultation undertaken during preparation of the EIS 58
Table 7-2 Summary of issues raised – local, State and Commonwealth government authorities 59
Table 8-1 Direct impacts to native vegetation from the EIS proposal 69
Table 8-2 Direct impacts on predicted ecosystem species 70
Table 8-3 Summary of potential impacts to hydrology associated with biodiversity habitat 75
Table 8-4 Summary of prescribed biodiversity impacts listed under the BC Regulation 77
Table 8-5 Environmental management measures for biodiversity 79
Table 8-6 Safeguards and management measures for Aboriginal heritage 85
Table 8-7 Safeguards and management measures for Non-Aboriginal heritage 88
Table 8-8 Consequence definitions 90
Table 8-9 Risk ratings 91
Table 8-10 Site features 91
Table 8-11 ASS risk mapping 93
Table 8-12 Preliminary risk assessment 96
Table 8-13 Safeguards and management measures for contamination and soil quality 101
Table 8-14 Adopted assessment criteria and standards for the EIS proposal 107
Table 8-15 Summary of assessed flood risks and potential impacts at proposed construction work areas for the EIS proposal 109
Table 8-16 Environmental management measures for hydrology, flooding and coastal processes impacts 115
Table 8-17 Grading matrix to assess the level of significance 119
Table 8-18 Evaluation of land use and development impacts 122
Table 8-19 Environmental management measures for land use and development impacts 127
Table 8-20 Water quality guideline values and water quality monitoring results for Georges River and Milperra Drain. 135
Table 8-21 Construction impact assessment on groundwater 137
Table 8-22 Operation impact assessment on groundwater 140
Table 8-23 Environmental management measures for groundwater and surface water impacts 145
Table 8-24 Landscape character and visual impact assessment matrix 149
Table 8-25 Landscape character zones 152
Table 8-26 Viewpoints 156
Table 8-27 Landscape character assessment summary 158
Table 8-28 Viewpoint assessment summary 160

Table 8-29 Environmental management measures for landscape character and visual impacts . 162
Table 9-1 Description of key roads within and surrounding the EIS proposal areas 166
Table 9-2 Summary of key intersections within the study area 166
Table 9-3 Level of Service criteria for intersections 168
Table 9-4: Existing (2019) traffic volumes and intersection performance 168
Table 9-5 Existing (2019) average weekday heavy vehicle volumes 169
Table 9-6 Level of service results for Do Minimum 2026 scenarios 175
Table 9-7: Level of service results for Do Minimum 2036 scenarios 176
Table 9-8: Level of service results for Proposal 2026 scenarios 176
Table 9-9: Level of service results for Proposal 2036 scenarios 176
Table 9-10 Traffic impact mitigation measures 178
Table 9-11 Noise Catchment Area Descriptions 181
Table 9-12 Measured existing ambient (dBLAeq) and background noise levels (dB_{LA90}) 183
Table 9-13 Noise Management Levels at residential receivers 183
Table 9-14 Noise Management Levels at other land uses 184
Table 9-15 NCA specific Noise Management Levels 184
Table 9-16 RNP Criteria for redevelopments of existing arterial roads for residential and non-residential land uses 186
Table 9-17 RNP Relative increase criteria for residential land uses 186
Table 9-18 EIS proposal construction scenarios and associated sound power levels 187
Table 9-19 Environmental management measures for construction noise impacts 190
Table 9-20 EIS impact assessment 195
Table 9-21 Environmental management measures for socio-economic impacts 199
Table 9-22 Environmental management measures for air quality impacts 202
Table 9-23 Environmental management measures for risk/hazard impacts 206
Table 9-24 Safeguards and management measures for cumulative impacts 214
Table 10-1 Summary of environmental management measures 217
Table 10-2 Summary of licensing and approvals required 236
Table 11-1 Objects of the EP&A Act 239
Table 11-2 Technical Guide Sustainability in infrastructure design - governing sustainability objectives 241

Figures

Figure 1-1 Location of proposal 2
Figure 1-2 Proposal overview 3
Figure 1-3 Relationship of REF/EIS 4
Figure 2-1 Property ownership – EIS proposal area 1 9
Figure 2-2 Property ownership – EIS proposal area 2 10
Figure 2-3 Property ownership – EIS proposal area 3 11

Figure 3-1 Approval processes 14
Figure 4-1 Crash history along Henry Lawson Drive and Milperra Road (2010 – 2019) 31
Figure 4-2 Crash by type along Henry Lawson Drive and Milperra Road (2010 – 2019) 31
Figure 6-1 Key features: EIS proposal area 1 41
Figure 6-2 Key features: EIS proposal area 2 42
Figure 6-3 Key features: EIS proposal area 3 43
Figure 8-1 Biodiversity constraints: EIS proposal area 1 65
Figure 8-2 Biodiversity constraints: EIS proposal area 2 66
Figure 8-3 Biodiversity constraints: EIS proposal area 3 67
Figure 8-4 Non-Aboriginal heritage items 87
Figure 8-5 Acid Sulphate Soil risks 94
Figure 8-6 Salinity 131
Figure 8-7 Groundwater Dependent Ecosystems 132
Figure 8-8 Landscape character zones 151
Figure 8-9 Visual impact assessment plan 155
Figure 9-1 Nearby transport routes 170
Figure 9-2 Crash history along Henry Lawson Drive and Milperra Road (2010 – 2019) 171
Figure 9-3 Crash by type along Henry Lawson Drive and Milperra Road (2010 – 2019) 171
Figure 9-4 Traffic model study area and construction haulage routes 174
Figure 9-5 Noise catchment areas 182

Appendices

Appendix A

Secretary's environmental assessment requirements and checklist

Appendix B

Environmental Planning and Assessment Regulation 2000 checklist

Appendix C

Technical working paper: BDAR

Appendix D

Technical working paper: Aboriginal Cultural Heritage Assessment

Appendix E

Technical working paper: Non-Aboriginal Heritage Statement of Heritage Impact

Appendix F

Technical working paper: Preliminary site investigation

Appendix G

Technical working paper: Flooding and hydrology

Appendix H

Technical working paper: Socio-economic

Appendix I

Technical working paper: Groundwater

Appendix J

Technical working paper: Surface water

Appendix K

Technical working paper: Landscape character and visual impact assessment

Appendix L

Technical working paper: Traffic and transport

Appendix M

Technical working paper: Noise and vibration

Certification

Submission of environmental impact statement
Prepared under Part 4 of the *Environmental Planning and Assessment Act 1979*.

Environmental impact statement prepared by:	
Name:	Lucia Coletta
Qualifications:	B of Science (Arch), MURP, University of Sydney
Address:	Aurecon Australasia Pty Ltd Level 5, 116 Military Road Neutral Bay, NSW 2089
Responsible person:	
Name:	Sarah Abid, Project Development Manager, on behalf of Transport for NSW Transport for NSW
Address:	20-44 Ennis Road Milsons Point NSW 2059

Proposed development:

The part of the proposal (being Henry Lawson Drive Upgrade Stage 1A), that is located on land to which State Environmental Planning Policy (Coastal Management) 2018 applies.

Address of the land on which the infrastructure to which the statement relates:

The proposed development is located on land along Henry Lawson Drive and includes intersection upgrades at Tower Road, Newbridge/Milperra Road and Auld Avenue. The EIS proposal relates to three areas of coastal wetlands mapped within this land.

The land is located within the Canterbury Bankstown local government area.

Description of the infrastructure to which the statement relates:

This environmental impact statement relates to areas of works associated with the Henry Lawson Drive Upgrade Stage 1A that are located on land mapped as coastal wetlands under State Environmental Planning Policy (Coastal Management) 2018.

The key features of the EIS proposal differ for each of the three EIS proposal areas.

The key features of EIS proposal area 1 are:

- Widening of Henry Lawson Drive northbound lanes
- Installing of fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure and water quality treatments
- Installing a vegetated channel along the toe of the new fill embankment
- Adjusting the existing shared path to suit the new re-alignment and to connect it back to the existing path
- Installing road furniture, including road safety barriers.

The key features of the EIS proposal area 2 are:

- Installing a new bus stop relocated from its existing position on Milperra Road
- Installing a section of a new footpath to the bus stop (connecting to the remainder of the new path to Henry Lawson Drive – REF proposal)
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure connecting to the outlet of the extended culvert
- Installing road furniture, including road safety barriers.

The key features of the EIS proposal area 3 are:

- Removing of existing ancillary structures
- Installing temporary fencing, flagging of exclusion boundaries & temporary erosion and sediment controls for use as an ancillary facility and construction area
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Stabilising the ground surface following the completion of construction to minimise erosion.

Environmental impact statement:

An environmental impact statement is attached addressing all matters in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979*.

Declaration:	I certify that I have prepared the contents of this environmental impact statement in response to the Secretary's Environmental Assessment Requirements dated 8 April 2020 and in accordance with the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. To the best of my knowledge this environmental impact statement contains all available information that is relevant to the assessment of the project and the information contained in the environmental impact statement is neither false nor misleading.
Signature:	
Name:	Lucia Coletta
Date:	15/07/21

Glossary of terms and abbreviations

Term	Meaning
AEP	Annual exceedance probabilities
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
APECs	Areas of Potential Environmental Concern
AQMP	Air Quality Management Plan
ARI	Average recurrence interval
ASS	Acid sulfate soil
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BOS	Biodiversity Offset Scheme
Biosecurity Act	*NSW Biosecurity Act 2015*
Bankstown LEP	*Bankstown Local Environmental Plan 2015*
BDAR	Biodiversity Development Assessment Report
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CHAR	Aboriginal cultural heritage assessment report
CLP	Community Liaison Plan
CoPC	Contaminants of potential concern
CSM	Conceptual Site Model
DCP	*Bankstown Development Control Plan 2015*
DGV	Derived Guideline Value
DLALC	Deerubbin Local Aboriginal Land Council
DPIE	Department of Planning, Industry and Environment
EES	Environment, Energy and Science (former Office of Environment and Heritage), within the DPIE
EIS	Environmental impact statement – Henry Lawson Drive Upgrade Stage 1A environmental impact statement (this document)

Term	Meaning
EIS proposal	The part of the proposal that is located on land mapped under State Environmental Planning Policy (Coastal Management) 2018 and subject to Part 4 of the EP&A Act (and this EIS). The EIS proposal forms part of the overall proposal
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Act 1999*
EPL	Environment protection licence
ERSED	Erosion and sediment
ESD	Ecologically sustainable development
FM Act	*Fisheries Management Act 1994*
GLALC	Gandangara Local Aboriginal Land Council
Henry Lawson Drive Upgrade Program	A four-stage plan to upgrade the 7.5 kilometre length of Henry Lawson Drive between the M5 South Western Motorway, Milperra, and Hume Highway, Lansdowne.
ICNG	Interim Construction Noise Guideline
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
GDEs	Groundwater dependent ecosystems
GIS	Geospatial Information Systems
KTP	Key Threatening Processes
LGA	Local government area
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
OOHW	Out-of-hours works
Overall proposal	The Henry Lawson Drive Upgrade Stage 1A proposal: the upgrade of a 1.3 kilometre length of Henry Lawson Drive Upgrade between Keys Parade, Milperra, to Tower Road, Bankstown Aerodrome, include an upgrade of 480 metres along Milperra Road. The REF proposal and the EIS proposal combined form the overall proposal.
PACHICI	Aboriginal Cultural Heritage Assessment Consultation and Investigation assessment
PAD(s)	Potential Archaeological Deposit(s)
PAH	Polycyclic Aromatic Hydrocarbons

Term	Meaning
PCBs	Polychlorinated Biphenyls
PFAS	Per and Poly-Fluoroalkyl Substances
PMST	*EPBC Act* Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997*
PSI	Preliminary Site Investigation
REF	Review of Environmental Factors - Henry Lawson Drive Upgrade Stage 1A review of environmental factors. The REF assesses the REF proposal.
REF proposal	The part of the overall proposal that is not located on land mapped under State Environmental Planning Policy (Coastal Management) 2018. This is subject to assessment under the REF.
ROL	Road Occupancy Licence
SAII	Serious and Irreversible Impacts
SAQP	Sampling Analysis and Quality Plan
SEPP	State Environmental Planning Policy
SEARs	Secretary's environmental assessment requirements
SIS	State Infrastructure Strategy 2018-2038: Building Momentum
SOHI	Non-Aboriginal Heritage Statement of Heritage Impact
SPR	Source-pathway-receptor
State and Regional Development SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
TECs	Threatened Ecological Communities
TRH	Total Recoverable Hydrocarbons
Transport	Transport for NSW
UXO	Unexploded ordnance
VOCs	Volatile organic compounds
WM Act	*Water Management Act 2000*
WQO	Water quality objectives

1 Introduction

This chapter introduces the overall and EIS proposal, providing a brief outline of its need, scope, and location. It also outlines the structure of this environmental impact statement (EIS).

1.1 Overview

Transport for NSW (Transport) is proposing to upgrade a 1.3 kilometre length of Henry Lawson Drive between Keys Parade, Milperra, to Tower Road, Bankstown Aerodrome (known as the Henry Lawson Drive Upgrade Stage 1A) (the overall proposal). The proposal includes intersection upgrades and upgrading 480 metres along Milperra Road. The overall proposal is located around 20 kilometres south west of the Sydney Central Business District (CBD) in the City of Canterbury Bankstown local government area (LGA). The location of the overall proposal is shown in Figure 1-1.

Henry Lawson Drive is a key connection for traffic moving between the Hume Highway, Milperra Road/Newbridge Road and the M5 Motorway. It is also used for local travel trips between residences and services. In terms of heavy vehicle access, Henry Lawson Drive is designated as a B-Double access route that connects surrounding large industrial areas of Milperra, Revesby, Chipping Norton and Moorebank.

The overall proposal is expected to ease existing traffic issues between the M5 Motorway and Hume Highway and increase travel efficiency for local road users by allowing for greater traffic capacity at key intersections. The upgrade is also anticipated to integrate with the neighbouring Bankstown Airport Masterplan, provide greater cycling options, improve existing pedestrian infrastructure, and enhance road safety in the area.

The overall proposal is subject to assessment under two planning pathways, a review of environmental factors (REF) under Part 5 of *Environmental Planning and Assessment Act 1979* (EP&A Act) and an EIS under Part 4 of the EP&A Act.

While the majority of the overall proposal is permissible under Division 5.1 of the EP&A Act (the REF proposal), a small part of the proposal falls on land mapped under State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP). That part of the proposal (known as the EIS proposal) is classified as designated development. It requires consent from Canterbury - Bankstown Council. An EIS (this document) is required to assess the impacts of the EIS proposal. A REF under Division 5.1 of the EP&A Act has been prepared to address the REF proposal.

The relationship between the REF proposal and the EIS proposal is discussed in more detail in Section 1.4 and Section 4.1.

Overall proposal boundary
Coastal Wetlands
Coastal Wetlands Proximity Area

P:\GIS\Project-4\project510003_HenryLawsonDrive\HLD_EIS_Figure1-1_Location of proposal rev1.mxd\JOB No.\13-07-21\Virgil.Robinson\Rev 0

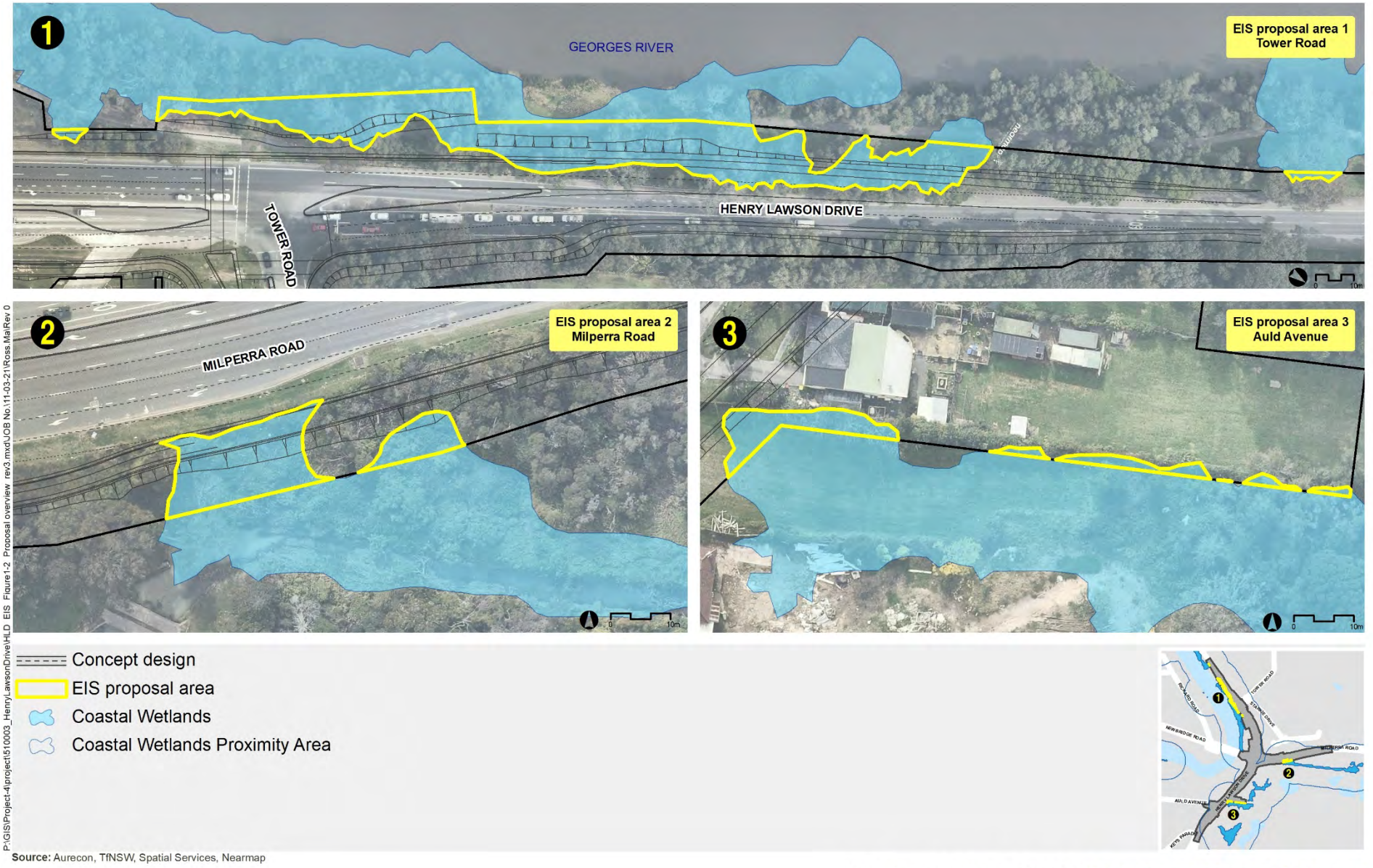
Source: Aurecon, TfNSW, Spatial Services, Nearmap, Esri

1:29,500
0 500 1,000m

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 1-1: Location of proposal

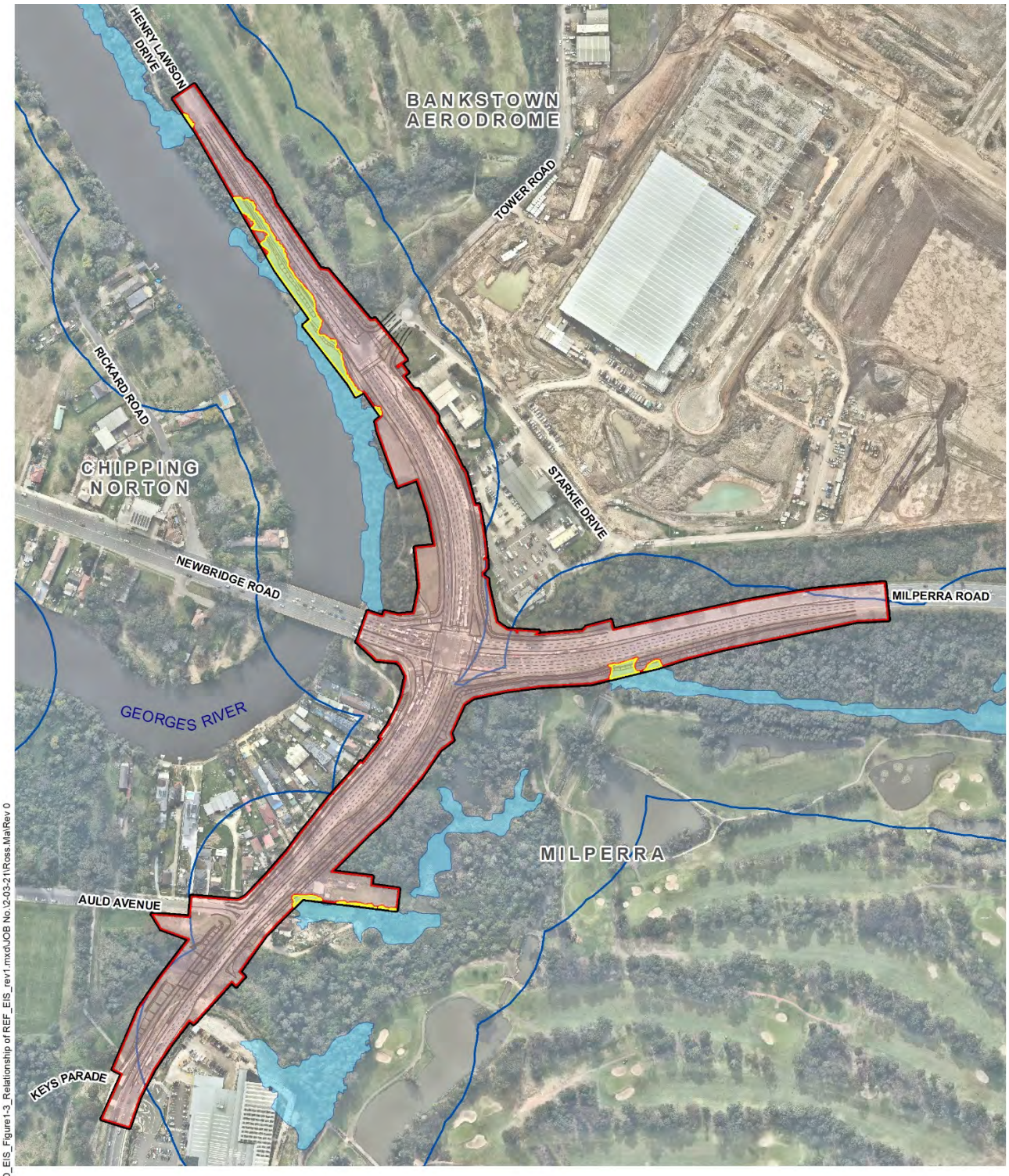


Source: Aurecon, TfNSW, Spatial Services, Nearmap

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 1-2: Proposal overview



P:\GIS\Project-4\project510003_HenryLawsonDrive\HLD_EIS_Figure1-3_Relationship of REF_EIS_rev1.mxd\JOB No.\2-03-21\Ross.Mai\Rev 0

Concept design
EIS proposal area (subject to Part 4 EIS)
REF proposal area (subject to Division 5.1 REF)
Overall proposal boundary
Coastal Wetlands
Coastal Wetlands Proximity Area

Source: Aurecon, TfNSW, Spatial Services, Nearmap

1:5,250
0 50 100m

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

Projection: GDA 1994 MGA Zone 56

FIGURE 1-3: Relationship of REF/EIS

1.2 Key features of the EIS proposal

The EIS proposal is grouped into three distinct areas as shown in Figure 1-2. The key features of the EIS proposal is described in these areas as follows:

EIS proposal area 1 – Henry Lawson Drive opposite Tower Road

The key features of EIS proposal area 1 are:

- Widening of Henry Lawson Drive northbound lanes
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure
- Installing a vegetated channel along the toe of the new fill embankment
- Adjusting the existing shared path to suit the new re-alignment and to connect it back to the existing path
- Installing road furniture, including road safety barriers.

EIS proposal area 2 – Milperra Road opposite Bankstown Airport

The key features of the EIS proposal area 2 are:

- Installing a new bus stop relocated from its existing position on Milperra Road
- Installing a section of a new footpath to the bus stop (connecting to the remainder of the new path to Henry Lawson Drive – REF proposal)
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure connecting to the outlet of the extended culvert
- Installing road furniture, including road safety barriers

EIS proposal area 3 – Henry Lawson Drive opposite Auld Avenue

The key features of the EIS proposal area 3 are:

- Removing existing ancillary structures
- Installing temporary fencing, flagging of exclusion boundaries and temporary erosion and sediment controls for use as an ancillary facility and construction area
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Stabilising the ground surface to minimise erosion.

1.3 The overall proposal

The overall proposal (Stage 1A) comprises of the following key features:

- Widening Henry Lawson Drive from two to four lanes
- Upgrading the signalised intersection of Henry Lawson Drive and Tower Road including:
  - An additional right turn lane from Tower Road onto Henry Lawson Drive
  - A new channelised short left-turn lane from Henry Lawson Drive (southbound) onto Tower Road
  - An additional right turn lane from Henry Lawson Drive (northbound) onto Tower Road
  - Retaining the pedestrian crossing across Henry Lawson Drive on the southern side of the intersection.
- Upgrading the signalised intersection of Henry Lawson Drive and Milperra Road/Newbridge Road including:
  - An additional right turn lane on the Milperra Road and Newbridge Road approaches to Henry Lawson Drive
  - An additional through lane on the Henry Lawson Drive southbound approach

    - The removal of the bus only lane on Milperra Road to provide an additional right turn lane on the Henry Lawson Drive northbound approach.
- Removing the dedicated left turn slip lane into the ALDI and fast-food area with access being retained via a standard property driveway
- Retaining the existing bus stop on Milperra Road (eastbound) and moving the westbound bus stop 20 metres to the west
- Altering access to Auld Avenue to a “left in/left out” only configuration
- Installing a new Henry Lawson Drive road bridge (over Milperra Drain) to the south of Auld Avenue (referred to as the Auld Avenue bridge) to carry northbound traffic and retaining the existing bridge for southbound traffic
- Constructing new footpaths on the eastern side of Henry Lawson Drive to connect Tower Road to the existing bus stop on the eastbound lanes of Milperra Road and a new footpath on the southern side between Henry Lawson Drive to the bus stop on the westbound lanes of Milperra Road
- Widening the shared user pathway between Flower Power (Keys Parade) and Newbridge Road to three metres and reconstructing footpaths along the western side of Henry Lawson Drive, where required
- Adjusting existing drainage, including lengthening culverts, installing new drainage infrastructure and water quality controls
- Relocating utilities (including electrical, gas, water and telecommunications)
- Final roadworks including pavement, kerb and gutters, signs, lighting and line marking
- Ancillary work for the proposal including, but not limited to road furniture, tie-in works, landscaping, earthworks and the like
- Temporary ancillary compounds, stockpile sites and associated facilities.

The overall proposal forms Stage 1A of the progressive upgrade of Henry Lawson Drive between the Hume Highway, Villawood, and the M5 South Western Motorway, Milperra. Subject to approval, construction of the Stage 1A proposal may commence in early 2023 and would take about two years to complete. Other stages of upgrading Henry Lawson Drive would be developed separately in the future and will be subject to a separate assessment process.

1.4 Relationship of the REF and EIS

The overall proposal is subject to assessment under two planning pathways, an REF under Division 5.1 of the EP&A Act and an EIS under Part 4 of the EP&A Act.

Development consent under Part 4 is usually not required for development for the purposes of a road that is being undertaken by Transport as a public authority. This type of development is ordinarily assessed as an ‘activity’ under Part 5 of the EP&A Act.

However, part of the overall proposal falls on land mapped as coastal wetlands under Coastal Management SEPP (the EIS proposal). As such, that part of the upgrade is classified as designated development and requires consent from Canterbury – Bankstown Council under Part 4 of the EP&A Act. Works classified as designated development require an EIS to be prepared to assess the environmental impacts.

Figure 1-3 shows the overall proposal and the areas subject to Division 5.1 of the EP&A Act (the REF proposal) and Part 4 of the EP&A Act (the EIS proposal).

A separate REF has been prepared for the remainder of the overall proposal in accordance with Division 5.1 of the EP&A Act. The REF also considers the indirect impacts of the REF proposal on coastal wetlands and the direct impacts on the coastal wetlands proximity area. A decision on the works proposed under the REF would be determined by Transport.

This EIS considers any cumulative impacts of the REF proposal. The cumulative impacts of the overall proposal are discussed in Section 9.6. Together the EIS and this REF assess the potential environmental impacts of the overall proposal and it is intended that these documents be read in conjunction with each other.

1.5 Purpose and structure of this environmental impact statement

This EIS has been prepared to address the Secretary's environmental assessment requirements (SEARs) issued by NSW Department of Planning, Industry and Environment (DPIE) on 8 April 2020 (Appendix A) and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (Appendix B).

The EIS is structured as follows:

- Introduction — provides a broad overview of the proposal and where it is located (Chapter 1).
- Site context and description (Chapter 2)
- Statutory framework and approval requirements - outlines the statutory requirements and explains the steps in the assessment and approval process (Chapter 3).
- Strategic justification and project need — provides the strategic context, explains the need for the overall proposal and identifies the proposal objectives (Chapter 4).
- Project development and alternatives — reviews the alternatives and options considered in developing the project including the consequences of not proceeding (Chapter 5).
- Project description — provides a detailed project description including route alignment, design standards, key design features and construction methodologies and staging (Chapter 6).
- Stakeholder and community engagement – outlines the consultation activities undertaken, issues raised and how these have been addressed (Chapter 7).
- Assessment of key issues— identifies the key environmental issues, assesses the impacts and proposes environmental management measures (Chapter 8).
- Assessment of other issues – identifies other environmental issues, assesses the impacts and proposes environmental management measures (Chapter 9).
- Summary of environmental management measures – collates all of the environmental management measures for the project identified through the impact assessment (Chapter 10).
- Project justification and conclusion — presents the justification for the project, including consideration of the principles of ecologically sustainable development (ESD) and the objects of the Environmental Planning and Assessment Act, 1979 (Chapter 11).
- References (Chapter 12).

The following appendices are provided in support of the EIS:

- Appendix A — Secretary's environmental assessment requirements and checklist
- Appendix B — Environmental Planning and Assessment Regulation 2000 checklist
- Appendix C — Technical working paper: BDAR
- Appendix D – Technical working paper: Aboriginal Cultural Heritage Assessment
- Appendix E – Technical working paper: Non-Aboriginal Heritage Statement of Heritage Impact
- Appendix F — Technical working paper: Preliminary site investigation
- Appendix G — Technical working paper: Flooding and hydrology
- Appendix H — Technical working paper: Socio-economic
- Appendix I — Technical working paper: Groundwater
- Appendix J – Technical working paper: Surface water
- Appendix K – Technical working paper: Landscape character and visual impact assessment
- Appendix L – Technical working paper: Traffic and transport
- Appendix M — Technical working paper: Noise and vibration.

The technical working papers have been developed as key information that has been prepared to support both the REF and the EIS proposal, in response to key issues as highlighted in the SEARs.

2 Site context and description

2.1 Location

The overall proposal is located around 20 kilometres south west of the Sydney CBD in the City of Canterbury Bankstown LGA. The proposal is mainly along Henry Lawson Drive and includes intersection upgrades at Tower Road, Newbridge/Milperra Road and Auld Avenue. The location of the proposal in a regional context is shown in Figure 1-1.

This application is focused on the three distinct EIS proposal areas which relate to the parts of the overall proposal that occur on land mapped as coastal wetlands under the Coastal Management SEPP. The boundaries of the three EIS proposal areas that form the site (and their location in the overall proposal) are shown in Figure 1-2.

- EIS proposal area 1 is located on Henry Lawson Drive opposite Tower Road. EIS proposal area 1 is in the north-western portion of the overall proposal boundary, on the Georges River side of Henry Lawson Drive.
- EIS proposal area 2 is located on Milperra Road adjacent to the Bankstown Golf Course. EIS proposal area 2 is in the eastern portion of the overall proposal boundary, on the southern side of Milperra Road.
- EIS proposal area 3 is located on Henry Lawson Drive opposite Auld Avenue. EIS proposal area 3 is in the southern portion of the overall proposal boundary, on the eastern side of Henry Lawson Drive.

These three areas include all coastal wetlands that is directly impacted by the overall proposal, including operational footprint and associated infrastructure, construction areas and ancillary facilities.

2.2 Ownership

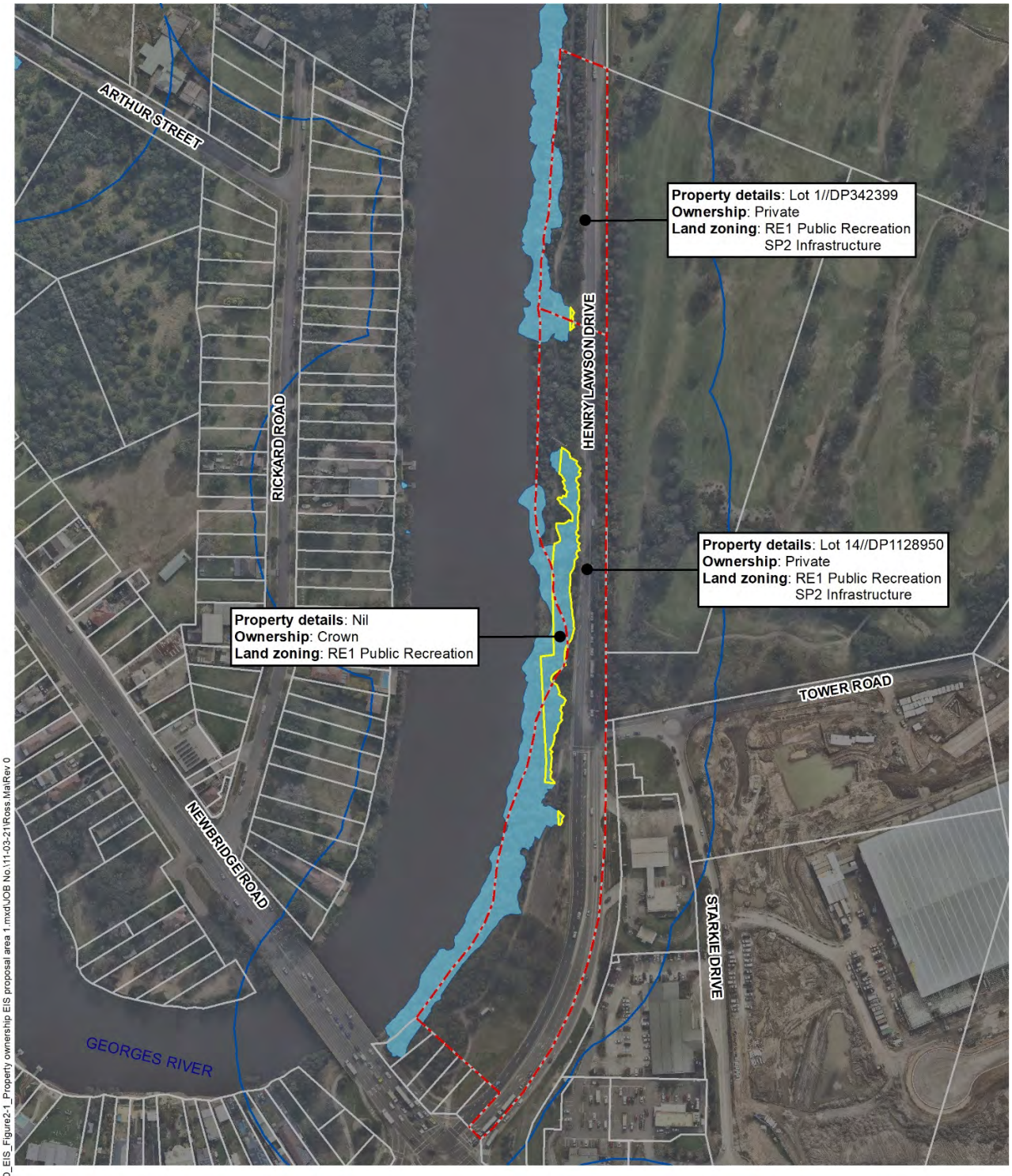
EIS proposal area 1 is partly owned by local government (Lot:14/DP1128950) and Crown land adjacent to the river. The property ownership details relating to EIS proposal area 1 is shown in Figure 2-1.

EIS proposal area 2 is partly owned by NSW government (Lot:6//DP1103168) and the Crown (Lot:3//DP1103168). The property ownership details relating to EIS proposal area 2 is shown in Figure 2-2.

EIS proposal area 3 is currently in two parcels of land that are in private ownership and owned by council (Lot:16/DP18399 and Lot:17//DP18399). The property ownership details relating to EIS proposal area 3 is shown in Figure 2-3.

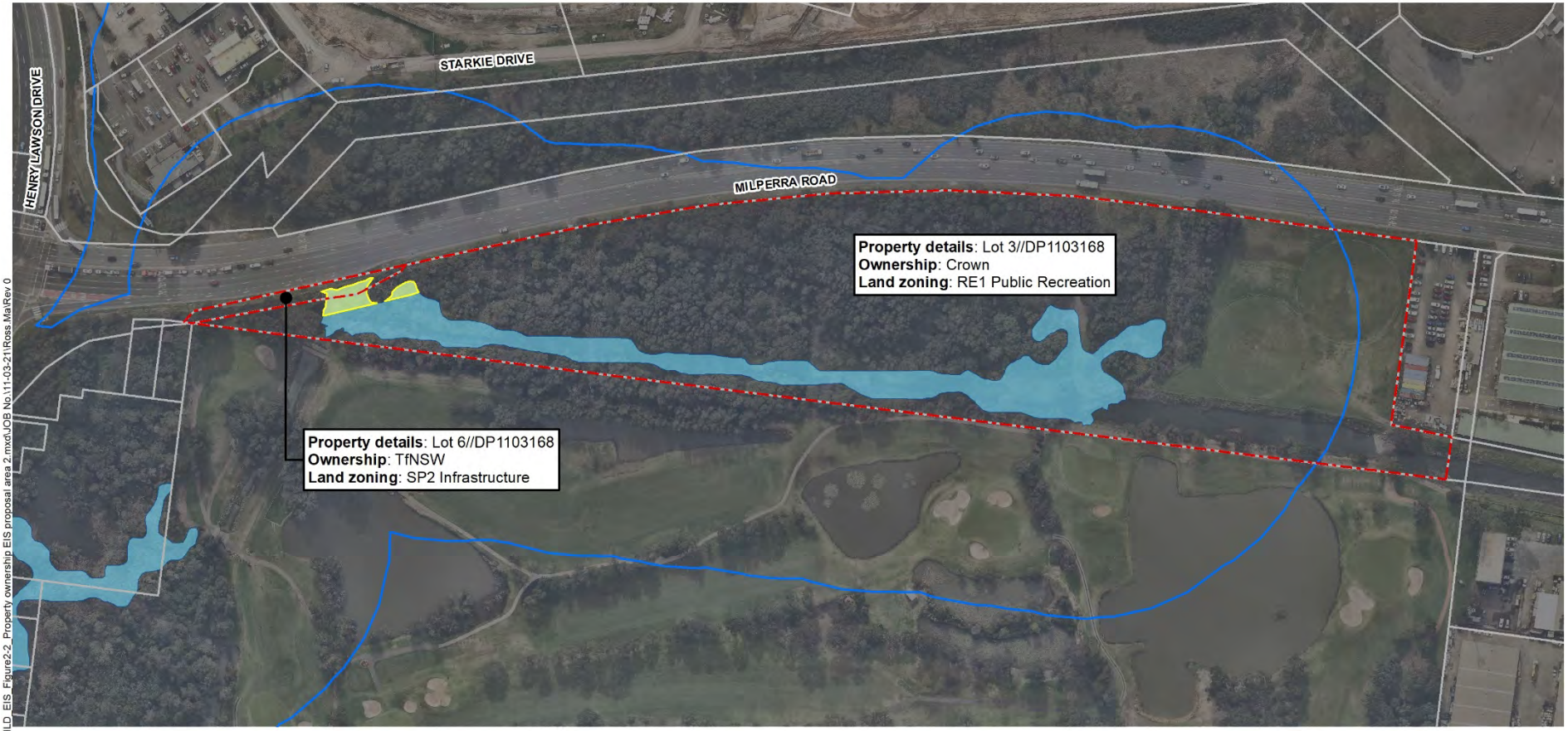
There are properties across the City of Canterbury Bankstown LGA that form part of the NSW Government's Floodplain Management Program to implement voluntary purchase schemes. There is one property within EIS proposal area 3 that is subject to the program. The purpose of this program is to reduce risks to properties in highly hazardous flood conditions from riverine or overland flooding (Office of Environment and Heritage, 2013).

Transport will go through a property acquisition process to acquire property that is not owned by NSW government prior to construction. Further information on this process is provided in Section 3.6.2.



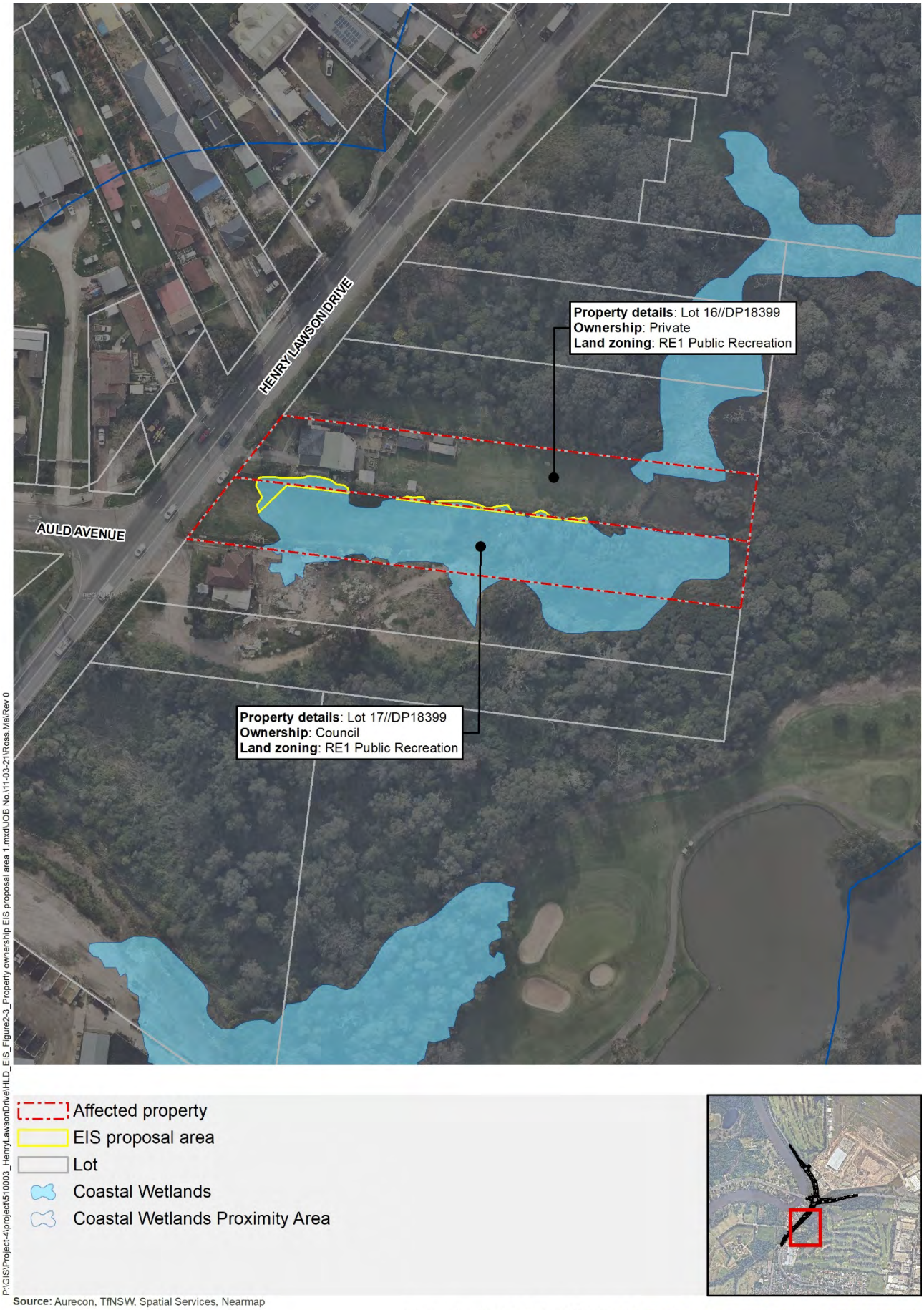
Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 2-1: Property ownership - EIS proposal area 1



Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 2-2: Property ownership - EIS proposal area 2


HENRY LAWSON DRIVE
AULD AVENUE
Property details: Lot 16//DP18399
Ownership: Private
Land zoning: RE1 Public Recreation
Property details: Lot 17//DP18399
Ownership: Council
Land zoning: RE1 Public Recreation
Affected property
EIS proposal area
Lot
Coastal Wetlands
Coastal Wetlands Proximity Area
P:\GIS\Project-4\project\510003_HenryLawsonDriveHLD_EIS_Figure2-3_Property ownership EIS proposal area 1.mxd\JOB No.\11-03-21\Ross.Mai\Rev 0
Source: Aurecon, TfNSW, Spatial Services, Nearmap
1:1,500
0
25
50m
Projection: GDA 1994 MGA Zone 56
Henry Lawson Drive Stage 1A Environmental Impact Statement
FIGURE 2-3: Property ownership - EIS proposal area 3

2.3 Zoning

The zoning of the three EIS proposal areas under the Bankstown Local Environmental Plan 2015 are as follows:

- EIS proposal area 1 is zoned as a mix of RE1 (Public Recreation) and SP2 (Road Infrastructure Facility)
- EIS proposal area 2 is zoned as a mix of RE1 (Public Recreation) and SP2 (Road Infrastructure Facility)
- EIS proposal area 3 is zoned as RE1 (Public Recreation)

Further detail on zoning is provided in Section 3.4.1.

2.4 Surrounding land uses

The surrounding land uses to each of the EIS proposal areas are:

- EIS proposal area 1: this area forms part of a broader riparian and recreational area that is bounded by the Georges River to the west and Henry Lawson Drive to the east. Further east is the Georges River Golf Course and the Bankstown Airport.
- EIS proposal area 2: this area forms part of Ashford Reserve, bounded to the north by Milperra Road and to the south by the Milperra Drain and the Bankstown Golf Course. Further to the east is the Milperra/Revesby industrial area.
- EIS proposal area 3: as noted in Section 2.2, this area is located on a private property that is identified by Canterbury Bankstown City Council as land to be acquired under a voluntary purchase scheme. Upon proposal completion, the property would be returned to a state suitable for its zoning as RE1. There are residences located to the west of Henry Lawson Drive opposite the area, as well as a range of sporting fields associated with Auld Avenue. To the south, there is a single residence and further south, a creekline (Milperra Drain) and a relatively new Flower Power development and commercial complex.

2.5 Site description

Henry Lawson Drive is a key connection for traffic moving between the Hume Highway, Milperra Road/Newbridge Road and the M5 Motorway. It is also used for local travel trips between residences and services. In terms of heavy vehicle access, Henry Lawson Drive is designated as a B-Double access route that connects surrounding large industrial areas of Milperra, Revesby, Chipping Norton and Moorebank.

The overall proposal is located to the east of the Georges River and surrounding recreational areas. There are a number of coastal wetlands within and surrounding the proposal associated with the Georges River.

EIS proposal area 1 is sited within a vegetated area (Swamp Oak Swamp Forest Fringing Estuaries), with the Georges River to the west and the Henry Lawson Drive to the east. The shared user path is partially located within EIS proposal area 1. This is shown in the aerial representation of the area in Figure 1-3 and in Figure 6-1.

EIS proposal area 2 is sited within a vegetated area (Swamp Oak open forest/Swamp Paperbark) of Ashford Reserve, with Milperra Road to the north and Bankstown Golf Course to the south.

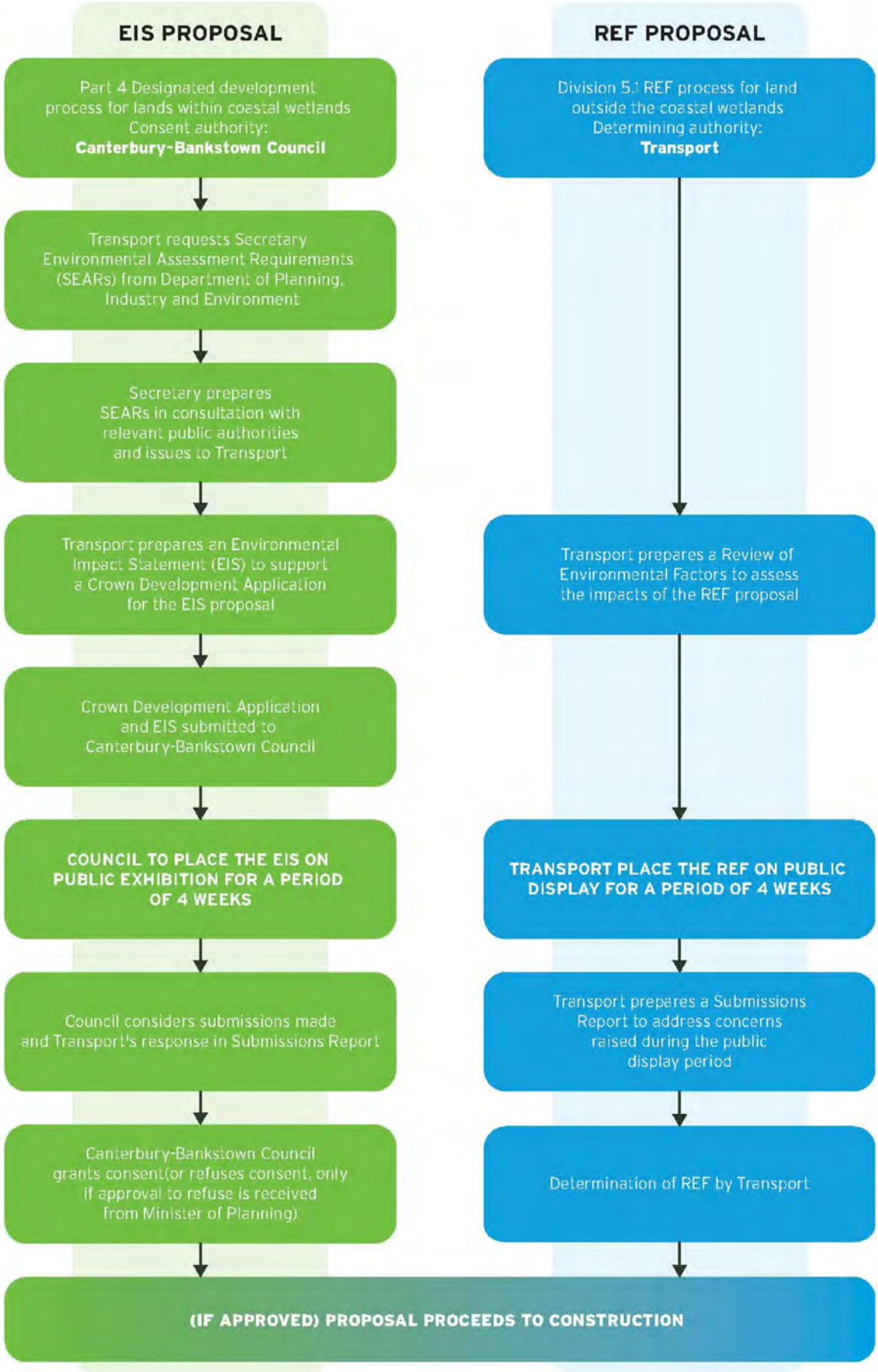
EIS proposal area 3 is sited partially within a lot with existing buildings and partially within an empty lot/grassed area (miscellaneous – weeds/exotics), with Henry Lawson Drive to the west and bushland and Bankstown Golf Course to the east. The coastal wetland for EIS proposal area 3 is associated with Milperra Drain to the south.

3 Statutory framework and approval requirements

Secretary's requirements	Where addressed in EIS
The EIS must assess the proposal against the relevant environmental planning instruments and other policies, including but not limited to:	
State Environmental Planning Policy (Infrastructure) 2007	Section 3.3.2
State Environmental Planning Policy (Coastal Management) 2018	Section 3.3.3
State Environmental Planning Policy 55 (Remediation of Land)	Section 3.3.4
Greater Sydney Region Plan 2018	Section 4.1.2
South District Plan 2018	Section 4.1.2
Bankstown Local Environmental Plan 2015	Section 3.4.1
Draft Canterbury Bankstown Consolidated Local Environmental Plan 2020	Section 3.4.1
Canterbury Bankstown Local Strategic Planning Statement 'Connective City 2036'	Section 4.1.2
Bankstown Development Control Plan 2015	Section 3.5.1
Bankstown CBD and Bankstown Airport Place Strategy	Section 4.1.2

3.1 Approval framework

The planning approval process for both pathways is shown in Figure 3-1.



Source: Aurecon

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 3-1: REF and EIS Proposal

3.2 Environmental Planning and Assessment Act 1979

Part of the overall proposal falls on land mapped as coastal wetlands under Coastal Management SEPP. As such, that part of the overall proposal is classified as designated development and requires consent from Canterbury Bankstown City Council under Part 4 of the EP&A Act. Works classified as designated development require an EIS to be prepared to assess the environmental impacts.

Transport applied to the Secretary of the DPIE to obtain SEARs for the EIS project. The SEARs were issued on the 8 April 2020 under section 4.12(8) of the EP&A Act. This EIS has been prepared in accordance with the SEARs and the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the EP&A Regulation. This is addressed in Appendix B.

This EIS for designated development will be lodged with Canterbury Bankstown City Council as part of the Crown development application seeking consent for the EIS proposal under section 4.2 of the EP&A Act.

In accordance with Schedule 1 of the EP&A Act, this EIS must be publicly exhibited for at least 28 days, during which time any person may make a written submission to the consent authority (Council) with respect to the development application. The consent authority will then consider the submissions as part of its evaluation of the project.

Matters that must be taken into consideration by a consent authority when determining a development application under Part 4 are detailed in section 4.15 of the EP&A Act. These matters are outlined in Table 3-1 with a reference to where each of these matters is addressed in the EIS.

As the development application to Canterbury Bankstown City Council will be made by the Crown (ie Transport) it will constitute a Crown development application under Division 4.6 of Part 4 of the EP&A Act. In accordance with section 4.33 of the EP&A Act, a consent authority may not refuse to grant consent for a Crown development application except with the approval of the Minister for Planning and Public Spaces and may not impose conditions upon its consent except with the approval of either the Minister for Planning and Public Spaces or the applicant (ie Transport).

Section 4.15 – Matters for consideration – general

Section 4.15 of the EP&A Act identifies matters that must be taken into consideration by a consent authority when determining a development application under Part 4. These matters are outlined in Table 3-1 with a reference to where each of these matters is addressed in the EIS.

Table 3-1 Section 4.15 matters for consideration

Matter for consideration	Comment/where addressed in EIS
(a) The provisions of:	
(i) any environmental planning instrument, and	Section 3.2
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and	Not applicable
(iii) any development control plan and	Section 3.4
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and	Not applicable

Matter for consideration	Comment/where addressed in EIS
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), that apply to the land to which the development application relates, and	Section 3.6
(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	Chapter 8 and Chapter 9
(c) the suitability of the site for the development,	Chapter 4 and Chapter 5
(d) any submissions made in accordance with this Act or the regulations	Chapter 7
(e) the public interest.	Chapter 7

3.3 State environmental planning policies

3.3.1 State Environmental Planning Policy (State and Regional Development) 2011

Part 4 of the State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional Development SEPP) identifies the development types that are considered to be regionally significant development where consent authority functions are conferred on regional planning panels.

Clause 4 of Schedule 7 of the SEPP outlines that development carried out by or on behalf of the Crown that has a capital investment value of over $5 million is deemed to be regional development.

The value of the works forming the EIS proposal would not have a value of over $5 million as they only consist of minor embankment works and road widening as part of the overall proposal. Therefore, a regional panel could not ordinarily be authorised to exercise Canterbury Bankstown City Council functions as consent authority in respect of the development application.

3.3.2 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 the ISEPP allows for 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.

However, while the overall proposal is a road project being undertaken by a public authority, it affects land that is regulated by the Coastal Management SEPP. As such, the provisions of the Coastal Management SEPP prevail over the ISEPP and ISEPP does not apply to the EIS proposal.

3.3.3 State Environmental Planning Policy (Coastal Management) 2018

The Coastal Management SEPP aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objectives of the *Coastal Management Act 2016* (Coastal Management Act). The coastal zone is defined in the Coastal Management Act as being the area of land comprised of one or more of four coastal management areas:

- Coastal wetlands and littoral rainforests area
- Coastal vulnerability area

- Coastal environment area
- Coastal use area

The EIS proposal is located within coastal wetlands mapped under the Coastal Management SEPP. Where possible, the overall proposal has been designed to minimise impacts to the wetlands such as through the adjustment of batter size. Under Clause 10 of the Coastal Management SEPP, any development carried out on land identified as coastal wetlands requires development consent. Development may include earthworks, draining the land and clearing of certain vegetation. Such development is declared designated development pursuant to Clause 10(2) of the SEPP. A Crown development application with an EIS is required to be prepared under Part 4 of the EP&A Act.

Clause 10(4) states that a consent authority must not grant consent for development on land identified as coastal wetlands unless the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological and ecological integrity of the coastal wetland. Impacts from the EIS proposal are discussed in detail in Chapter 8 of this EIS.

Furthermore, Clause 11 of the Coastal Management SEPP details that development consent must not be granted to development on land wholly or partly identified as “proximity area for coastal wetlands” unless the consent authority is satisfied that the proposed development will not significantly impact on the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or; the quantity and quality of surface and ground water flows to the adjacent coastal wetland. The EIS proposal is not within, but adjacent to proximity areas. The REF proposal is located within the proximity areas and the proposed impacts have been assessed in the REF.

EIS proposal area 1 is also mapped as coastal use and coastal environment areas. Under Clause 18, if land is mapped as more than one of the coastal management areas, the development controls of the highest of the coastal management areas applies. The highest of the coastal management areas in the EIS proposal area 1 are the coastal wetlands. Nevertheless, the matters of consideration for the coastal use and coastal environment areas and where they are addressed in the EIS are detailed in Table 3-2.

Table 3-2 Coastal Management SEPP Matters for consideration

Coastal Management SEPP area	Matter for consideration	Comment/where addressed in EIS
Coastal environment area (Cl 13)	Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—	
	a. the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment	Section 8.1, Section 8.5 and Section 8.7
	b. coastal environmental values and natural coastal processes	Section 8.5 and Section 8.7
	c. the water quality of the marine estate (within the meaning of the *Marine Estate Management Act 2014*), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1	Section 8.5 and Section 8.7
	d. marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms	Section 8.1

Coastal Management SEPP area	Matter for consideration	Comment/where addressed in EIS
	e. existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability	Section 9.3
	f. Aboriginal cultural heritage, practices and places	Section 8.2
	g. the use of the surf zone.	N/A
Coastal use area (Cl 14)	Development consent must not be granted to development on land that is within the coastal use area unless the consent authority: a. has considered whether the proposed development is likely to cause an adverse impact on the following—	
	(i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	Section 8.5
	(ii) overshadowing, wind funnelling and the loss of views from public places to foreshores	Section 8.8 and Section 9.3
	(iii) the visual amenity and scenic qualities of the coast, including coastal headlands	Section 8.8
	(iv) Aboriginal cultural heritage, practices and places	Section 8.2
	(v) cultural and built environment heritage	Section 8.2 and Section 8.3

3.3.4 State Environmental Planning Policy No 55 – Remediation of Land

The State Environmental Planning Policy No 55 – Remediation of Land (1998 EPI 520) aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

The State Environmental Planning Policy No 55 states that a consent authority must not consent to the carrying out of any development on land unless –

(a) it has considered whether the land is contaminated, and
(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

A preliminary site investigation (PSI) has been carried out for the overall proposal area and did not detect any contamination for the EIS proposal areas. However, as part of the overall proposal, a Detailed Site Investigation would be undertaken.

3.4 Local Environmental Plans

3.4.1 Bankstown Local Environmental Plan 2015

The proposal is located within the City of Canterbury Bankstown LGA. The City of Canterbury Bankstown was formed in May 2016, replacing the former Bankstown City and Canterbury City councils. The amalgamation process did not consolidate the local environmental plans of the local councils, and as a result, the Bankstown Local Environmental Plan 2015 (Bankstown LEP) and Canterbury Local Environmental Plan remain in force.

As the proposal is located within the former Bankstown City Council LGA, the Bankstown LEP applies. Table 3-3 outlines the land use zones under the Bankstown LEP and consistency of the EIS proposal against the objectives of each zone.

Table 3-3 illustrates the land use zones under the Bankstown LEP within the EIS proposal area.

Table 3-3 Consistency of EIS proposal with LEP zones

Zone	Objective of zone	Consistency of proposal with objectives
SP2 Infrastructure	To provide for infrastructure and related uses To prevent development that is not compatible with or that may detract from the provision of infrastructure	The proposal would be consistent with the objectives of this zone as it is road infrastructure.
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	The proposal once constructed would improve recreational settings through improvements to active transport linkages. The proposal has been designed to minimise impacts on the natural environment and scenic resources.

Under the LEP, development for the purposes of roads is permitted in the SP2 and RE1 zones with consent from Council.

There are also a series of additional local provisions in Part 6 of the Bankstown LEP, including provisions relating to:

- Acid sulfate soils (ASS) (clause 6.1)
- Earthworks (clause 6.2)
- Flood planning (clause 6.3)
- Biodiversity (clause 6.4)
- Riparian land and watercourses (clause 6.5).

As development consent for the EIS proposal is required under Part 4 of the EP&A Act, the matters listed above are considered within Chapter 8 of this EIS.

As of October 2020, a consolidated local environmental plan for the LGA has been drafted by Canterbury Bankstown City Council. The *Draft Canterbury Bankstown Consolidated Local Environmental Plan* (Draft Consolidated LEP) has undergone public consultation and is currently being reviewed by DPIE.

As the Draft Consolidated LEP has not yet commenced, the provisions of the Bankstown LEP apply to the proposal area. However, the Draft Consolidated LEP land zoning map illustrates zones within the EIS proposal to remain SP2 Infrastructure and RE1 Public Recreation, consistent with the zones identified within Table 3-3.

3.5 Development control plans and other policies

3.5.1 Bankstown Development Control Plan 2015

The Bankstown Development Control Plan 2015 (DCP) supplements the Bankstown LEP by providing additional objectives and development controls to enhance the function, appearance and amenity of development in the City of Bankstown.

The EIS proposal is not located within any of the areas with precinct controls and does not involve the construction of any buildings or structures that would need to consider controls such as storey limits, setbacks and building design.

Part B11 Tree Management Order states that a person must not cut down, fell, uproot, kill, poison, ringbark, burn or otherwise destroy, lop or otherwise remove a substantial part of any prescribed tree defined in clause 2.3 or carry out excavation and earthworks within the tree protection zone except with a permit from Council and subject to any conditions specified in the permit. The EIS proposal would involve removing prescribed trees as it would involve the removal of 0.25 hectares of four native plant communities that are listed as a Threatened ecological community (TEC) under the *Biodiversity Conservation Act 2016* (BC Act). Clause 2.4 of the DCP states that where works are being undertaken under the *Roads Act 1993*, a permit is not required.

The proposal area is not located within the biodiversity mapped area in the Terrestrial Biodiversity Map or located on a property listed as a heritage item in Schedule 5 of the Bankstown LEP. The impact on vegetation and local heritage items has been considered in Chapter 8 and Appendix C.

The EIS proposal and overall proposal are located within the High Flood Risk overlay within Part B12 Flood Risk Management. However, there are no development standards under the DCP relating to flood risk for road/transport infrastructure. A flood assessment has been completed for the overall proposal and is summarised in Chapter 8 and Appendix G.

3.5.2 Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment

The Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment 1999 is a regional environmental plan which applies to the Georges River Catchment.

The specific aims and objectives of this plan that are of relevance to the EIS proposal are related to environmental protection and water quality and river flows, which are as follows:

a. to preserve and protect and to encourage the restoration or rehabilitation of regionally significant sensitive natural environments such as wetlands (including mangroves, saltmarsh and seagrass areas), bushland and open space corridors within the Catchment, by identifying environmentally sensitive areas and providing for appropriate land use planning and development controls,
b. to preserve, enhance and protect the freshwater and estuarine ecosystems within the Catchment by providing appropriate development,
c. to ensure that development achieves the environmental objectives for the Catchment.

As a road transport project, the overall proposal would be considered as a public utility undertaking under the plan, and the planning control is set out in the local environmental plan or deemed environmental planning instrument for the land. In regard to the stormwater management works that are a part of the EIS proposal, development consent is required except where works are in accordance with a Stormwater Management Plan approved by the Director-General of the Environmental Protection Authority.

3.5.3 NSW Wetlands Policy

The NSW Wetlands Policy (DECCW 2010) aims to provide for the protection, ecologically sustainable use and management of wetlands within NSW. Twelve guiding principles have been developed for the sustainable management of wetlands.

The EIS proposal has currently been designed to avoid direct impacts to mapped coastal wetlands as far as possible but will unavoidably result in encroachment into coastal wetlands as the existing Henry Lawson Drive already sits within or immediately adjacent to the areas mapped under the Coastal Management SEPP. Impacts on wetland areas are considered minimal based on the small area of impact and the assessment contained in this EIS.

Mitigation measures are proposed to be implemented to minimise indirect impacts including potential water quality impacts, on the coastal wetlands.

3.6 Other relevant NSW legislation

3.6.1 Coastal Management Act 2016

The *Coastal Management Act 2016* promotes strategic and integrated management, use and development of the coast for the social, cultural and economic wellbeing of the people of NSW.

The Coastal Management Act defines the coastal zone as comprising of the four coastal management areas. The Coastal Management Act establishes management objectives specific to each of the management areas, reflecting their different values to coastal communities and the priorities for those areas.

The EIS proposal areas are subject to the provisions of the Coastal Management Act as it is located within the coastal zone, with areas mapped as coastal wetlands. EIS proposal area 1 is also mapped as coastal use and coastal environment areas.

The Coastal Management Act outlines the following management objectives for the coastal wetlands and littoral rainforests area:

- To protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity,
- To promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests,
- To improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration,
- To support the social and cultural values of coastal wetlands and littoral rainforests,
- To promote the objectives of state policies and programs for wetlands or littoral rainforest management.

As detailed within Section 1.4, this EIS has been prepared for the areas impacted that are mapped under the provisions of the Coastal Management SEPP. This EIS will assess the potential environmental impacts in accordance with the requirements of the Coastal Management Act and Coastal Management SEPP.

3.6.2 Crown Lands Management Act 2016

The *Crown Land Management Act 2016* (Crown Land Management Act) provides a streamlined framework from Crown land administration and management in NSW.

The EIS (and overall) proposal will require the acquisition of parcels of Crown land along the Georges River and along Milperra Road.

Under Clause 2.18 (1), the Minister for Primary Industries can:
'Despite any other provision of this Act, the Minister may grant a lease, licence, permit, easement or right of way over dedicated or reserved Crown land for any of the following purposes (a relevant interest)—
(a) any facility or infrastructure,
(b) any other purpose the Minister thinks fit.'

Land acquisition will occur in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Any temporary work proposed to be carried out on Crown Land requires a lease or permit from the DPI (Crown Land).

3.6.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) regulates land, air, noise and water pollution in NSW. It also aims to provide opportunity for increased public involvement and access to information regarding environmental protection.

An environment protection licence (EPL) is required for scheduled activities or scheduled development work outlined in Schedule 1 of the POEO Act. The following scheduled activities potentially apply to the proposal:

- Road construction if it results in four or more traffic lanes (not including bicycle lanes or lanes used for entry or exit), where the road is classified or proposed to be classified as a main road for at least three kilometres of its length in the metropolitan area, and for at least five kilometres in any other area
- Extractive activities, where excavation required for the proposal is greater than 30,000 tonnes per year
- Cement or lime handling, meaning the handling of cement, fly ash, powdered lime (other than agricultural lime) or any other similar dry cement products where the amount is more than 150 tonnes of cement or lime per day or 30,000 tonnes of cement or lime per year.

The EIS proposal does not meet these trigger levels, therefore an EPL would not be required for the proposal.

3.6.4 Water Management Act 2000

The *Water Management Act 2000* (WM Act) aims to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The WM Act is based on the principles of ESD, aiming to ensure the fundamental health of rivers and groundwater systems and associated wetlands, floodplains, estuaries are protected.

The EIS proposal is covered by the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011 and therefore the WM Act applies.

A controlled activity approval is required from the DPIE (Water) for certain types of developments and activities that are carried out in or near a river, lake or estuary. Transport, as a public authority, is exempt from the requirements to obtain a controlled activity approval under Clause 38 of the Water Management (General) Regulation 2004. Aquifer interference approval is therefore not required in regard to the potential impacts to groundwater dependent ecosystems (GDEs).

Elements of the WM Act (including relation to drainage management, aquifer interference activities) and general principles for design specific to the overall proposal have been considered in this assessment to inform potential construction and operational phase risks of the proposal.

The EIS proposal has several direct and indirect impacts relevant to groundwater, including excavations for extended drainage infrastructure. Groundwater monitoring and other safeguards are therefore proposed. It is noted that the proposal does not intend to extract large quantities of groundwater triggering the need to apply for a water extraction licence (under the NSW AIP (DPI Office of Water, 2012)). EIS proposal area 2 will include excavations of about 1.5 metres for new drainage infrastructure. There is potential to encounter groundwater, however, the proposal would not extract groundwater for the purposes of water supply.

3.6.5 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources for the benefit of present and future generations.

Part 7 of the FM Act relates to the protection of fish and aquatic habitats with the objective of conserving the biodiversity of fish and aquatic vegetation. It provides for the management of certain works located on land that is permanently or intermittently submerged by water. Pursuant to sections 201, 205 and 219 of the FM Act, works and activities such as those listed above, may be undertaken under the authority of a permit.

The EIS proposal does not involve dredging, reclamation, damage to marine vegetation and de-snagging.

The FM Act is considered in Section 8.1 and Appendix C. No habitat for threatened fish or TEC listed under the FM Act occurs within the EIS proposal area. In the study area, the banks of the Georges River are lined by seedlings, shrubs and trees of River mangroves (*Aegiceras corniculatum*) and Grey mangroves (*Avicennia marina*) (PCT 920). Mangroves are protected under the FM Act. The mangroves would not be impacted by the EIS proposal.

3.6.6 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) and its supporting regulations commenced on 25 August 2017. The BC Act repeals the Threatened Species Conservation Act 1995 along with other natural resource management legislation.

The BC Act sets out the environmental impact assessment framework for threatened species, threatened ecological communities and Areas of Outstanding Biodiversity Value (formerly critical habitat) for Part 5 activities (amongst other types of development).

Under the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat. The proposal would not have a significant impact on threatened species or ecological communities or critical habitat. Further detail on the biodiversity assessment conducted for this proposal is provided in Section 8.1. A Biodiversity Development Assessment Report (BDAR) has been prepared in support of the EIS proposal (provided in Appendix C). Both have been prepared in accordance with Part 6 of the BC Act.

3.6.7 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* (Biosecurity Act) provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds.

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

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Weeds of concern were identified within the EIS proposal and would be managed in accordance with the requirements of the Biosecurity Act. Further information is provided in Section 8.1.

3.6.8 Aboriginal Land Rights Act 1983

Through the *Aboriginal Land Rights Act 1983*, vacant Crown land not lawfully used or occupied or required for an essential purpose or for residential land, is returned to Aboriginal people (and vested in Aboriginal Land Councils). In accordance with Section 42B of the *Aboriginal Land Rights Act 1983*, land vested in an Aboriginal Land Council can only be acquired by Transport through an Act of Parliament.

Under Section 39, the Minister may acquire land (including an interest in land) by agreement or by compulsory process in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. The Minister may only do so if the Minister is of the opinion that there are exceptional circumstances which warrant the acquisition of land for the purpose of satisfying the objectives of this Act.

The proposal would require a partial property acquisition of properties that are subject to an Aboriginal claim and has not yet been determined. Transport would continue to consult with Local Land Councils during the detailed design phase to minimise impacts to any Aboriginal land claim land.

3.7 Commonwealth legislation

Under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) proposed 'actions' that have the potential to significantly impact on matters of national environmental significance (MNES), the environment of Commonwealth land or that are being carried out by a Commonwealth agency must be referred to the Australian Government. If the Australian Government Minister for the Environment determines that a referred project is a "controlled action", the approval of that minister would be required for the project.

Assessments of impact significance were conducted for all EPBC Act listed threatened species and ecological communities considered likely to be affected by the EIS proposal. The EIS proposal impact together with the REF proposal impacts would not result in a significant impact to MNES and the environment of Commonwealth land. Further detail is provided in Section 8.1 and Appendix C.

Accordingly, the EIS proposal has not been referred.

4 Strategic justification and project need

This chapter outlines the relationship of the overall proposal to the strategic planning framework. It also identifies the need for the proposal and the proposal objectives. A statement of strategic need concludes the chapter.

Secretary's requirements	Where addressed in EIS
Project justification – including: • The need for the proposal, the suitability of the site for the development, a demonstration that the proposal is consistent with relevant strategic planning documents, a consideration of impacts of 'no action' and a consideration of alternative options and operation technologies.	Chapter 4, Chapter 9 and Chapter 11

4.1 NSW and Australian strategic planning and policy framework

The following section describes the compatibility of the EIS and overall proposal with key strategic planning and policy documents.

4.1.1 Australian strategic planning documents

Infrastructure Australia's 2021 Infrastructure Priority List

Infrastructure Australia's 2021 *Infrastructure Priority List* is a comprehensive investment roadmap to support Australia's recovery from the COVID-19 pandemic. The Infrastructure Priority List was released in February 2021 and features 44 new infrastructure proposals for Australia's cities, regions, and remote communities.

An infrastructure investment is nationally significant if, based on the evidence presented, the Infrastructure Australia Board expects the investment to have a material impact on national output by:

1. Addressing a problem that would otherwise impose economic, social and/or environmental costs; or
2. Providing an opportunity for realising economic, social and/or environmental benefits; or
3. Both addressing a problem and providing an opportunity.

While the proposal is not recognised in the Priority List, the proposal is aligned with government strategies and policies, has social, economic and environmental benefits, and is deliverable. It is also located in the 'fast-growing city' of Sydney and is also nearby/connects to the M5 Motorway, which is linked to priority initiatives such as the A3 and A6 corridor capacity and Heathcote Road capacity and safety.

National Freight and Supply Chain Strategy

The National Freight and Supply Chain Strategy (August 2019) sets an agenda for coordinated and well-planned government and industry action across all freight modes over the next 20 years and beyond. It sets a national vision for freight systems and supply chains to contribute to a strong and prosperous Australia through achieving the following goals:

- Improved efficiency and international competitiveness
- Safe, secure and sustainable operations
- A fit for purpose regulatory environment
- Innovative solutions to meet freight demand
- A skilled and adaptable workforce
- An informed understanding and acceptance of freight operations.

Henry Lawson Drive is a B-Double transport route that allows access to the M5 Motorway and the Hume Highway. The overall proposal would be consistent with the direction proposed in the National Freight and Supply Chain Strategy. The overall proposal would improve the freight and logistics network by increasing capacity along Henry Lawson Drive at the Newbridge Road/Milperra Road intersection. It would improve freight access to the surrounding area and (in conjunction with other stages of the Henry Lawson Drive upgrade program) to the M5 Motorway and the Hume Highway.

National Road Safety Strategy 2021-20

The draft National Road Safety Strategy for 2021-30 (Strategy) is currently out for consultation until 23 March 2021. The draft Strategy supports strong governance, transparency, and accountability by all levels of government, and adopts a social model approach to deliver road safety actions, mapping out a path to foster a road safety culture across Australian society.

One of the key drivers for the overall proposal would support this direction towards a safer road transport system as it would ease existing traffic issues between the M5 Motorway and Hume Highway and enhance road safety in the area.

4.1.2 NSW strategic planning documents

Premier's Priorities

The Premier's Priorities represent the NSW Government's commitment to making a significant difference in enhancing the quality of life of the people of NSW, with each priority set with an ambitious target. The key policy priorities for the NSW Government are:

- A strong economy
- Highest quality education
- Well connected communities with quality local environments
- Putting customer at the centre of everything we [the NSW Government] do
- Breaking the cycle of disadvantage.

While the overall proposal is not specifically mentioned within the Premier's Priorities, the proposal supports the key policy priority of enhancing the people of NSW's quality of life through 'well connected communities with quality local environments'. The proposed widening of Henry Lawson Drive would help to alleviate congestion and improve travel time, allowing motorists through the intersection more effectively and improving connectivity in the area.

Future Transport Strategy 2056

The Future Transport 2056 (Future Transport Strategy) provides an integrated vision for NSW through a suite of strategies and plans for transport developed alongside the SIS, Greater Sydney Region Plan and the Department of Planning and Environment's regional plans. The Future Transport Strategy outlines the 40 year vision, directions, and outcomes framework for customer mobility in NSW, guiding investment over the longer term. The Future Transport Strategy outlines six state-wide outcomes to guide investment, policy and reform and service provision.

'Optimising the network and better using existing infrastructure' is a key objective in the Future Transport Strategy to be addressed over the next 40 years. As part of this network issue, mitigating the costs and impacts of congestion is identified as a major focus for planning the future network.

The overall proposal would help to alleviate congestion and improve travel times, aligning with the Future Transport Strategy's strategic objective to optimise the network and better using existing infrastructure.

Greater Sydney Services and Infrastructure Plan

The Greater Sydney Services and Infrastructure Plan (Services and Infrastructure Plan) forms part of the Future Transport Strategy. The Services and Infrastructure Plan's overall transport vision has been developed to support the Greater Sydney City's vision for Greater Sydney as a "30 minute city", where people have access to jobs and services within 30 minutes by public transport.

The Services and Infrastructure Plan builds on the state-wide transport outcomes identified in the Future Transport Strategy, establishing specific outcomes that Transport customers can expect and identifying the policy, service and infrastructure initiatives to achieve these.

The Future Transport State-wide Outcomes and Greater Sydney Transport Customer Outcomes are as follows:

- Customer focused – convenient and responsive to customer needs
- Successful places – sustaining and enhancing the liveability of our places
- A strong economy – connecting people and places in the growing city
- Safety and performance – safely, efficiently and reliably moving people and goods
- Accessible services – accessible for all customers
- Sustainability – makes the best use of available resources and assets.

The overall proposal will assist in achieving these customer outcomes through reducing traffic delays, alleviating congestion and improving travel times along Henry Lawson Drive, particularly during weekday peak periods.

State Infrastructure Strategy

The State Infrastructure Strategy 2018-2038: Building Momentum (SIS) outlines the NSW Government's 20-year strategic vision for infrastructure needs and priorities (Infrastructure NSW, 2018). The SIS identifies policies and strategies needed to meet the needs of the growing NSW population and economy.

The SIS recognises that different parts of NSW face different opportunities and needs, and sets geographic directions for infrastructure planning, investment and policy. The proposal is located within the Central River City of Greater Sydney, an area facing infrastructure challenges and opportunities such as poor connectivity, emerging innovation precincts and competitive and growing industries. The SIS identifies the following infrastructure responses to these challenges and opportunities, which are supported by the proposal:

- Improve intercity and intracity transport connections
- Improve intracity walking and cycling connections
- Improve north-south transport connections (for example to and from Greater Parramatta from the south).

In addition to identifying infrastructure responses to geographic areas, the SIS also identifies transport-specific challenges and opportunities, which include:

- Addressing capacity constraints
- Improving productivity
- Improving road safety.

The overall proposal would support these opportunities as it would:

- Ease existing traffic issues between the M5 Motorway and Hume Highway with significant improvements in delay and volume throughput due to capacity improvements
- Increase travel efficiency for local road users by allowing for greater traffic capacity at key intersections
- Significantly impact road safety in the area due to increased intersection capacity and smoother operation of the network in general
- Improve freight access to surrounding area and (in conjunction with other stages of the Henry Lawson Drive upgrade program) to the M5 Motorway and the Hume Highway.

Further detail on the traffic impacts of the overall proposal is provided in Section 9.1.

Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Region Plan: A Metropolis of Three Cities (Greater Sydney Region Plan) outlines the vision to transform Greater Sydney into a metropolis of three cities:

- The Western Parkland City
- Central River City
- Eastern Harbour City.

The Greater Sydney Region Plan sets a 40 year vision (to 2056), establishing a 20 year plan to manage growth and change for Greater Sydney in the context of social, economic and environmental matters. The vision brings new thinking to land use and transport patterns to boost Greater Sydney's liveability, productivity and sustainability by spreading the benefits of growth. The Greater Sydney Region Plan outlines the Ten Directions that supports the overall vision of three cities where most residents live within 30 minutes of their jobs, education and health facilities, services and great places.

While not specifically mentioned in the plan, the overall proposal supports the directions outlined within the plan through:

- Adapting existing infrastructure to meet future needs and optimise usage
- Developing a more accessible and walkable city through improving the freight and logistics network.

South District Plan

The South District Plan provides a 20-year plan to manage growth and achieve the 40-year vision, while enhancing Greater Sydney's liveability, productivity and sustainability into the future. It is a guide for implementing The Greater Sydney Region Plan at a District level and is a bridge between regional and local planning.

The overall proposal supports the following planning priorities within the South District Plan:

- Planning Priority S1 Planning for a city supported by infrastructure
- Planning Priority S12 Delivering integrated land use and transport planning and a 30-minute city.

Canterbury Bankstown Local Strategic Planning Statement 'Connective City 2036'

The Canterbury Bankstown Local Strategic Planning Statement 'Connective City 2036' was approved in December 2019 and provides an over-arching strategic plan to help guide growth in Canterbury-Bankstown over the next 20 years. It identifies a suite of 20-year strategic initiatives that we need to start planning for now to ensure a successful and prosperous city over the medium to longer term.

Connective City 2036 aims to integrate a variety of transport modes with different land uses so that more people can connect to more places within the City and beyond. It will help to improve the City's ecological and river systems and create quality places for healthy living and ecological integrity.

The overall proposal supports the following priorities relating to one of the 10 Evolutions - *Movement for Commerce and Place:*

- Maintain and improve strategic road and rail transport corridors
- Address blockages in the road network to improve traffic flow on Greater Sydney-serving roads
- Protect Greater Sydney's regional freight corridors.

Henry Lawson Drive is identified in Connective City 2036 as one of the major roads reinforced as metropolitan transport and freight routes. Duplicating Henry Lawson Drive from the Hume Highway to the M5 Motorway is highlighted as a project that will complement the work on Bankstown City Centre. It is subsequently identified as a key action which will assist in the need to address blockages in the road network to improve traffic flow.

Bankstown CBD and Bankstown Airport Place Strategy

The Bankstown CBD and Bankstown Airport Collaboration Area Place Strategy provides a vision and shared objectives for the place and sets out priorities and actions to realise this vision. The vision is that by 2036, Bankstown CBD and Bankstown Airport Collaboration Area will be a green, healthy and dynamic destination that capitalises on its diverse culture and its proximity to Salt Pan Creek and Georges River. The Strategy was approved by the Greater Sydney Commission in December 2019.

It is acknowledged in the strategy document that the industrial and freight cluster is serviced by roads such as Henry Lawson Drive, Milperra Road and the M5 Motorway which are subject to major congestion, due mainly to the higher proportion of private vehicle use in and around the area.

Two of the key actions are:

- To develop a place-based integrated transport strategy that considers the health, academic, research and training precinct, growth at Bankstown CBD and connectivity to, from and within the Collaboration Area (Action 1)
- Investigate and deliver improvements for pedestrian and cyclist connectivity and better at grade pedestrian facilities across major road corridors and provide enhanced design, place and safety outcomes at the interface of Bankstown CBD, key gateways and destinations (Action 5)

.

Both of the above actions includes reference to Henry Lawson Drive where it is suggested that walking and cycling facilities should be improved at intersections around Haig Avenue – Rabaul Road and Milperra Road to enhance access to Georges River with consideration to flood level and design. The overall proposal will also improve walking facilities at intersections as a new pedestrian pathway will be installed to the bus stop on Milperra Road (as shown in Figure 6-2).

Road Network Plan Summary Report: Henry Lawson Drive and Woodville Road

The Henry Lawson Drive and Woodville Road network plan (Transport, 2018) provides a framework for the development and management of Henry Lawson Drive/Woodville Road, based on the network's strategic movement and place function and customer needs. The plan outlines following objective statements:

- A safe road system for every customer supporting the Towards Zero vision of zero fatalities and serious injuries on NSW roads by 2056.
- Improve travel time and reliability for key customer group (freight and car users) along the corridor to support and enhance its function as a primary north-south link between M5 and Parramatta.
- Support access to safe crossing opportunities of the corridor for active modes, for both commuting and recreational uses, linking local centres, and transport interchanges on parallel rail lines.
- Facilitate the efficient, safe and reliable movement of goods along the corridor and beyond, supporting the growth of freight precincts such as Yennora, Villawood and Bankstown Airport, the metropolitan centre of Parramatta and strategic centres of Fairfield and Bankstown.
- Integrate current and future land use planning with road network development to ensure compatible and complementary uses and functions.

The EIS proposal as part of the overall proposal would help achieve the objectives of the road network plan through the increased capacity of the proposal improving travel times and efficiency for motorists and freight operators, as well as improved connectivity and safety for active transport users.

4.2 Project need

The overall proposal is needed to:

- Alleviate congestion along the corridor that causes frustrating and costly delays for all road users across spreading peaks
- Address a road environment contributing to a high rate of casualty crashes
- Support growth in the area from large scale development in and around Milperra and the Bankstown Airport.

4.2.1 Existing road network conditions

Henry Lawson Drive is a largely two lane road, one-lane in each direction at mid-block locations in the overall proposal area. There is localised widening associated with the Tower Road and the Newbridge Road/Milperra Road intersections. The posted speed limit on this section is 60 km/h.

The corridor currently provides limited pedestrian or cycling facilities, although pedestrian movements are catered for at both Tower Road and the Newbridge Road/Milperra Road intersections. There are no public transport routes along Henry Lawson Drive in the overall proposal area. There is a bus service (M90) that passes through the overall proposal area along Newbridge Road and Milperra Road.

Traffic surveys undertaken in the first half of 2018 across Henry Lawson Drive and associated feeder streets between Hume Highway and M5 Motorway shows around 55,500 vehicles/hour during the AM and 58,500 vehicles/hour during the PM peak in both directions.

Heavy vehicles account for about nine per cent during the AM peak period and six per cent of total traffic volume during the PM peak period. The proportion of heavy vehicles on Henry Lawson Drive is high when compared to the average of four per cent for heavy commercial vehicles during peak periods across the broader Sydney urban road network.

Congestion within the overall proposal area (and Henry Lawson Drive generally), is a significant problem in the area. Travel time data collected on Henry Lawson Drive during both the AM and PM peak hours provides trip times along Henry Lawson Drive between the Hume Highway and M5 Motorway. Travel speeds during the peak periods in both directions are well below signposted speeds (60 km/h and 70 km/h (north of Stage 1A)). Travels speeds vary from 15 km/h during the PM peak for trips travelling south to 38 km/h during the PM peak travelling north.

4.2.2 Crash statistics, including any available information on crash causes

The current and future levels of congestion on Henry Lawson Drive coupled with an unforgiving road environment (ie one way in each direction with limited median and road shoulders) result in a high rate of vehicle crashes.

Crash data was extracted between 2010 and 2019 from the Crash Link database within Transport for the overall proposal area plus a section of Newbridge Road.

The crash history data shows that over the past nine years, crashes vary between 10 and 18 per year, with casualties between five and 19 per year around Henry Lawson Drive and Milperra Road. Rear end crashes make up the majority of crashes (67.5 per cent) followed by opposing vehicles turning (20.16 per cent) and lane changing (12.10 per cent). The data also shows most crashes occur within 10 metres of the intersection. AM and PM peak periods during the weekdays also make up the bulk of all crashes.

A comparison of crash data of the overall proposal area with other sections of the Henry Lawson Drive between the Hume Highway and the M5 Motorway was undertaken. It showed that the number of crashes on the roads to be upgraded as part of the overall proposal result in the highest crash rate compared to other sections of Henry Lawson Drive.

The crash history is summarised in Figure 4-1 along with the crash types shown in Figure 4-2.

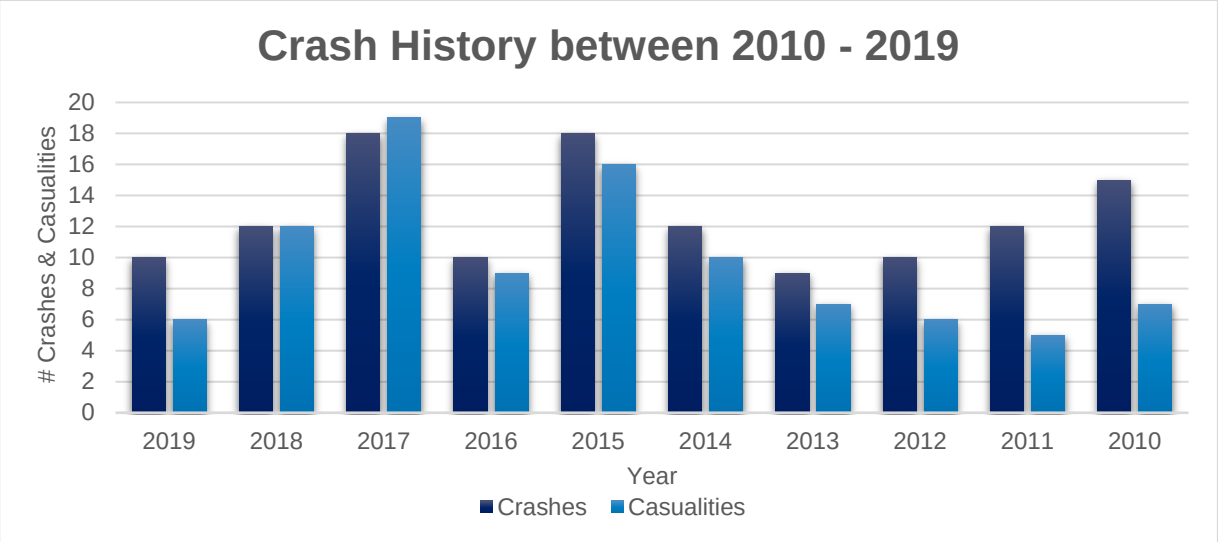


Figure 4-1 Crash history along Henry Lawson Drive and Milperra Road (2010 – 2019)

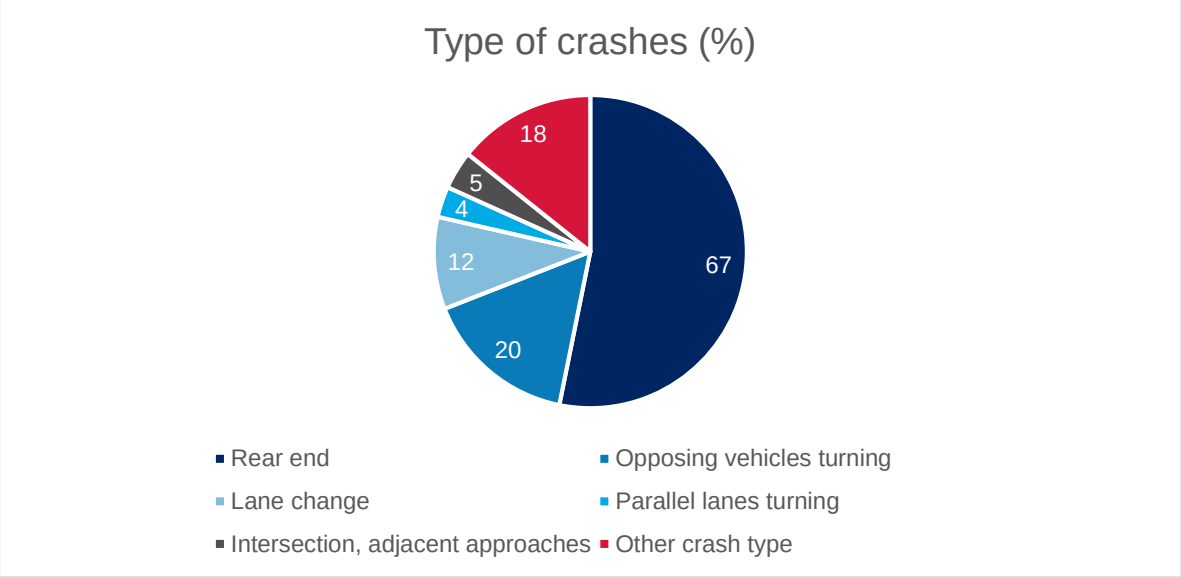


Figure 4-2 Crash by type along Henry Lawson Drive and Milperra Road (2010 – 2019)

4.2.3 Further development and growth in the area

There are three significant developments proposed that would interact with the overall proposal. Trips generated from these developments will add to the existing congested conditions in the overall proposal area. The developments include:

- Flower Power retail complex (in operation) – at Keys Parade intersection immediately south of the overall proposal area, now operational. Based on traffic generation information provided to the project team in late 2018, the development of the Flower Power nursery and retail space is expected to contribute additional 220 vehicle movements in the AM peak and 320 in the PM peak.

- Bankstown Airport (under construction) – Bankstown Airport is accessed from Tower Road in the overall proposal area. Bankstown Airport Limited have submitted the Preliminary Draft Major Development Plan to the Federal Minister for approval of the Infrastructure and Regional Development of Bankstown Airport. Development works are in progress to build large retail and leisure centres, factory outlets, and restaurants to maximise opportunities to increase economic activity and jobs growth within the Bankstown to Liverpool Enterprise corridor. The proposed development projects are expected to generate an additional 1,300-1,850 peak hour vehicle trips by 2024. Bankstown Airport Limited would upgrade Tower Road/Henry Lawson Drive to an interim stage to service the immediate needs of the redevelopment. The overall proposal would then integrate into the Bankstown Airport road upgrade works and complete the necessary works to transition back into the existing lanes north of Tower Road.
- Riverlands Development (in planning phase)– The Riverlands residential subdivision is located south of the overall proposal, however, could result in increased traffic along Henry Lawson Drive. The proposed development proposed a total of 240 sub lots, together with upgrades to existing road infrastructure and the upgrade to Keys Parade for access to the proposed development zone. Based on traffic generation information provided to the project team in late 2018, the predicted traffic is an additional 427 movements in AM peak, 528 in PM peak movements.

These traffic generating developments would result in increased demand on Henry Lawson Drive and could exacerbate existing congestion issues.

4.3 Project objectives

The key objectives of the overall proposal include:

- Improve travel times, journey time reliability and road safety outcomes for all road users.
- Improve freight efficiency and reduce vehicle operating costs on the road network.
- Support new development in the precinct by improving traffic flow and connectivity to Bankstown Airport, Milperra Industrial Estate and proposed residential development in the area and the surrounding road network in the south west of Sydney
- Improve connectivity and safety for pedestrians and cyclists.

The EIS proposal would support these objectives as being part of the overall proposal. Activities within the EIS proposal would also directly support improved connectivity and safety for pedestrians and cyclists through the provision of pedestrian and shared paths.

The urban design objectives for the overall proposal are derived from the nine urban design principles defined in the Transport (2020) urban design policy – *Beyond the Pavement*. The objectives are set out in relation to these principles in Table 4-1.

Table 4-1 Urban design objectives for the overall proposal

Principle	Objectives
Principle 1 – Contribute to the overall landscape structure and revitalisation of the region	• Develop an alignment which permits the ongoing development of Henry Lawson Drive through the provision of upgraded capacity and intersections to service the increasing demand on the roads • Design an alignment which is responsive to its landscape setting and does not detract from it • Minimise negative physical impacts on drainage corridors and open space networks associated with these • Seek opportunities to minimise landscape impacts by investigating possibilities to minimise footprint including the use of retaining walls.
Principle 2 – Respect the land uses and built form of the corridor	• Minimise the footprint of the corridor to limit impacts to adjoining vegetation, communities, services and service corridors, and industrial lands

Principle	Objectives
	• Respond to the ecological communities of the area and landscape character of the corridor • Minimise the intrusion of road-related elements on the local landscape.
Principle 3 – Connecting modes and communities	• Provide safe and efficient access to the residential communities of Bankstown residential and commercial precincts • Investigate best access routes for cyclists and pedestrians to provide high quality crossing points, comfortable and safe connections • Provide active transport opportunities both within the alignment and connecting to the broader local context and networks, where a need has been identified. A key consideration will be the connection to the Hume Highway, M5 Motorway and to Liverpool • Provide flood free access which maintains access in all weather.
Principle 4 – Fit the landform of the corridor	• Minimise the footprint of the corridor to limit impacts to adjoining vegetation communities and adjoining land uses • Provide a formation which addresses local flood patterns • Consider form of potential cut and fills and how this sits within the existing landscape.
Principle 5 – Responding to natural pattern	• Provide a response which addresses the close proximity to commercial properties and the effect of changing character • Drainage and its management should reflect the fact the alignment is on the floodplain and respond accordingly to areas expected to be subject to inundation • Preserve existing cultural patters within the landscape where evident within the corridor • Vary the gradient of earthworks to provide visual interest and reflect characteristics of the surrounding landform and landscape.
Principle 6 – Protect and enhance the heritage and cultural values of the corridor	• Preserve the integrity of heritage items and area of cultural importance to the local community • Avoid, where possible areas of identified historic and cultural value • Acknowledge and respond to the heritage and cultural values of the project area • Acknowledge and respond to the aboriginal values and places in the broader landscape • Consider the interpretation of the heritage areas along the corridor.
Principle 7 – Designing an experience in movement	• Minimise disruption to the visual qualities of the land use • Use landscape to frame or define views from the road, providing a backdrop and context to the road • Investigate potential of using planting to heighten Henry Lawson Drive's sense of place.
Principle 8 – Creating self-explaining road environments	• Provide plantings that reinforce the character and connections of the corridor with the adjoining development • Provide a landscape design which reflects the needs and performance requirements of intersections along the corridor • Utilise landscape design as a way to differentiate character zones, heightening the sense of place.

Principle	Objectives
Principle 9 – Achieving integrated and minimal maintenance design	• Develop a consistent approach to the design of soft landscaping along the alignment which is responsive to the character and feel of the road environment with which it connects as well as the character of the corridor through which it passes. Planting design Principles to be consistent to those outlined in the 'Landscape Design Guideline: Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors (Roads and Maritime, 2018). • Provide plantings to frame views and guide the driver along the alignment, provide a backdrop and screen in part to the development that is adjacent.

4.4 Statement of strategic need

Without the development of the overall proposal, road and traffic conditions within the overall proposal area that would continue into the future include:

- Worsening congestion along the corridor causing frustrating and costly delays for all road users across spreading peaks.
- Poor driver behaviour in an unforgiving road environment contributing to a high rate of casualty crashes.

The overall proposal would support these opportunities as it would:

- Result in significant improvements in delay and volume throughput at the Milperra/Newbridge Road and Tower Road intersections due to capacity improvements
- Increase travel efficiency for local road users by allowing for greater traffic capacity at key intersections
- Significantly impact road safety in the area due to increased intersection capacity and smoother operation of the network in general
- Improve freight access to surrounding area.

In addition, the overall proposal in conjunction with other stages of the Henry Lawson Drive upgrade program would ease existing traffic congestion issues and improve freight access between the M5 Motorway and Hume Highway.

The development of the overall proposal is consistent with the objectives, aims and strategic transport, land use and road safety planning documents. It will provide an increased capacity that would alleviate congestion and provide additional capacity to cater for development growth in the area.

The EIS proposal is needed as, without the aspects forming the EIS proposal, the overall proposal would not be able to be constructed. The EIS proposal would assist in achieving the broader objectives of the overall proposal which are outlined in Section 4.2 and Section 4.3.

5 Project development and alternatives

The overall proposal was developed to, where possible, avoid and minimise the direct and indirect impacts to the coastal wetlands.

The development of strategic alternatives and options and the process undertaken for the selection of the preferred option for the overall proposal is detailed in the following sections.

5.1 Strategic response options

The options development for the corridor considered strategic response options, which considered a range of non-infrastructure and infrastructure solutions to challenges on the Henry Lawson Drive corridor. An Investment Logic Mapping (ILM) workshop was conducted in November 2018.

The challenges identified in the ILM workshop were congestion, lack of future capacity, road closures due to flooding and other events, rat running in surrounding residential areas and crash history along Henry Lawson Drive.

Four strategic response options were considered:

- Do-minimum – maintenance only of the Henry Lawson Drive corridor
- Increase Supply – duplication of the Henry Lawson Drive corridor
- Travel Demand Management – use of contra-flow arrangements on the Henry Lawson Drive corridor
- Increase Productivity – upgrade corridor to a rapid transit or light rail corridor.

Of these options, only the 'Increase Supply' option was considered to positively address all the identified challenges. It would also not exclude the inclusion of Travel Demand Management and Increase Productivity at a later stage.

5.2 Strategic alternatives

Once it was decided that the corridor would need to be upgraded, three different strategic alternatives were considered. These included:

- Alternative 1 – four lane widening (two lanes either direction)
- Alternative 2 – four lane with a widened median to allow for six lanes in the future (two lanes either direction and allowance for a future third lane to be constructed within a widened central median)
- Alternative 3 – six lane widening (three lanes either direction).

The VM workshop held in September 2019 considered the three alternatives and compared them to the 'do minimum' alternative (ongoing maintenance and optimising intersection operations such as signalling optimisations or minor intersection reconfiguration). The participants of the VM Workshop included the Transport project team and other Transport stakeholders.

These alternatives were compared against traffic benefit and economic analysis to determine the most optimal solution. Traffic benefits included vehicle-kilometre-travelled (VKT), vehicle-hour travelled (VHT), number of vehicle stops, average speed and traffic volume. These were compared for the alternatives and the Do minimum alternatives for the existing case (2018 and the future cases (2026 and 2036). The key benefits incorporated within the Cost Benefit Analysis (CBA) assessment were in the form of savings in travel time, vehicle operating costs and crash costs.

The VM workshop concluded that the four lane widening (Alternative 1) was the preferred option, as traffic modelling showed it would sufficiently address the congestion problem within the foreseeable future. Upgrading the whole corridor to six lanes would only provide marginal benefits compared to the four-traffic lane widening option with higher costs associated with property acquisition and biodiversity offsets, as a result of greater disturbance impacts to threatened biodiversity communities and species. With all these considerations, it was necessary to refine the project scope to better align with available funding. Overall, Alternative 1 was found to offer the best value-for-money solution, highest BCR and minimal loss in biodiversity values among the alternatives assessed.

5.3 Henry Lawson Drive Stage 1A options

The overall proposal for Stage 1A considered options in terms of proposal alignment and deferring structural options for Auld Avenue bridge. While the EIS proposal forms part of the overall proposal, the options addressed in this EIS are the alignment options which have a bearing on the EIS proposal.

Further discussion of options for the overall proposal (such as Auld Avenue bridge structural options) is considered in the REF document.

5.3.1 Methodology for selection of the preferred option

The methodology for selection of the preferred option involved a collaborative process. Concept design development (which included assessing all the evaluation criteria referred to below) and value management workshops took place, which included concurrences from Transport's subject matter experts (SMEs), network operations concurrence, metro bus planning and development concurrence, safety-in-design and constructability workshop for assessment of preferred option. A long term strategic vision assessment was conducted to assess what is the best fit for the wider corridor and upcoming development, and onsite investigations were also carried out.

The options were assessed against a criteria of minimising property acquisition, lesser impacts to utilities and better design alignment considerations (eg geometry).

5.3.2 Identified options

There were two options (with one containing two sub-options) considered for the overall proposal. These options were compared against a 'do minimum' scenario.

'Do minimum' option

The 'do minimum' option would result in the Henry Lawson Drive remaining in its current state without any improvements to the intersection.

In comparison to existing travel times, early traffic modelling undertaken for the 'do minimum' option showed north and southbound travel time increasing by as much as 300 per cent across all future years for both the AM and PM peaks.

Option 1 – Widening to the western side of Henry Lawson Drive

Option 1 proposed to maximise use of the Transport owned land and adjoining properties along the western side of Henry Lawson Drive south of Newbridge Road. This would avoid impacting the two private properties located on the eastern side of Henry Lawson Drive near Auld Avenue. However, this option would result in the acquisition (full or partial) of a number of properties on the western side.

Option 1 provides three through lanes southbound and two through lanes northbound along Henry Lawson Drive.

The advantage and disadvantages of this option are discussed in Table 5-1.

Table 5-1 Option 1 advantages and disadvantages

Potential benefits	Disadvantages/implications
• Uses the existing property boundaries along the western side of Henry Lawson Drive • Avoids impacting properties along the eastern side of Henry Lawson Drive south of Milperra Road • Provides 20m of dual right turn lane along Newbridge Road into Henry Lawson Drive southbound and will improve efficiency of the right turn • Would not impact on any areas of mapped coastal wetlands, but would be within the proximity area to the wetlands (same as the existing road pavement).	• Requires acquisition of waterfront properties along the western side of Henry Lawson Drive including a full property acquisition due to proximity to the house • The limited length of dual right lane from Newbridge Road into Henry Lawson Drive is shorter than provided within Options 2A and 2B (the turn bay length is controlled by the existing Georges River Bridge) • Reduces the length of left turn lane from Newbridge Road into Henry Lawson Drive for vehicles to merge compared to existing conditions. • Requires utility relocations along both sides of Henry Lawson Drive for the entire limit of works.

Option 2A – Widening Henry Lawson Drive to the east with a free flow left turn from Newbridge Road

This option proposes to reduce property acquisitions along the western side of Henry Lawson Drive which contains waterfront properties. Rather, this option still requires a full acquisition of a property along the eastern side.

Option 2A provides three through lanes southbound and two through lanes northbound along Henry Lawson Drive with a free flow left turn lane from Newbridge Road into Henry Lawson Drive (northbound).

The advantage and disadvantages of this option are discussed in Table 5-2.

Table 5-2 Option 2A advantages and disadvantages

Potential benefits	Disadvantages/implications
• Avoids full property acquisition along the western side of Henry Lawson Drive • Reduces acquisition of waterfront properties significantly along the western side of Henry Lawson Drive • Provides a free flow left turn lane from Newbridge Road onto Henry Lawson Drive northbound, improving efficiency of the left turn movement • Increase dual right turn storage eastbound along Newbridge Road into Henry Lawson Drive that was proposed within Option 1. The turn bay storage is increased from 20 m to 30 m allowing storage for an additional 2 cars, improving efficiency of the right turn. • Allows additional length within the left turn lane from Newbridge Road into Henry Lawson Drive for vehicles to access the left turn lane compared to Option 1	• Reduces the use of land already acquired for road widening as part of the existing property boundaries along the western side of Henry Lawson Drive. • Requires an increased impact to council owned land on the eastern side of Henry Lawson Drive. • Would be within the proximity area to the wetlands (same as the existing road pavement). Has the potential to impact on small areas of coastal wetlands opposite Auld Avenue (comprising vacant property with mown grass).

Potential benefits	Disadvantages/implications
• Avoids impacting utilities along the western side of Henry Lawson Drive between Newbridge Road and about 50 m north of Auld Avenue (about 240 m in length).	

Option 2B – Widening Henry Lawson Drive to the east with a signalised left turn from Newbridge Road

Option 2B is the same as Option 2A in that the option upgrades Henry Lawson Drive on the eastern side of the existing road.

Option 2B provides three through lanes northbound along Henry Lawson Drive and a signalised left turn lane from Newbridge Road onto Henry Lawson Drive.

The advantages and disadvantages of Option 2B are the same as Option 2A.

5.3.3 Evaluation of options

The options were evaluated based on the following key indicators:

- Traffic assessment benefits
- Road geometry and road environment
- Increased safety and connectivity for motorists and pedestrians
- Cost implications (land acquisition, available funds)
- Proximity to coastal wetlands and associated vegetation
- Community needs
- Intersection improvements
- Supporting upcoming development.

5.3.4 Preferred option

Based on a combination of factors, Option 2A was deemed as preferred, not only due to reduced property impacts on residential properties but also due to further design reasons, including:

- Reduced utility impacts along the western side of Henry Lawson Drive south of Newbridge Road.
- Improved geometry along Henry Lawson Drive compared to option 1.
- Improvement in intersection efficiency by allowing increased dual right turn storage on Henry Lawson Drive to Tower Road and Milperra Road.
- the alignment allows future proofing of Henry Lawson Drive at the intersection with Newbridge Road and Milperra Road. This option allows for an additional through lane along Henry Lawson Drive northbound in the future with limited strip property acquisitions.

5.4 Design refinements

5.4.1 Operational technologies

There are a number of operational technologies that are currently being used along the overall proposal area. This includes CCTV, traffic control signals, traffic detection system and red light speed camera. All these systems would be upgraded as part of the overall proposal, with location and upgrades required to be confirmed during the detailed design.

However, during the options assessment, two further operational technologies were considered for use. These were variable message signs (VMS) and flood warning alerts. VMSs are not required as there are existing VMSs to the south of Stage 1A on approach to the M5 Motorway.

5.4.2 Future design refinements

The development of the EIS proposal areas has considered the overall proposal footprint as well as construction activities while minimising environmental impacts where practicable. Whilst there is flexibility in the EIS proposal area to further reduce the footprint during the detailed design phase, there are key design elements that remain under investigation and may require additional footprint in some areas. Optimisation of the footprint will be undertaken during detailed design and would gather additional ground survey and geotechnical information to support ongoing design, the placement of water quality controls and infrastructure, the use of retaining walls instead of embankments and a review of constructability techniques and options.

6 Project description

This chapter describes the proposed scope of work for the EIS proposal, which is the subject of this EIS, including the route alignment, corridor width, main project elements, ancillary facilities, design standards and construction activities. Section 1.4 provides an overview of how the EIS proposal fits within the overall proposal for the Henry Lawson Drive Upgrade, to be assessed by the REF in parallel with this EIS.

A detailed description of the overall proposal is provided in the REF. Details of the construction of the overall proposal have also been summarised in this chapter to provide context for any potential indirect impacts on the coastal wetlands.

6.1 Overview of the proposal

6.1.1 The proposal

The key features of the EIS proposal are grouped into three distinct areas and are described in the following sections and shown in Figure 6-1 to Figure 6-3.

EIS proposal area 1 – Henry Lawson Drive opposite Tower Road

The key features of EIS proposal area 1 are:

- Widening of Henry Lawson Drive northbound lanes
- Installing of fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure and water quality treatments
- Installing a vegetated swale along the toe of the new fill embankment
- Adjusting the existing shared path to suit the new re-alignment and to connect it back to the existing path
- Installing road furniture, including road safety barriers.

EIS proposal area 2 – Milperra Road opposite Bankstown Airport

The key features of the EIS proposal area 2 are:

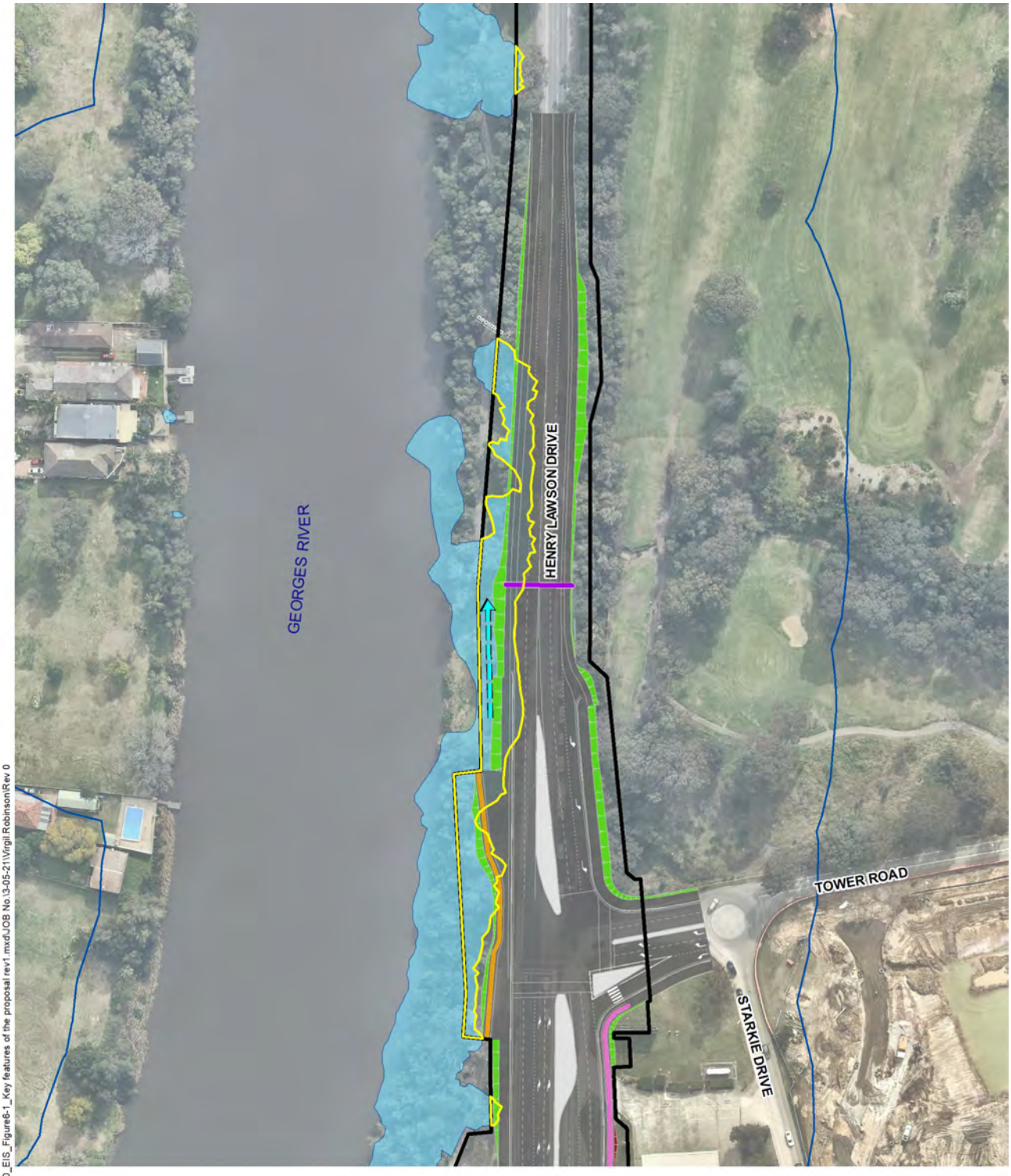
- Installing a new bus stop relocated from its existing position on Milperra Road
- Installing a section of a new footpath to the bus stop (connecting to the remainder of the new path to Henry Lawson Drive – REF proposal)
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Extending existing stormwater culvert and installing outlet scour protection measures
- Installing additional stormwater drainage infrastructure connecting to the outlet of the extended culvert
- Installing road furniture, including road safety barriers.

EIS proposal area 3 – Henry Lawson Drive opposite Auld Avenue

The key features of the EIS proposal area 3 are:

- Removing of existing ancillary structures
- Installing temporary fencing, flagging of exclusion boundaries and temporary erosion and sediment controls for use as an ancillary facility and construction area
- Installing fill embankments along the edge of the new carriageway to meet existing ground levels
- Stabilising the ground surface following the completion of construction to minimise erosion.

The EIS proposal description represents the proposal concept design and this would be refined during the detailed design phase.



Concept design
EIS proposal area
Overall proposal boundary
Proposed grassed swale
Extend major 1.2mx2.4m culvert
Pedestrian path (2m)
Shared path (3m)
Cut
Fill
Coastal Wetlands
Coastal Wetlands Proximity Area

P:\GIS\Project-4\project5100003_HenryLawsonDrive\HLD_EIS_Figure6-1_Key features of the proposal rev1.mxd\JOB No.\3-05-21\Virgil.Robinson\Rev 0

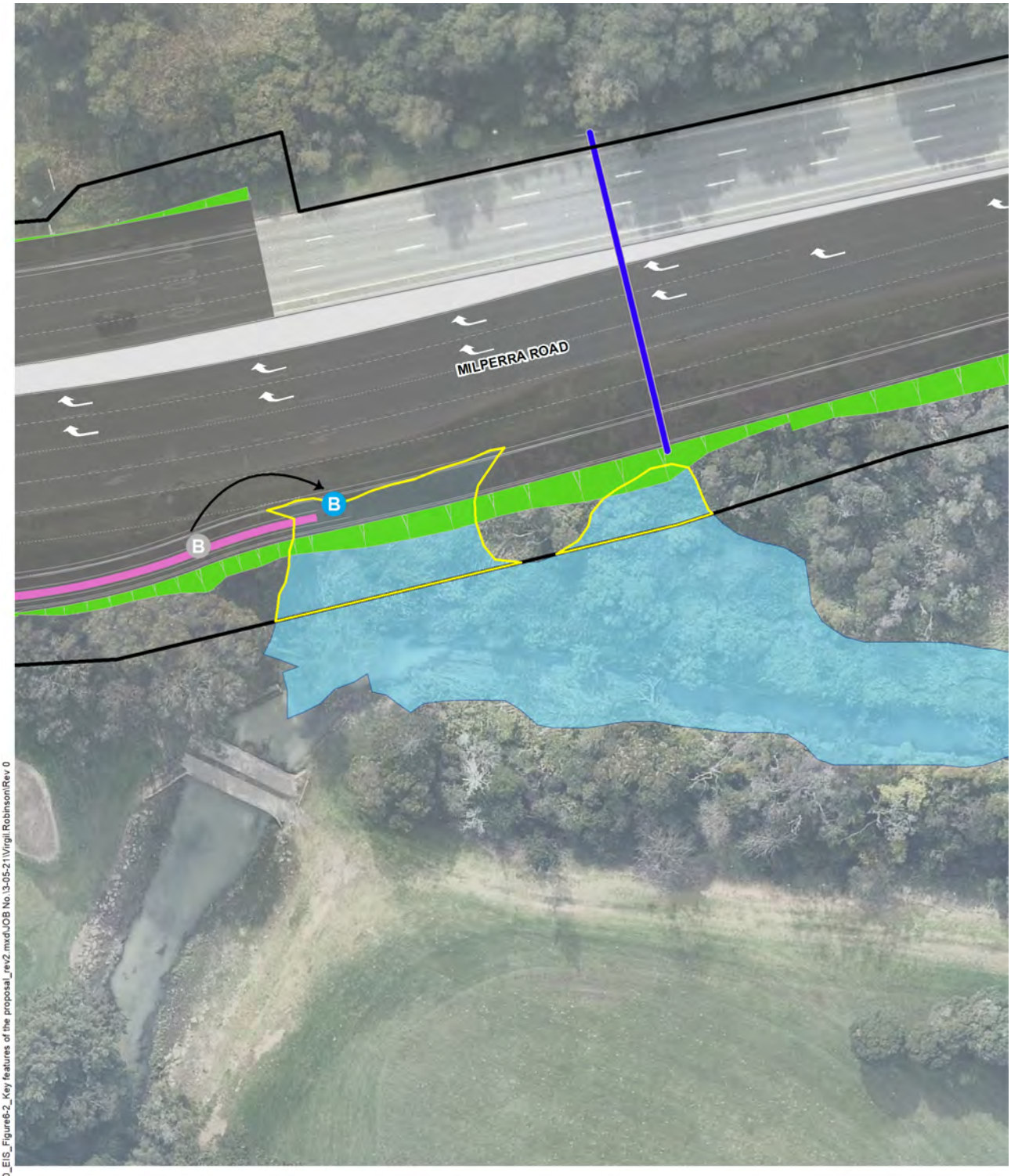
Source: Aurecon, TfNSW, Spatial Services, Nearmap

1:1,750
0 25 50m

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 6-1: Key features: EIS proposal area 1



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Concept design
EIS proposal area
Overall proposal boundary
Proposed bus stop location
Existing bus stop to be relocated
Extend major 2x1.2m box culvert
Pedestrian path (2m)
Cut
Fill
Coastal Wetlands
Coastal Wetlands Proximity Area

Source: Aurecon, TfNSW, Spatial Services, Nearmap

1:625
0 5 10m

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

Projection: GDA 1994 MGA Zone 56

FIGURE 6-2: Key features: EIS proposal area 2

Concept design
EIS proposal area
Overall proposal boundary
Shared path (3m)
Cut
Fill
Coastal Wetlands
Coastal Wetlands Proximity Area
Potential ancillary facility

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Source: Aurecon, TfNSW, Spatial Services, Nearmap

1:625
0 10 20m

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 6-3: Key features: EIS proposal area 3

6.2 Design

The following sections detail the major design features of the project in relation to the EIS proposal.

6.2.1 Proposal footprint

EIS proposal area 1

- Area to be acquired for the proposal and would partially remain part of the operational road corridor
- Permanent features include: embankments, part of the Henry Lawson Drive upgrade, extended drainage infrastructure and water quality treatment, any new road furniture including lighting, road barriers etc.
- The adjusted shared use path along the Georges River, while constructed as part of the proposal, would revert to Canterbury Bankstown City Council management upon completion.

The EIS proposal area 1 is around 2,320 square metres.

EIS proposal area 2

- Area to be acquired for the proposal and remain part of the operational road corridor
- Permanent features include: embankments, part of the Milperra Road westbound lane, a new bus stop, section of new footpath to the bus stop, extended stormwater drainage infrastructure and scour protection, any new road furniture such as road safety barriers.

EIS proposal area 2 is located on Milperra Road adjacent to the Bankstown Golf Course. EIS proposal area 2 is in the eastern portion of the overall proposal boundary, on the southern side of Milperra Road. EIS proposal area 2 is around 367 square metres.

EIS proposal area 3

- Area to be acquired for the proposal and would partially remain part of the operational road corridor.
- Permanent features include: embankments, part of the Henry Lawson Drive upgrade.
- Once construction is completed, a portion of the EIS proposal area 3 on Lot 16//DP 18399 (that forms part of the ancillary facility) would be passed onto Canterbury Bankstown City Council as part of the voluntary buyback scheme for properties within the floodplain.

EIS proposal area 3 is located on Henry Lawson Drive opposite Auld Avenue. EIS proposal area 3 is in the southern portion of the overall proposal boundary, on the eastern side of Henry Lawson Drive. EIS proposal area 3 is 163 square metres.

6.2.2 Intersections and interchanges

There are no intersections and interchanges proposed within the three EIS proposal areas. However, EIS proposal area 1 is influenced by the Tower Road intersection. The upgrade of this intersection has required that the shared path along the Georges River be shifted closer to the Georges River to maintain connectivity and still provide access across Henry Lawson Drive at this intersection.

Further details on intersection upgrades are provided in the REF.

6.2.3 Drainage and water quality

The drainage design of the overall proposal would be developed to provide road immunity above a 20-year average recurrence interval (ARI) flood event. To achieve this, existing cross drainage structures would be utilised where possible (and extended where needed), while new pit and longitudinal drainage pipe networks would be required.

The overall proposal includes drainage adjustments and the extension of the culverts within EIS proposal area 1 and 2. For EIS proposal area 1, the existing 1.2 metre high by 2.4 metre wide culvert that passes underneath Henry Lawson Drive, north of Tower Road would be extended. For EIS proposal area 2, the existing dual 1.2 metre box culvert passing under Milperra Road would be extended. This is shown in Figure 6-1 and Figure 6-2.

During detailed design, scour protection and energy dissipation measures would be incorporated into the design of the drainage outlets to manage localised increases in flow velocity.

EIS proposal area 3 would not have any drainage infrastructure constructed on the site.

A series of vegetated swales and bio-retention systems would be provided at locations in and near the EIS proposal areas. A vegetated swale would be constructed in EIS proposal area 1. These water quality treatments would be further developed during the detailed design phase.

Operational water quality treatment features that interact with the EIS proposal areas are shown in Figure 6-1.

6.2.4 Active and public transport features

Shared use path

Through the EIS proposal area 1, a section of shared use path would be constructed. To the north, the path would connect to the existing path, and to the south, it will connect into reconstructed path as part of the overall proposal. Together these form the reconstruction of a section of shared path that runs alongside the Georges River. This path would be constructed similar to the remainder of the path with a width of 2.5 metres and using similar materials.

Pedestrian footpaths

In EIS proposal area 2, a section of footpath would be constructed that would terminate at the new bus stop. This footpath would connect into the footpath being constructed as part of the overall proposal. Together, this footpath forms a new connection from the Henry Lawson Drive/Milperra Road intersection to the new bus stop. This footpath would be 3.5 metre wide.

Bus stop

The existing bus stop (westbound) on Milperra Road would be moved 20 metres to the east. Features of the bus stops would be similar to existing, including bus stop signage and timetables. Bus stops have been retained on Milperra Road to service potential future patronage for the Bankstown Airport redevelopment.

6.2.5 Connections to existing roads and tie-ins

Tie-ins that would be relevant to the EIS proposal include:

- At the northern extent of the EIS proposal area 1, the overall proposal would tie into the existing Henry Lawson Drive
- At the eastern extent of the EIS proposal area 2, the overall proposal would tie into the existing Milperra Road.

The tie-ins would involve minor pavement works and lane marking alterations.

6.2.6 Roadside furniture and lighting

Ancillary work for the overall proposal includes road furniture, which would occur in EIS proposal areas.

Street lighting is likely to be included in EIS proposal area 1 (opposite Tower Road) and EIS proposal 2 (lighting required to the end of the left slip lane where the bus stop is to be relocated). While street lighting may be required near EIS proposal area 3, due to the nearby Auld Avenue intersection, no street lighting would be required on the actual area.

Other road furniture such as safety barriers (where required) would also be installed in EIS proposal area 1 and EIS proposal area 2. Bus stop infrastructure would also be installed on EIS proposal area 2.

6.2.7 Utility services

Public utility adjustments and relocations would be required for the overall proposal. This would include:

- Electricity supply and street lighting
- Gas
- Telecommunications
- Water and sewer
- Stormwater.

Generally, utility relocations and adjustments along Henry Lawson Drive would largely occur on the eastern side with utilities on the western side of the road mostly to be retained unless specified in further investigations or designs.

Proposed adjustments would be finalised in consultation with utility providers during detail design.

6.2.8 Property access and acquisition

The EIS proposal would require both full and partial property acquisition. Permanent acquisition and temporary lease arrangements would be required. Indicative acquisition and leases are detailed in Table 6-1.

Table 6-1 Property acquisition

Lot/DP	Owner	Acquisition type	Land use zone (LEP)	Area (m^2)	Property area (m^2)
EIS proposal area 1					
No DP available	Crown waterway	Partial acquisition	RE1/SP2	413	N/A
No DP available	Crown waterway	Lease	RE1	115	N/A
Lot 1//DP342399	Council	Partial acquisition	SP2	728	6956
Lot 14//SP1128950	Council	Partial acquisition	RE1/SP2	1436	Georges River
		Lease	RE1	330	
EIS proposal area 2					
3//DP1103168	Crown	Partial acquisition	RE1	260	56,000
EIS proposal area 3					
16//DP18399	Private	Full acquisition	RE1	3000	3000
17//DP18399	Council	Partial acquisition	RE1	35	3200
		Lease	RE1	8.6	3200

The property acquisition process would be undertaken in accordance with the *Land Acquisition Policy and the Land Acquisition (Just Terms Compensation) Act 1991* and Land Acquisition Reform 2016. Throughout the detailed design phase, the extent of property acquisition would be refined and consultation with relevant property owners would occur to develop property adjustment plans.

The acquisition and lease of these properties would be undertaken in accordance with the legislative requirements as listed *Crown Lands Management Act 2016*.

The proposal would require a partial property acquisition of a property that is subject to an Aboriginal claim land. Transport would continue to consult with Local Land Councils during the detailed design phase to minimise impacts to any Aboriginal land claim land.

6.2.9 Pavement

The overall proposal would use the existing pavements as much as possible to avoid the need for extensive new pavement layers along Henry Lawson Drive and Milperra Road.

All pavement sections that intersect the EIS proposal areas are all sections of new pavement (ie where widening of the road surface would occur). As such, in these areas, a full depth flexible pavement would be constructed to match the same road level as the rehabilitated pavement.

6.3 Design criteria

6.3.1 Design standards and criteria

The overall proposal has been designed to satisfy relevant standards and applications, including:

- Published Transport supplements to Austroads Guides
- Austroads Road Design Guides
- Australian Standards.

Specific design criteria for the elements of the overall proposal are presented in Table 6-2.

Table 6-2 Overall proposal design criteria

Design element	Location	Design criteria
Carriageway	Whole alignment	Two-lane dual carriageway
Design speed	Henry Lawson Drive	70km/h
	Newbridge Road and Milperra Road	80km/h
Posted speed	Henry Lawson Drive	60km/h
	Newbridge Road and Milperra Road	70km/h
Through lane widths	Henry Lawson Drive	3.5 metres 4 metres for kerb side lanes
	Milperra Road and Newbridge Road	3.2 metres eastbound 3.3 metres westbound Retention of wider kerbside lane
Turning lane width	Throughout project (Excluding the dual right turn lanes from Newbridge Road)	3.3 metres
	Dual right turn lanes from Newbridge Road into Henry Lawson Drive	3 metres
Shoulder width	Proposed new northbound Auld Avenue Bride	0.5 metres in front of proposed bridge barrier 0.7 metres along both sides of carriageway in front of proposed barriers

Design element	Location	Design criteria
	Henry Lawson Drive north of Tower Road	2.0 metres on northbound lanes 1.0 metres southbound
Median widths	Throughout proposal	Type SF kerb 0.5 to 7 metres throughout project 1.5 metres at signalised intersections 0.5 metres at isolated locations generally at the end of right turn bays
Pedestrian and cycle footpaths	Western side of Henry Lawson Drive from Tower Road to Keys Parade	3.0 metres wide shared path
	Eastern side of Henry Lawson Drive from Tower Road to Milperra Road	Proposed pedestrian footpath. Size to be confirmed at a later stage.
Batter	Throughout the project	4:1
	The southern side of Milperra Road in areas adjoining or near Coastal Wetlands The east and western side of Henry Lawson Drive north of Tower Road	2:1 2:1
Safety barriers	Safety barriers to be installed in critical areas along the alignment. 4:1 batter has been adopted for most of the project to minimise need for excessive safety barriers	Combination of steel safety barriers and crash cushions.
Pavement	Across the project area	Dense grade asphalt

6.3.2 Urban design principles and objectives

Urban design and landscaping along the proposal alignment would be designed to minimise the need for maintenance and to avoid any possible impacts to sight distance, particularly around driveway accesses.

The urban design and landscaping principles guiding the design have been outlined in Section 4.3.

6.3.3 Landscape framework

A Landscape Strategy Plan has been prepared for the overall proposal. This Strategy Plan has been developed to achieve an integrated outcome that helps fit the overall proposal as sensitively as possible into its context and to minimise the impacts of the overall proposal on the existing landscape character.

For and adjacent to the EIS proposal areas, particularly in EIS proposal area 1, revegetation would seek to use the same species as those removed to match the existing vegetation communities.

Progressive landscaping would be undertaken throughout the construction.

6.4 Construction works

The construction methodology outlined in the following sections discusses the construction of the overall proposal. These sections address those elements which would be constructed on the EIS proposal area. Description of the construction of other components of the overall proposal are presented in the REF.

Construction of the overall proposal is expected to commence in early 2023 and would take about 2 years to complete.

6.4.1 Construction footprint

A construction footprint has been developed for the overall proposal to cover all works and construction activities (referred to as the overall proposal boundary on Figure 1-3). The EIS proposal areas form the construction footprint for those works that fall within coastal wetlands (refer to Figure 6-1, Figure 6-2 and Figure 6-3). The area of coastal wetland impacted from the EIS proposal is about 0.26 hectares. In general, the construction footprint has assumed a five metre buffer from the edge of design, but also takes into account ancillary facilities and works areas for equipment and machinery. Where possible, the footprint has been developed to minimise environmental impacts to the coastal wetlands. During detailed design, this may be refined again to further reduce impacts.

6.4.2 Overview of construction activities

Construction activities and methods to be employed for the EIS proposal would be consistent with those for the overall proposal. This is largely due to the small scale of the area comprising the EIS proposal, being limited to embankment works, road widening, pedestrian and cyclist facilities, road furniture and use as an ancillary facility site. Construction activities would be carried out in accordance with a construction environmental management plan (CEMP) to ensure work complies with Transport's commitments and legislative requirements. Detailed work methodologies would be identified by the construction contractor.

The proposal is expected to involve the following activities:

- Preliminary works: establishment works including ancillary facilities, construction access areas and the implementation of environmental, traffic and pedestrian controls, existing building and fencing removal, clearing and grubbing
- Utility adjustment works
- Earthworks
- Widening and pavement works
- Drainage works
- Pedestrian pathway and shared path works
- Landscaping and finishing works
- Removal of ancillary facilities and site rehabilitation.

These construction activities are described in further detail in Table 6-3.

Table 6-3 Proposed methodology for each construction activity

Activity	Proposed methodology
Preliminary works	• Installation of construction boundary hoarding/fencing • Installation of sediment and erosion controls • Vegetation removal and grubbing works • Establishing ancillary facilities, designated laydown areas and services required for these facilities (eg communication, water, electrical and security) • Adjusting existing fencing structures • Installation of temporary traffic and pedestrian controls

Activity	Proposed methodology
Utility works	• Preconstruction utility location identification • Protection of services where required • Adjusting, relocation and installation of services • Testing and commissioning of services • Reinstatement of surfaces, including backfill and compaction
Earthworks	• Site inspection and survey • Removal of topsoil, stockpiling and/or disposal if weed affected • Cut to subgrade • Foundation treatments, where required • Grading and compaction of materials to required levels
Widening and pavement works	• Install new kerb and gutter as required
Drainage works	• Upgrade stormwater drainage and install environmental controls as required • Excavation of trenches and pits for drainage, delivery of and placement of precast pipe and pits, filling of trenches and compaction.
Pedestrian pathway and shared path works	• Survey and set-out of formwork • Cut to level and graded • Construction of pathways

Landscaping and finishing works	• Progressive landscaping would be undertaken throughout the construction. This would include:
	  • Spreading of topsoil and mulch
	  • Planting
	• Finishing works would include:
	  • Installation of new street lighting, road furniture and signage.
	  • Line marking
	  • Removal of all traffic management devices and environmental controls.

Removal of ancillary facilities and site rehabilitation	• Relocation/decommissioning of utilities and services • Decommission and removal of site offices, equipment, and materials at completion, including demolition of existing buildings and structures no longer required at the Henry Lawson Drive ancillary facility in consultation with Council • Restore ground surface and rehabilitate

6.4.3 Construction ancillary facilities

To support construction for the overall proposal, a range of ancillary facilities would be required. Three ancillary facilities have been indicatively identified for the overall proposal.

The facilities would include:

- Site compounds for site offices, car parking, sheds, workshops, and storage
- Areas for material delivery and storage, including Auld Avenue bridge structural elements
- Water capture and treatment locations
- Stockpile locations for materials spoil and mulch.

Ancillary facilities would be temporary sites and structures and would be developed for the sole purpose of the construction of the proposal and be returned to pre-existing conditions or rehabilitated.

EIS proposal area 3 partially comprises land that would be part of the ancillary facility (Henry Lawson Drive site), along its southern property border (refer to Figure 6-3). The Henry Lawson Drive site is located on residential land, Lot:16/DP18399 and would be acquired for the overall proposal.

The Henry Lawson Drive site is about 2,900 square metres, of which 162.76 square metres is within EIS proposal area 3. The eastern border of the site is comprised of a vegetated creekline and grassed areas that connects to Bankstown Golf Course. This site is the least likely to flood, so is more suited for loose material storage than other areas. However, these would all be appropriately bunded and secured to avoid flood impacts from minor floods and so as to not impact the adjoining wetlands.

If possible, the existing structure would be used to form part of the main office space.

Access to the site would be off Henry Lawson Drive via a left in/left out arrangement. Larger trucks and deliveries would require traffic controls to access the site.

Potential uses for this ancillary site include:
- Site staff parking
- Main site offices
- Materials storage
- Storage of topsoil, imported material, green waste.

The Henry Lawson Drive ancillary facility has been identified by Canterbury Bankstown City Council as a property that is part of the voluntary purchase Scheme as it is located in a flood prone area. Transport would consult with Canterbury Bankstown City Council and the DPIE – Environment, Energy and Science (former Office of Environment and Heritage) (EES) during detailed design to determine site restoration requirements for this site, which may include the removal of the existing dwelling and associated structures, following the completion of construction.

There is also an ancillary facility that is located directly south of EIS proposal area 1. The Georges River site is covered in detail in the REF; however, it is recognised that the proximity to the Georges River means that proposed uses on this site are limited to avoid the potential for materials moving off site. Potential uses for this ancillary site include:
- General material storage (no fuel or hazmat-based materials)
- Site staff parking
- General waste storage (appropriately bunded or secured) and pick up bay.

6.4.4 Traffic management and access

The overall proposal is expected to generate traffic movements during construction associated with the following activities:
- Delivery of construction materials including concrete and precast structural elements
- Spoil removal
- Importation of fill material for earthworks
- Delivery and removal of construction equipment and machinery
- Construction worker labour force travelling to work and during work.

Access for pedestrians and to public transport would be maintained around the construction site during construction. Bus stops on Milperra Road would be moved to allow for safe access (EIS proposal area 2). Detours for pedestrian/cyclist access would be implemented within the proposal area. In regard to the existing shared user path along Georges River near Tower Road and near Newbridge Road for EIS proposal area 1, pedestrian access may be detoured or removed for part of construction. Alternative arrangements would be managed through signage and wayfinding.

Access to EIS proposal area 3, as part of an ancillary facility will be fenced for the duration of construction.

6.4.5 Workforce and construction work hours

Construction works would be undertaken in both standard hours and out-of-hours works (OOHW) for the proposal. Standard construction hours as defined in the Interim Construction Noise Guideline (DECC 2009b) (ICNG) are:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm
- Sunday and Public Holidays: No work.

OOHW would be required to minimise disruptions to the road network. Works undertaken out of hours of relevance to the EIS proposal are works to the Tower Road/Henry Lawson Drive. The works would be adjacent to EIS proposal area 1 but would not affect it as works would be confined to the existing or proposed road pavement.

The Henry Lawson Drive ancillary facility (part EIS proposal area 3) may be required to operate out-of-hours to support those works.

Any OOHW would be undertaken in accordance with the Construction Noise and Vibration Guidelines (Roads and Maritime 2016).

6.4.6 Plant and equipment

A range of plant and equipment would be used during construction of the overall proposal. The final equipment and plant requirements would be identified by the contractor. An indicative list of plant and equipment that would be used for each construction phase relevant to the EIS proposal is provided in Table 6-4.

Table 6-4 Indicative list of plant and equipment

Preliminary works	Vacuum truck, light vehicles, bogie tipper truck
Utility works	Vacuum truck, light vehicles, backhoe/excavator, concrete saw, daymaker, generator, crane, whacker plate, compactor, bogie tipper truck, jumping jack
Building and fencing removal	Light vehicle, vacuum truck, excavator, rigid truck, handheld tools, hammer drill, crane, bogie tipper truck
Earthworks	Excavator, grader, light vehicles, bogie tipper truck, rigid truck, backhoe/ excavator, loader, profiler, truck and dog, vacuum truck, water cart, road sweeper, daymaker, generator
Widening and pavement works	Trencher, trucks, hand held tools, angle grinder, backhoe/excavator, vacuum truck, paver and asphalt finisher, compactor, vibratory roller, concrete saw, concrete pump, concrete agitators, line marking machine, road sweeper, water cart, daymaker, generator, vibratory roller, jumping jack, grader, crane
Drainage works	Hand held tools, angle grinder, underbore directional drill, vacuum truck, rigid truck, truck and dog, light vehicle, concrete saw, concrete pump, concrete agitators, road sweeper, water cart, hiab crane, daymaker, vibratory roller, water truck, asphalt paver, grader, crane
Pedestrian pathway and shared path works	Handheld tools, angle grinder, vacuum truck, rigid truck, excavator, water cart, concrete saw, concrete pump, concrete agitators, water truck, daymaker, generator

Preliminary works	Vacuum truck, light vehicles, bogie tipper truck
Landscaping and finishing works	Grader, bobcat, trucks, handheld tools, compactor, trencher, light vehicle, bogie tipper truck, crane, whacker plate, front loader
Removal of ancillary facilities and site rehabilitation	Light vehicle, excavator, trucks, bobcat, handheld tools, crane, bogie tipper truck

6.4.7 Earthworks

The overall proposal would retain, in general, the existing road pavement and level, so that there are minimal earthworks required. However, areas of largest earthwork are adjacent to the Georges River, near Tower Road (EIS proposal area 1).

The estimated quantities of materials associated with earthworks for the EIS proposal are a fraction of that required for the overall proposal. Only 0.9 cubic metres of cutting would be required for the EIS proposal area, and 931 cubic metres of material would be required for embankments in the EIS proposal areas.

As there would be a deficit of excavated material generated to required fill material, additional material would need to be sourced from local suppliers or, preferably, from other Transport projects.

6.4.8 Source and quantity of materials

About 620 cubic metres of concrete and 15,850 cubic metres of asphalt would be required for the overall proposal. Concrete culverts and pits, along with other materials, would also be required for the overall proposal. Only a fraction of these materials would be required for the EIS proposal. These would be transported to the site and stored temporarily at ancillary sites during construction.

Materials would be sourced from appropriately licensed commercial suppliers in nearby areas where possible. None of the materials proposed to be used are considered to be in short supply.

Water demand for the overall proposal is only indicative at this stage, however given the nature and scale of the proposal, the proposal is not expected to be water intensive. Water use during construction would be minor and largely used for dust suppression and for the construction of the widened carriageway (e.g. compaction). The water requirement would vary, dependent on material sources and methodologies applied by the construction contractor, and weather conditions. Sufficient potable water would be supplied for about 70 construction staff and this is expected to be about 80 kL per annum. The proposed ancillary site on Henry Lawson Drive, for site offices, is an existing building connected to the main water supply network.

All non-potable water would be sourced from construction sediment sumps, a standpipe (if one is located nearby), local sub-contractor watercarts or an alternative nearby source. Water would be sourced responsibly and in accordance with any water restrictions at the time of construction, or relevant exemptions would be sought. The proposal does not propose to extract water or to apply for a licence to extract water for construction needs or for domestic purposes. Water requirements and water supply options would be further investigated during detailed design.

Spoil and waste disposal

Where possible, cut material would be re-used on site. However, if material is not suitable, it would be classified in accordance with the NSW Environmental Protection Authority (EPA) Waste Classification Guidelines (EPA 2014) and disposed of at an approved materials recycling or waste disposal facility.

6.5 Staging

Construction staging of the overall proposal would be determined by the construction contractor. However, it is anticipated that works for the overall proposal (Stage 1A) would be undertaken in one construction stage, with the potential for early works.

The early works would take place prior to the formal approval of construction management plans and would be managed by a separate 'Early works environmental management plan'.

Early works may include:

- Establishment works including ancillary facilities
- Utility relocations
- Construction access areas and the implementation of environmental, traffic and pedestrian controls
- Existing fencing removal
- Clearing and grubbing.

During the main construction works, works would need to be staged to maintain traffic flow along the corridor. An indicative construction staging would be:

- Stage 1 – Auld Avenue bridge construction. All lanes to be retained for construction.
- Stage 2 – Widening north of Auld Avenue on the western side to cater for the 4 lanes of traffic. Also, widening to the north of Tower Road on the southbound lanes. All lanes to be retained during construction.
- Stage 3 – Widening along Milperra Road, Henry Lawson Drive southbound and northbound near Tower Road. Most lanes to be retained except for the right turn lane from Milperra Road into Henry Lawson Drive. The 320 metres right turn bay will be reduced down to 170 metres during stage 3 to provide width for widening on the southern side.
- Stage 4 – Widening along the western side of Henry Lawson Drive northbound and along Milperra Road to the northern side.

Detailed activities involving the construction staging and work sequencing would be further developed in detailed design and confirmed once construction contractors have been engaged.

7 Stakeholder and community engagement

Secretary's requirements	Where addressed in EIS
During the preparation of the EIS, consultation must occur with the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. The following parties were identified as those who should be consulted with.	
Environment, Energy and Science Group (Biodiversity and Conservation, and Environment Protection Authority); Regions, Industry, Agriculture and Resources Group (former Department of Industry) of the Department Planning, Industry and Environment	Section 7.2.3
Department of Premier and Cabinet (Heritage)	Section 7.2.3
Rural Fire Service	Section 7.2.3
Fire & Rescue NSW	Section 7.2.3
Canterbury Bankstown City Council	Section 7.2.3
Bankstown Airport	Section 7.2.3
SW SES	Section 7.2.3
Sydney Water	Section 7.2.3
Special interest groups, including the Gandangara Local Aboriginal Land Council and Registered Aboriginal Parties	Section 7.2.2 and 7.2.3
The surrounding landowners and occupiers that are likely to be impacted by the overall proposal	Section 7.3.2

This chapter discusses the overall proposal's consultation to date, as well as future consultation activities.

7.1 Consultation objectives and strategy

The *Henry Lawson Drive Upgrade Stage 1A: Communication and Consultation Strategy* (consultation strategy) has been implemented for the overall proposal. The objective of the consultation strategy is to ensure local residents, businesses and stakeholders are aware of and are consulted during the development and delivery of the upgrade. This includes during the development of the concept design, environmental assessment, detailed design and construction phases.

The consultation strategy outlines Transport's milestones, methods and reporting. Communication and consultation milestones include (but are not limited to):

- Consultation and reporting on the early concept design (completed 2020)
- Consultation with affected residents, businesses and stakeholders for the preparation of the SEARS report (completed 2020)
- Public display of the REF and EIS (expected mid-2021), which would include:
  - Notifications
  - Engagement with local council
  - Project web portal
  - Public meetings and/or community information events (virtual or otherwise)
  - Publication of frequently asked questions (FAQ) documents

    - Briefing notes
    - Media engagement
    - Publication of outcomes
- Targeted community and stakeholder consultation during the detailed design phase
- Public engagement during construction:
    - Advanced/start of work notifications
    - Traffic management notifications, including any lane closures
    - Night time work notifications and consultation
    - Quarterly project updates
    - Responding to enquiries and complaints
    - End of construction
- Ongoing construction communications (jointly provided by Transport and the construction contractor).

7.2 Consultation process and activities to date

7.2.1 Consultation overview

Communication and consultation milestones include (but are not limited to):

- Consultation and reporting on the early concept design (completed 2020)
- Consultation with affected residents, businesses and stakeholders for the preparation of the SEARs report (completed 2020).

Other activities include (but are not limited to) separate engagement with local residents, businesses and stakeholders on specific or sensitive aspects of the project.

7.2.2 Aboriginal cultural heritage consultation

Aboriginal community consultation carried out to date for the proposal has involved:

- A site survey undertaken in consultation with Aboriginal stakeholders for Stage 2 of the Aboriginal Cultural Heritage Assessment Consultation and Investigation (PACHCI) assessment. For this stage, Transport (previously Roads and Maritime) organised the involvement of representatives from the Gandangara Local Aboriginal Land Council (GLALC) and Deerubbin Local Aboriginal Land Council (DLALC). Individuals from both land councils were consulted to assist in the field survey and to identify whether the study area held any sites and/or values known to the local Aboriginal community. The results of the survey were also presented to Aboriginal representatives at the end of each day for review and discussion. The findings from this site assessment are documented in the Henry Lawson Drive Upgrade (Hume Highway to M5) Aboriginal Archaeological Survey Report (Kelleher Nightingale, 2018).
- As part of the Aboriginal cultural heritage assessment report (CHAR) prepared in accordance with Stage 3 of the PACHCI, formal consultation was undertaken with Aboriginal stakeholders. Transport invited Aboriginal people who hold knowledge relevant to determine the cultural heritage significance of Aboriginal objects and Aboriginal places in the area to register an interest in a process of community consultation. The investigations included consultation with 18 Aboriginal community groups and individuals. All stakeholders were also provided with a copy of the proposed test excavation methodology and CHAR methodology. Eight formal responses were received, with all stating support or agreement with the proposed assessment methodology.

The formal consultation process for the CHAR has included:

- Advertising for registered Aboriginal parties
- Government agency notification letters
- Notification of closing date for registration
- Provision of proposed assessment methodology
- Ongoing compilation of registrants list, through continuing to register individuals and groups for consultation on the project

- Provision of draft CHAR for review
- An Aboriginal Focus Group meeting to discuss investigation results in September 2020, draft CHAR and detailed mitigation strategies
- Ongoing consultation with the local Aboriginal community.

For the overall proposal, Transport has consulted with the 18 Aboriginal community groups and individuals:

- GLALC
- A1 Indigenous Services
- Barking Owl Aboriginal Corporation
- Barraby Cultural Services
- Butucarbin Aboriginal Corporation
- Cubbitch Barta Native Title Claimants Aboriginal Corporation
- Darug Aboriginal Cultural Heritage Assessments
- Darug Land Observations
- Didge Ngunawal Clan
- Kawul Cultural Services
- Merrigarn
- Murra Bidgee Mullangari
- Wingikara
- Woronora Plateau Gundangara Elders Council
- Wurrumay Consultants
- Yulay Cultural Services
- Yurrandaali Cultural Services
- Registered Aboriginal Stakeholder (details withheld).

7.2.3 Consultation undertaken before preparation of the EIS

Transport undertook community consultation around the concept design for the overall proposal in February 2020.

Community consultation and community engagement was carried out to understand community views and values so that feedback could be considered in further development of the concept design. Community consultation aimed to seek comments, feedback, ideas, and suggestions on the proposed early concept design features, identify and contact any potentially affected residents and stakeholders, and to build a comprehensive database of any interested and concerned community members.

Throughout the consultation period, there was a community update that occurred via a letterbox distribution to 5500 local properties. During this period there were 78 comments/submission received.

Community consultation on the early concept design was done over a period of 28 days. The consultation report was prepared in July 2020 and is placed on the project website (https://www.rms.nsw.gov.au/projects/henry-lawson-drive/index.html).

7.2.4 Consultation undertaken during preparation of the EIS

Transport undertook further consultation in September – October 2020 for the overall proposal to satisfy the SEARs. The consultation was in the form of a letter containing a description of the proposal, an illustration of the proposal key features and an outline of the environmental assessment of the concept design. The consultation letter invited feedback from residents, businesses, local Aboriginal representatives, and government agencies for consideration in the REF and EIS.

Transport has also consulted with Canterbury Bankstown City Council on an ongoing basis for the proposal and NSW State Emergency Service, as part of the REF Proposal's ISEPP requirements.

A summary of the consultation undertaken during preparation of the EIS is shown in Table 7-1.

Table 7-1 Consultation undertaken during preparation of the EIS

Community/stakeholder group	Consultation activities
Canterbury Bankstown City Council	Multiple project briefings and meetings through late 2019 to mid-2021. Sharing of data and information to support impact assessment studies. Invitation to comment on study methodologies. ISEPP consultation letter – September 2020 Meeting with Council and SES – September 2020
NSW State Emergency Service	ISEPP consultation letter – September 2020 Meeting with Council and SES – September 2020
DPIE – Transport Assessments	Consultation letter – September 2020
DPIE - EES - Biodiversity and Conservation	Consultation letter – September 2020
EES - EPA	Consultation letter – September 2020
DPIE - Regions, Industry, Agriculture and Resources - Department of Primary Industries - Fisheries	Consultation letter – September 2020
DPIE - Regions, Industry, Agriculture and Resources - Water	Consultation letter – September 2020
Department of Premier and Cabinet (Heritage)	Consultation letter – September 2020
Rural Fire Service	Consultation letter – September 2020
Fire & Rescue NSW	Consultation letter – September 2020
Bankstown Airport	Consultation letter – September 2020 Ongoing project and interface meetings through concept and detailed design.
Sydney Water	Consultation letter – September 2020
GLALC	Aboriginal Focus Group Meeting – September 2020 Invitation to comment on CHAR
Registered Aboriginal Parties	Aboriginal Focus Group Meeting – September 2020 Invitation to comment on CHAR. See Section 7.2.2
Residents (Henry Lawson Drive and Auld Avenue)	Consultation letter – September 2020
Businesses (ALDI, BP Station, KFC, Hungry Jacks, Flower Power, Bankstown Golf Course and Georges River Golf Course)	Consultation letter – September 2020

7.3 Summary of issues raised

7.3.1 Issues raised by government agencies

The issues raised by government agencies relevant to the EIS proposal, during all consultation efforts for the overall proposal and where these are addressed in the EIS is summarised in Table 7-2.

Table 7-2 Summary of issues raised – local, State and Commonwealth government authorities

Stakeholder	Issues raised	Where addressed in EIS
Canterbury Bankstown City Council	The need to adequately assess the ongoing and accumulative impacts of the works on the coastal wetlands vegetation community	Section 8.1 Biodiversity and Section 9.6 Cumulative impacts
DPIE – Crown Lands	Confirmation that if Lot 3 DP 1103168 and Lot 292 DP 41530 are affected, as Crown land they will need to be compulsory acquired under the provisions of the *Land Acquisition (Just Terms) Compensation Act 1991*.	Section 6.2.8 Property access and acquisition
DPI Fisheries	Contamination and soil quality – requested that the possible downstream impacts of contaminated soil to aquatic ecology be considered during and post construction.	Section 8.4 Contamination and soil quality
	Biodiversity – requested that a riparian revegetation plan be compiled to extend across the entire development footprint.	Section 8.1 Biodiversity
	Coastal processes – requested that the downstream effects of changes to the flow regime due to bank works be considered, and that habitat friendly in water structure be considered.	Section 8.5 Coastal processes
	Environmental monitoring and management – noted that offsets under the *Fisheries Management Act (1994)* may also be required.	Section 8.1 Biodiversity
NSW EPA	Contamination and soil quality – requested that the need for remediation of the land is identified and document how remediation would be undertaken in accordance with current guidelines.	Section 8.4 Contamination and soil quality
	Groundwater and surface water – requested update in references to the ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.	Section 8.7 Groundwater and surface water

In addition, Canterbury Bankstown Council reviewed the draft EIS and accompanying draft technical working papers. Council's feedback was considered in the finalisation of this EIS and technical working papers and Transport has provided a response directly back to Council.

7.3.2 Issues raised by the community

Feedback from the early concept design community consultation and follow up consultation in September 2020 did not include any feedback on impacts to coastal wetlands (specifically for the EIS proposal).

The key issues raised on the overall proposal relate to the scope of the Stage 1A upgrade and proposed widening, design alterations/options including consideration of an underpass or overpass, changes to Auld Avenue, access to properties as well as other design suggestions for consideration. Refer to Chapter 5 and Table 5-2 of the REF for a summary of the issues raised by the community and where the issues are addressed in the REF.

7.3.3 Issues raised by the Aboriginal community

Feedback from the Aboriginal Focus Group meeting did not include any feedback on impacts to coastal wetlands (specifically for the EIS proposal).

The key issues raised on the overall proposal at this meeting related to:

- Questions on the age of the trees affected
- The mitigation measures in Stage 1A if potential archaeological deposits (PADs) would be affected in future stages of the corridor upgrade
- The mandatory training on unexpected heritage finds
- Whether there was also potential for discoveries in the sand deposits
- Potential for burials deeper down than the test excavations.

7.4 Future consultation

Transport will continue to identify and manage issues of interest or concern to the community during the assessment and approval process and, if the project is approved, during its construction. The aims of ongoing communications and consultation are to provide the community with:

- Accurate and accessible information regarding the processes and activities associated with the project
- Information in a timely manner
- Appropriate avenues for providing comment or raising concerns, and to ensure they are aware of the avenues
- A high level of responsiveness to their issues and concerns throughout development and delivery of the project.

7.4.1 Consultation during the exhibition of the environmental impact statement

Canterbury Bankstown City Council as the consent authority will place this EIS on public exhibition in accordance with the requirements of Part 4 of the EP&A Act. The EIS exhibition period will occur in parallel with the REF display.

The EIS will be advertised and placed on public exhibition for a minimum of 28 days.

The EIS is on display for comment between Wednesday 4 August 2021 and Friday 17 September 2021. You can access the document on the Canterbury Bankstown Council website: haveyoursay.cbcity.nsw.gov.au

(To request a printed version of the document, contact the Henry Lawson Drive upgrade project team by telephone on 1800 951 218 or email henrylawsondrive@transport.nsw.gov.au)

Feedback on the EIS proposal must be sent to Canterbury Bankstown Council. Please send your written comments to:

By post:
Mr Matthew Stewart
General Manager
City of Canterbury Bankstown
PO Box 8
Bankstown NSW 1885

By email:
haveyoursay@cbcity.nsw.gov.au

Any submissions would be considered by Council as part of their approval process. For further information on consultation activities undertaken for the project or to make a submission on the EIS, go to Council's website (haveyoursay.cbcity.nsw.gov.au).

7.4.2 Consultation during construction stages

Community involvement through the construction phase for the overall proposal would be undertaken by Transport and the construction contractor. Activities/notifications that could occur include:

- Advanced/start of work notifications
- Traffic management notifications, including any lane closures
- Night time work notifications and consultation
- Quarterly project updates
- Responding to enquiries and complaints
- End of construction
- Ongoing construction communications.

Other activities include (but are not limited to) separate engagement with local residents, businesses and stakeholders on specific or sensitive aspects of the overall proposal (eg – continued access to Auld Avenue, property adjustments including continued driveway access for residential properties).

8 Assessment of key issues

This chapter provides an assessment of the key environmental issues for the project as identified in the SEARs and as per the relevant requirements of Schedule 2, Part 3 of the Environmental Planning and Assessment Regulation 2000.

For the purposes of this assessment, only direct and indirect impacts of activities within the EIS proposal areas have been included. For each key issue the existing environment is described, the potential impacts (both direct and indirect) of the EIS proposal during construction and operation are assessed, the influence of relevant planning matters are considered and proposed management and mitigation measures are described. Cumulative impacts of the environmental issues for the EIS proposal are considered in Section 9.6 and the proposed management and mitigation measures chapter are collated in Chapter 10.

8.1 Biodiversity

Secretary's requirements	Where addressed in EIS
Biodiversity – including: • a detailed assessment of the ecological value and potential impacts of biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act). If the proposed development is likely to significantly affect threatened species, the application for development consent is to be accompanied by a Biodiversity Development Assessment Report (BDAR) prepared in accordance with Part 6 of the BC Act, and • a detailed assessment of the potential impacts (direct and indirect) to coastal wetlands and aquatic species/habitats listed under the *Fisheries Management Act 1994* and any offset requirements resulting from this assessment.	Section 8.1 Section 8.1.4

8.1.1 Assessment methodology

A biodiversity assessment report has been prepared for the overall proposal (discussed in the REF) and a BDAR has been prepared for the EIS proposal. The BDAR is discussed in this section.

The following activities were undertaken to complete the BDAR:

- Desk-based searches of relevant databases and historical records
- Field inspections of the study area to identify and assess biodiversity values in accordance with Stage 1 (Biodiversity assessment) and Stage 2 (impact assessment (biodiversity values and prescribed impacts)) of the Biodiversity Assessment Methodology (BAM)
- An assessment of 'likelihood of occurrence' following the collation of database records and species and community profiles
- Assessing the potential impacts to flora, fauna, migratory and aquatic species including assessments of significance where required
- Assessing the potential impacts to the coastal wetlands
- Identification of construction and operational management measures as well as the need for biodiversity offsets.

Field investigations undertaken for the assessment included:

- Initial native vegetation surveys undertaken by WSP (2019) over an eight-day period on the 21 to 25 May and 31 May, 1 June and 21 of June 2018

- Additional field surveys were undertaken on the 6 April and 7 April 2020. The focus of these surveys was to fulfil any requirements of the BAM within the subject land (including additional BAM Vegetation Integrity plots) as well as ground-truth the results of the background research, habitat suitability assessments, presence of threatened species and breeding habitat features for candidate threatened fauna.

8.1.2 Existing environment

Landscape

The EIS proposal areas are located within the Sydney Basin Bioregion/Cumberland subregion within the Georges River Alluvial Plain. Within a 1,500-metre buffer area of the overall proposal, native vegetation cover has been identified as 18 per cent, and the cleared areas are associated with residential housing in the suburbs of Georges Hill, Bankstown Aerodrome and Milperra.

Nearby watercourses to the EIS proposal areas include the Georges River and Milperra Drain (that crosses Henry Lawson Drive south of Auld Avenue).

There are several Coastal Management SEPP listed coastal wetlands and associated proximity buffers within the overall proposal study area. The EIS proposal areas comprise around 0.26 hectares of coastal wetlands listed under the Coastal Management SEPP.

The native vegetation within the overall proposal study area provides connectivity to large patches of remnant native vegetation further north to Landsdowne Reserve and patches fringing Georges River.

The biodiversity constraints are shown for EIS proposal area 1 in Figure 8-1, EIS proposal area 2 in Figure 8-2 and EIS proposal are 3 in Figure 8-3.

Native vegetation

Four NSW Plant Community Types were recorded within the EIS proposal areas. These are:

- PCT 781: Coastal Freshwater Lagoons of the Sydney Basin and South East Corner
- PCT 835: Forest Red Gum-Rough-barked Apple Grassy Woodland on Alluvial Flats of the Cumberland Plain, Sydney Basin
- PCT 1236: Swamp Paperbark – Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion
- PCT 1234: Swamp Oak Swamp Forest Fringing Estuaries, Sydney Basin and South East Corner.

All four NSW Plant Community Types are associated with threatened ecological communities (as shown in Table 8-1).

Other areas not mapped as native vegetation within EIS proposal areas were assigned to miscellaneous ecosystem classes referred to as ‘Weeds/exotics - non-native vegetation’. EIS proposal areas 1 and 3 are partially within this miscellaneous ecosystem class. The ‘Weeds/exotics - non-native vegetation’ area impacted is only 0.01 hectares.

Threatened ecological communities

Three threatened ecological communities (TECs) listed under the BC Act were recorded within the EIS proposal areas. These are:

- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

Of these three BC Act-listed TECs, two also correspond with EPBC Act listed TECs which include:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.

Threatened species

There are no threatened flora species found within the EIS proposal areas. There are two species within the overall proposal study area. These are:

- Downy Wattle (*Acacia pubescens*) (BC Act, Vulnerable; EPBC Act, Vulnerable)
- Nettle Bottle Brush (*Callistemon linearifolius*) (BC Act, Vulnerable).

Field surveys also recorded one threatened fauna species within the overall proposal study area, being Southern Myotis (*Myotis macropus*) (listed under as Vulnerable under the BC Act). Southern Myotis were found to be roosting in a culvert in the northern section of the overall proposal study area. It is therefore considered that there is potential for the species to utilise culverts and bridges that have waterbodies within proximity. They also may utilise hollow-bearing trees that are close to waterbodies within the area (i.e. areas near Georges River). The BDAR identifies that EIS proposal areas 1 and 2 are located within the Southern Myotis habitat.

Matters of National Environmental Significance

Wetlands of International Importance

One wetland of international importance (Ramsar) occurs within 10 kilometres of the study area which is the Towra Point Nature Reserve. Towra Point Nature Reserve lies on the northern side of Kurnell Peninsula, forming the southern and eastern shores of Botany Bay. It is not located within the overall proposal study area. Additionally, the EIS proposal occurs downstream of a nationally important wetland, Voyager Point wetland.

Listed threatened ecological communities

As recognised above, there are two TECs listed under the EPBC Act recorded within the EIS proposal area. Coastal Swamp Oak is classed as Endangered under the EPBC Act (which is the threatened ecologically community with the largest extent in the EIS proposal with 0.2 hectares), while River-flat eucalypt forest is Critically Endangered under the EPBC Act. The extent of TECs that are classed as Critically Endangered under the EPBC Act within the EIS proposal is 0.022 hectares.

Listed threatened species

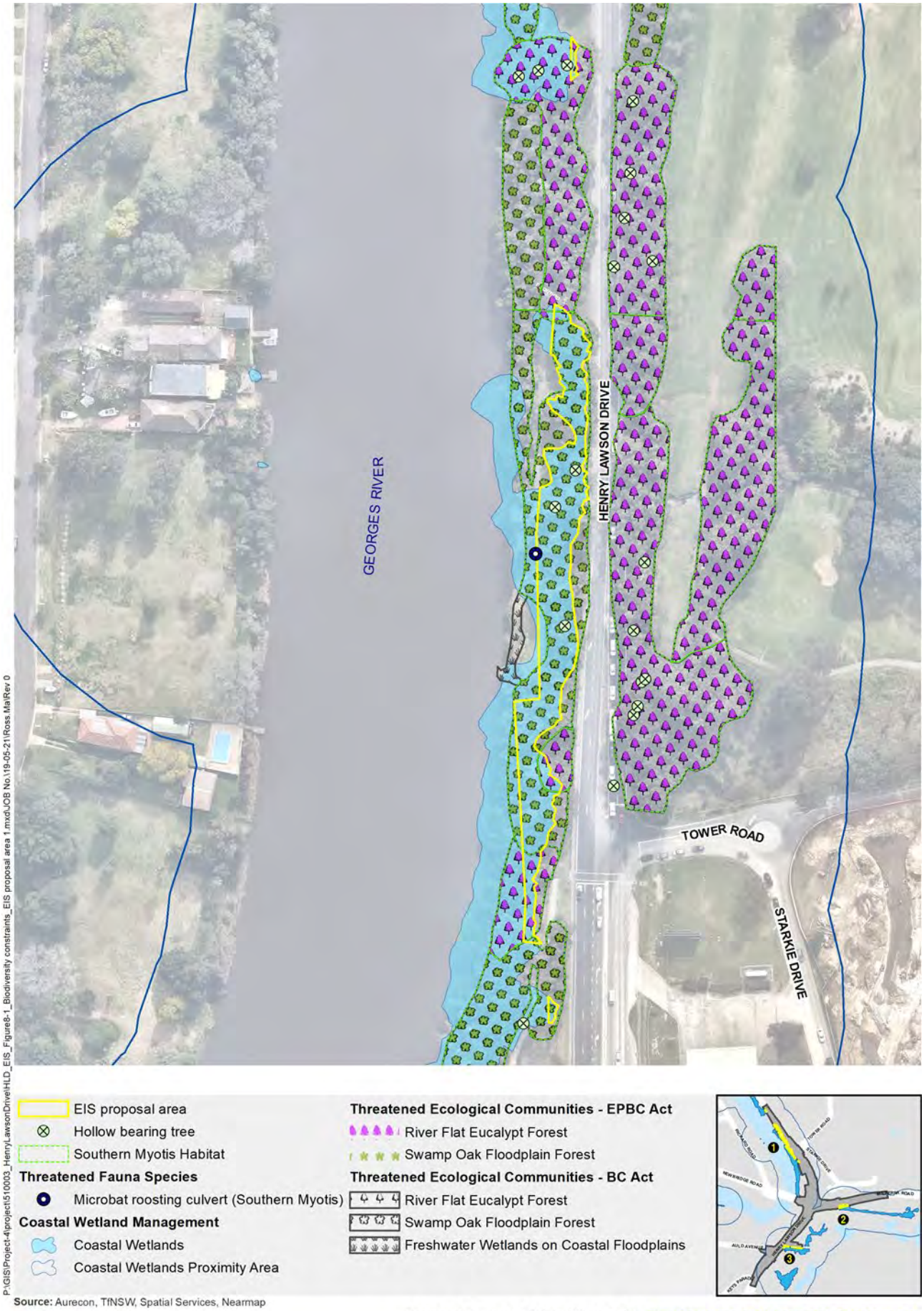
A population of Downy Wattle (listed as Vulnerable) was recorded directly adjacent to the overall proposal study area during the field survey on the southern side of Milperra Road within Ashford Reserve. Downy Wattle was not recorded within the development footprint of the EIS proposal. Threatened fauna species listed under the EPBC Act.

Two EPBC Act listed threatened fauna species that are considered at least moderately likely to occur include:

- Swift Parrot (listed as Critically Endangered): 0.24 hectares of habitat in EIS proposal area
- Grey-headed Flying-fox (listed as Vulnerable): 0.26 hectares of habitat in EIS proposal area.

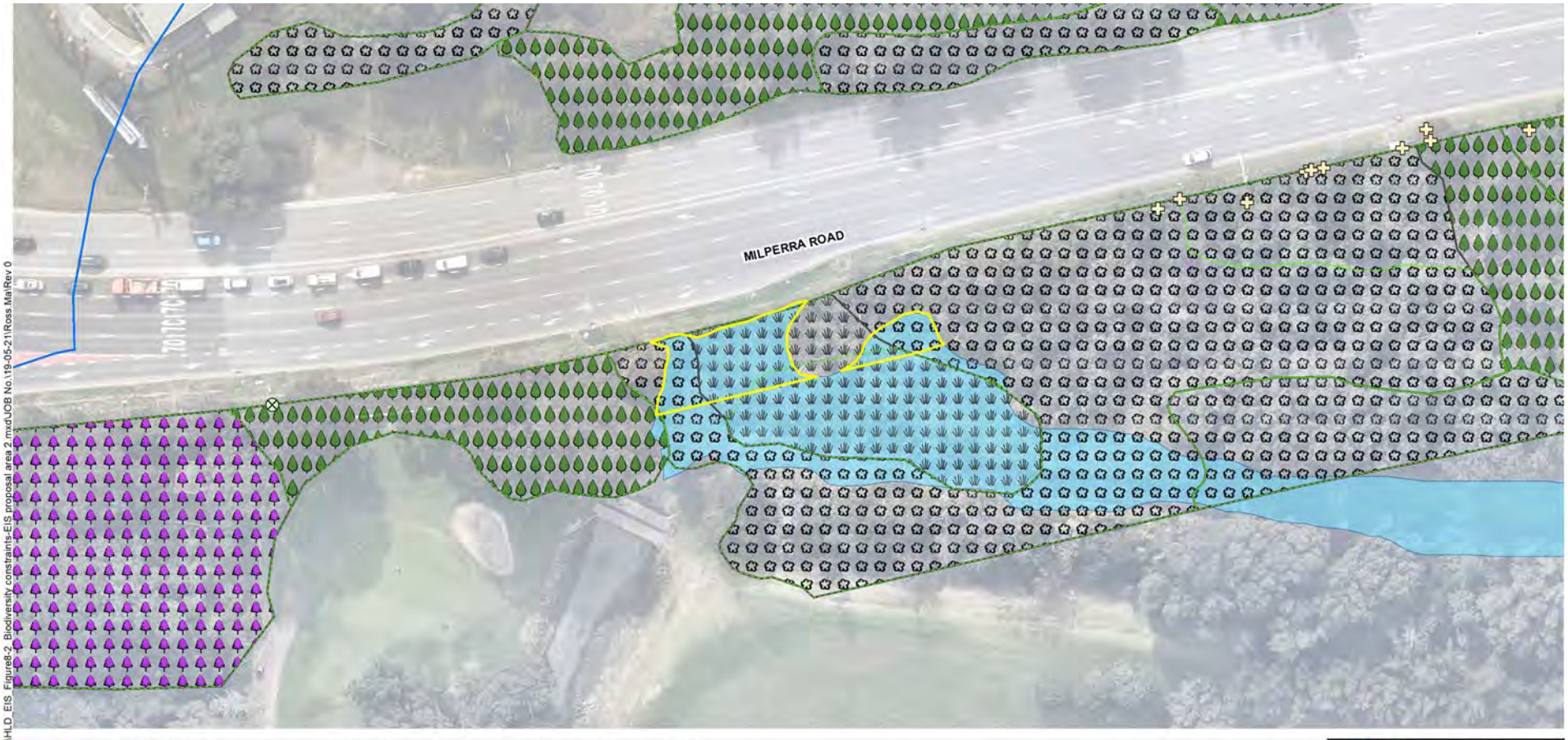
Listed Migratory species

Eastern Osprey was considered moderately likely to occur based on the presence of suitable habitats. Habitats in the overall proposal study area were considered unlikely to constitute important habitat for the Eastern Osprey and any of the listed migratory species. As such, these species were not considered further in the BDAR assessment.



Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-1: Biodiversity constraints - EIS proposal area 1


MILPERRA ROAD
EIS proposal area
Hollow bearing tree
Southern Myotis Habitat
Threatened Flora Species
Callistemon linearifolius
Coastal Wetland Management
Coastal Wetlands
Coastal Wetlands Proximity Area
Threatened Ecological Communities - EPBC Act
Cooks River / Castlereagh Ironbark Forest
River Flat Eucalypt Forest
Threatened Ecological Communities - BC Act
River Flat Eucalypt Forest
Swamp Oak Floodplain Forest
Cooks River / Castlereagh Ironbark Forest
Freshwater Wetlands on Coastal Floodplains
P:\GIS\Project-4\project510003_HenryLawsonDrive\HLD_EIS_Figure8-2_Biodiversity constraints-EIS proposal area 2.mxd\JOB No.\19-05-21\Ross.Mai\Rev 0
Source: Aurecon, TfNSW, Spatial Services, Nearmap
1:1,000
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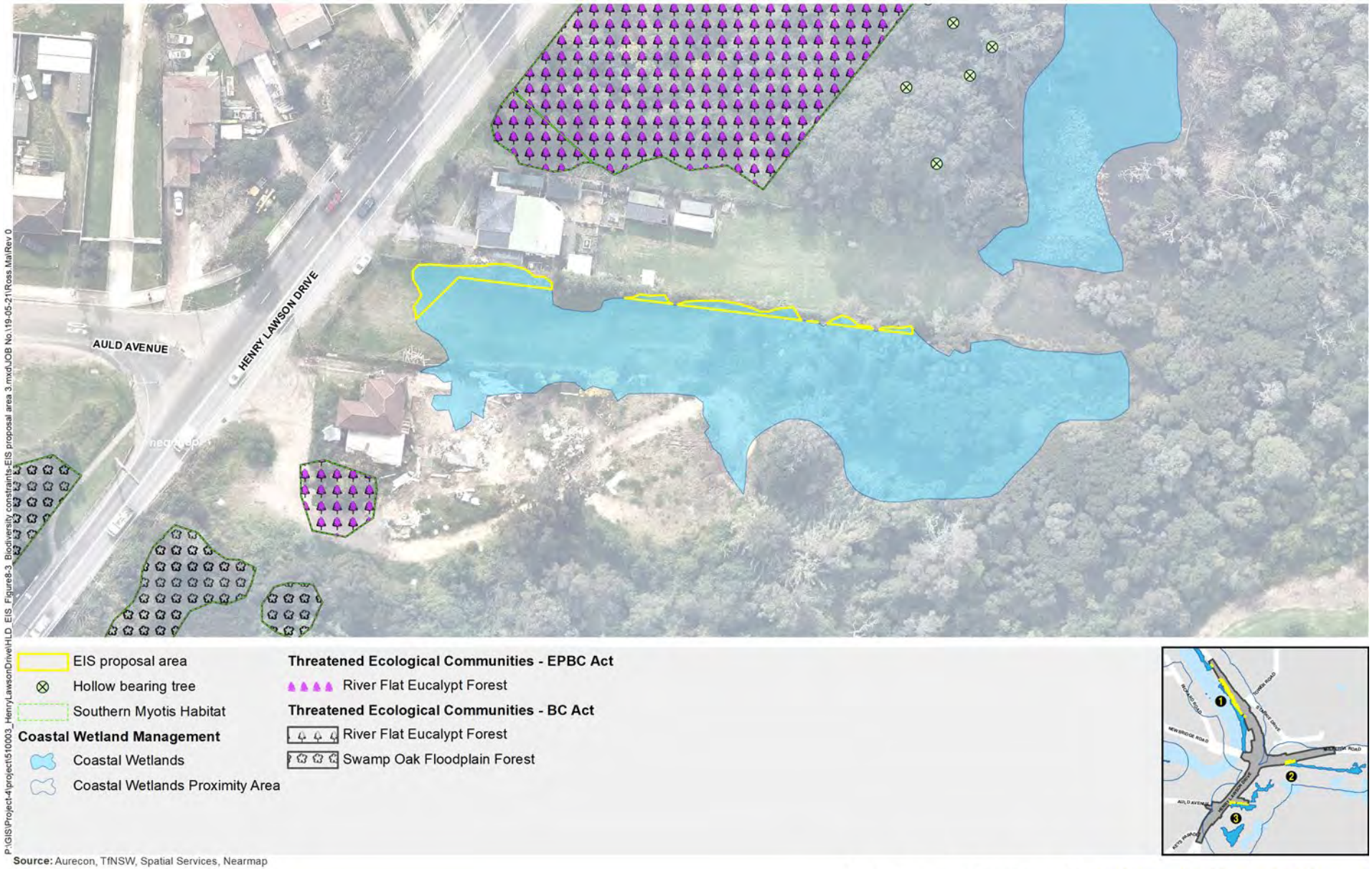
Projection: GDA 1994 MGA Zone 56
Henry Lawson Drive Stage 1A Environmental Impact Statement
FIGURE 8-2: Biodiversity constraints - EIS proposal area 2



Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-3: Biodiversity constraints - EIS proposal area 3

Aquatic habitats

Henry Lawson Drive runs parallel or adjacent to the Georges River for most of the proposal area. Relatively high aquatic biodiversity values are associated with the existing riparian vegetation. The Georges River has a waterway classification of Class 1: Major key fish habitat with habitat sensitivity Type 2: Moderately sensitive key fish habitat as defined in the Policy and guidelines for fish habitat conservation and management – Update 2013 (Department of Primary Industries, 2013).

Habitat for threatened freshwater fish is not mapped in the Georges River. The threatened fish species returned from the EPBC Act Protected Matters Search Tool (PMST) search are also not known to occur in the overall proposal study area.

The riparian vegetation is dominated by fringing river mangroves which are interspersed with and backed by Swamp Oak forest and eucalypt forest vegetation communities. While riparian vegetation within the proposal area contains weeds and exotic species, the mangrove habitat (River mangroves (*Aegiceras corniculatum*) and Grey mangroves (*Avicennia marina*)) represents a significant natural aquatic feature of high conservation value. These mangrove habitat areas do not occur within the EIS proposal area.

As recognised earlier, the EIS proposal areas occur within areas mapped as 'coastal wetlands' as determined by the Coastal Management SEPP. Coastal wetlands are recognised as an important habitat feature.

The BDAR also identifies where aquatic species/habitat are listed under the FM Act. No habitat for threatened fish listed under the FM Act occurs within the EIS proposal area.

8.1.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Environment Planning and Assessment Act 1979*
- State Environmental Planning Policy (Coastal Management) 2018
- *Biodiversity Conservation Act 2016*
- *Biosecurity Act 2015*
- *Fisheries Management Act 1994.*

8.1.4 Assessment of potential impacts

Impacts on biodiversity values have been avoided and minimised through the planning and design phase of the EIS proposal. A preliminary biodiversity assessment of two alternative alignments (4 lane option and 6 lane option) were evaluated to identify the most environmentally acceptable alternative with the minimal loss in biodiversity values (WSP, 2019). This investigation was used to inform the avoidance and minimisation of impacts on biodiversity values associated with the proposal. The options assessments were undertaken to minimise the amount of potential clearing to avoid and/or minimise impacts on native vegetation and associated habitat. Refer to Section 8 of the BDAR for detail on how the EIS proposal was developed in order to avoid or minimise the impacts on native vegetation and habitat, and to avoid or minimise prescribed biodiversity impacts that may be difficult to quantify, replace or offset.

The EIS proposal would have the potential to result in the following direct and indirect impacts to biodiversity:

- Direct impacts on native vegetation
- Direct impacts on threatened species and habitat
- Indirect impacts including:
  - Reduced viability of adjacent habitat due to edge effects
  - Transport of weeds from the site to adjacent vegetation

- Transport of pathogens from the site to adjacent vegetation
- Reduced viability of adjacent habitat due to noise, dust or light spill
- Loss of breeding habitats
- Downstream impacts of contaminated soils on aquatic ecology
- Trampling of threatened flora species.

The potential cumulative impacts on biodiversity from the EIS proposal, the overall proposal and other nearby projects are described in Section 9.6.

Direct impacts

Impacts on native vegetation

The EIS proposal would result in the removal of 0.25 hectares of four native plant communities, as shown in Table 8-1.

Table 8-1 Direct impacts to native vegetation from the EIS proposal

Vegetation zone	Threatened ecological community, with Status (BC Act)	Hollow bearing trees	Extent (ha)
PCT 781: Coastal Freshwater Lagoons of the Sydney Basin and South East Corner – Moderate condition	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions: Endangered	No	0.02
PCT 835: Forest Red Gum-Rough-barked Apple Grassy Woodland on Alluvial Flats of the Cumberland Plain, Sydney Basin – Moderate condition (Forest Red Gum variant)	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions: Endangered	Yes	0.02
PCT 1236: Swamp Paperbark - Swamp Oak tall shrubland on estuarine flats, Sydney Basin Bioregion and South East Corner Bioregion – Poor condition	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions: Endangered	No	0.01
PCT 1234: Swamp Oak Swamp Forest Fringing Estuaries, Sydney Basin and South East Corner – Moderate condition		No	0.20
Total area of native vegetation			0.25

The EIS proposal would directly impact on 0.25 hectares of BC Act-listed TECs.

The Key Threatening Processes (KTP) listed under the BC Act associated with the native vegetation removal includes clearing of native vegetation, land clearance and degradation of native riparian vegetation along NSW courses. Degradation of native riparian vegetation along NSW courses is also of relevance under the FM Act. The EIS proposal would contribute to these processes through the clearing of 0.25 hectares of native vegetation comprised of four native plant communities, and the clearing of native vegetation communities that provide riparian habitat.

The EIS proposal would directly impact on 0.01 hectares of non-native vegetation, which is considered to be minor.

Impacts on threatened species and habitat

The EIS proposal would directly impact on vegetation that provides foraging habitat for 42 threatened species[1] in the EIS proposal area. The details on this wider investigation are provided within the BDAR in Appendix C. Of those species investigated, there are only three that have a moderate likelihood of occurring within or using habitat within the EIS proposal area which are: Swift Parrot, Large Bent-winged Bat and Little Bent-winged Bat (as shown in Table 8-2).

Table 8-2 Direct impacts on predicted ecosystem species

Scientific name	Common name	BC Act	Serious and Irreversible Impacts (SAII)[2]	Associated PCT(s)	Habitat impacted (ha)
Large Bent-winged Bat	Miniopterus orianae oceanensis	V	Yes	PCT 781. PCT 835, PCT 1234 and PCT 1236	0.26
Little Bent-winged Bat	Miniopterus australis	V	Yes	PCT 781. PCT 835, PCT 1234 and PCT 1236	0.26
Swift Parrot	Lathamus discolor	E	Yes	PCT 835, PCT 1234 and PCT 1236	0.24

In addition, the Southern Myotis was identified roosting in a culvert adjacent to EIS proposal area 1. All native vegetation within the EIS proposal areas, as they are within 200 metres of a waterbody with rivers, creeks and other waterbodies three metres or wider, are considered to be breeding habitat for the species.

The KTP associated with impacts to threatened species includes loss of hollow-bearing trees and removal of dead wood and dead trees. Three hollow bearing trees were recorded within the EIS proposal area 1 during vegetation integrity plots and random meanders. During pre-clearing surveys prior to construction, the total hollow counts will be confirmed. A few dead standing trees will require removal from the EIS proposal area 1. Dead wood on the ground, which is scattered through the EIS proposal area at low density, would also be removed.

No threatened flora species were recorded within the EIS proposal area.

Non-native vegetation impacts

The removal of 0.01 hectares of non-native vegetation located within EIS proposal area 3 would reduce habitat for threatened bird and bat species. However, this is considered minor as this area is cleared, containing exotic pasture weeds and exotic shrubs, providing foraging habitat for commonly occurring birds with no habitat for threatened species.

Aquatic impacts

Direct impacts on aquatic and riparian habitat would occur within EIS proposal areas 1 and 2. The habitat to be removed at these locations are associated with the Georges River and Milperra Drain. The removal of native aquatic and riparian vegetation would contribute to two KTPs relevant to impacts on aquatic ecology:

- Clearing of native vegetation, and
- The degradation of native riparian vegetation along new south wales watercourses.

[1] Vulnerable (V), Endangered (E) or Critically Endangered (CE)
[2] Serious and irreversible impact, 'Guidance to assist a decision-maker to determine a serious and irreversible impact' (Department of Planning Industry and Environment, 2019)

Both KTPs address the potential consequences on aquatic ecology from the removal of vegetation immediately along river and creek banks (such as mangroves) and on the floodplain (such as Swamp Oak forest and eucalypt forest) which provide important ecosystem functions. Removal of riparian vegetation could degrade water quality due to increased sediment-laden runoff, intensify longer term bank erosion, mobilise potential ASS, decrease food availability for aquatic biota and result in loss of bank-associated habitat such as overhangs and shade.

Direct impacts on listed threatened fish species or other threatened aquatic/marine species are unlikely due to the low probability of their occurrence in the study area. No direct impacts to mapped Key Fish Habitat would occur as the mapped Key Fish Habitat is outside of the EIS proposal areas.

Fauna injury or death has the greatest potential to occur during construction when clearing of aquatic vegetation would occur. The extent of this impact would be proportionate to the extent of vegetation that is cleared. Less mobile species (e.g. ground dwelling amphibians) may find it difficult to rapidly move away from the clearing when disturbed. The EIS proposal area is only likely to contain a limited number of aquatic species that may be impacted during vegetation removal.

Entrapment of aquatic wildlife in any trenches or pits that are dug is a possibility if the trenches are deep and steep sided. Wildlife may also become trapped in or may choose to shelter in machinery that is stored in the study area overnight. If these animals were to remain inside the machinery, or under the wheels or tracks, they may be injured or may die once the machinery is in use.

Impacts to aquatic habitat require mitigation measures to be implemented to limit impacts. These are discussed in Section 8.5.6.

The EIS proposal would directly impact about 0.26 hectares of coastal wetlands. The EIS proposal has currently been designed to avoid direct impacts to mapped coastal wetlands as far as possible but would unavoidably encroach further on coastal wetlands. The existing Henry Lawson Drive road corridor already sits within the area mapped under the Coastal Management SEPP. The impacts associated within the EIS proposal are likely to be minor based on the area of clearing being less than two hectares. Due to the relatively minor extent of impacts on coastal wetlands and given environmental safeguards that will be implemented to minimise potential impacts it is unlikely that the EIS proposal would significantly affect coastal wetlands within the study area.

Groundwater dependant ecosystems (GDEs) which are surface expressions of groundwater within the locality of the study area (<10 kilometres) include the Georges River. Other GDEs which are reliant on subsurface groundwater in the EIS proposal area which would be impacted upon by the EIS proposal include:

- Cumberland River-flat Forest
- Coastal Freshwater Lagoon
- Coastal Swamp Paperbark – Swamp Oak Scrub
- Estuarine Swamp Forest.

Due to the relatively minor extent of excavations and the implementation of environmental groundwater safeguards, it is unlikely that interception of groundwater flows would significantly affect GDEs within the study area. The EIS proposal area is not expected to substantially interfere with subsurface or groundwater flows associated with the Georges River. Refer to Section 8.7 for more detail on the groundwater impact assessment, and Section 8.7.6 for the groundwater safeguards.

Indirect impacts

Reduced viability of adjacent habitat due to edge effects

"Edge effects" (spread of weeds, dieback, hydrological impacts) are those effects that can be caused by tracks and roads. This means that the ecological impact of roads could spread further than the immediate vegetation clearing boundary for road construction. Edge effects create vulnerable areas subject to degradation by the spread of weeds, pollutant/ nutrient enriched run-off from road pavement and dumping of rubbish. These edge effects have the potential to reduce the long-term viability of adjacent habitat. It is listed as a KTP.

These edge effects are present for Henry Lawson Drive and Milperra Road as existing operating roads with weed invasion being the most prominent as observed when preparing the BDAR. EIS proposal area 1 has edge effects from Henry Lawson Drive and the shared pathway through the middle of the vegetation. EIS proposal area 2 is subject to edge effects from Milperra Road. The EIS proposal area has been designed to impact the minimal amount of native vegetation, threatened species habitat and to avoid TECs. As the EIS proposal involves widening the road, this impact of edge effects is likely to exacerbate and encroach further to additional areas of native vegetation and habitat that previously had a greater separation from the road and its edge effects.

The vegetation recorded within the study area mostly occurred in linear patches with some degree of weed invasion. Vegetation recorded in moderate condition and/or with connectivity to larger patches of vegetation is most vulnerable to edge effects. The viability of these areas may be reduced by the EIS proposal if not appropriately managed.

Transport of weeds from the site to adjacent vegetation

The EIS proposal involves earthworks to widen the road and construction around native vegetation in moderate or certain connectivity to larger areas of native vegetation. This means that the EIS proposal could result in an indirect impact relating to weed establishment. This is relevant for EIS proposal areas 1 and 2 in particular.

Transport of pathogens from the site to adjacent vegetation

The EIS proposal has the potential to increase the spread of pathogens that threaten native biodiversity values, such as the soil-borne pathogen Phytophthora (*Phytophthora cinnamomi*) and Myrtle rust (*Austropuccinia psidii*).

Phytophthora infects root systems whereas Myrtle Rust deforms leaves and leads to heavy defoliation. Both pathogens are associated with damage and death to native plants and may be dispersed over large distances. Phytophthora can be spread through flowing water, such as storm runoff, or may be spread within a site via mycelial growth from infected roots to roots of healthy plants. Propagules of Phytophthora may also be dispersed by vehicles (eg cars and earth moving equipment), animals, walkers and movement of soil. Myrtle rust spores can be spread easily via contaminated clothing, hair, skin and personal items, infected plant material, equipment as well as by insect/animal movement and wind dispersal.

The EIS proposal's construction activities would likely to lead to an increased risk of dispersal of these pathogens (if present) through works involving soil disturbance.

Reduced viability of adjacent habitat due to noise, dust or light spill

Noise, dust, light and contaminant pollution would potentially occur from all EIS proposal activities, although the risk of pollution would be greatest where activities are near to vegetated areas and during construction.

During construction of the EIS proposal, increased noise and vibration levels in the study area and immediate surrounds are likely due to vegetation clearing, ground disturbance, machinery and vehicle movements, and general human presence. Noise, dust, light and contaminant pollution are likely to occur, if not managed from all EIS proposal activities, although will be greatest where activities take place near vegetated areas and during construction. The noise and vibration from these activities would potentially disturb fauna and may disrupt wildlife behaviours. These impacts would be localised to the construction areas and are not considered likely to have a significant, long-term impact on wildlife populations outside the area of direct impact.

Elevated levels of dust may be deposited onto the foliage of vegetation adjacent to the EIS proposal activities, which has the potential to impact the health of the vegetation. The impact of dust deposition on foliage is likely to be highly localised, intermittent, and temporary and is therefore not considered likely to be a major impact.

As some night works would be required and lighting installed on the roadside, it is considered that ecological light pollution may occur which affects nocturnal fauna. Due to the urban environment, most, if not all, areas of habitat are already impacted by ecological light pollution associated with existing fixed lighting, residences and road vehicle movements. The changes to light conditions associated with the EIS proposal, though essentially permanent, would therefore be unlikely to have a significant impact on local fauna populations. Lighting associated with the EIS proposal would be designed to minimise 'light spill' for the benefit of nearby residents and this would also reduce potential impacts on fauna populations.

Mobilisation of contaminants

During the construction period, localised release of contaminants could accidentally occur. If this occurred, the most likely result would be localised contamination of soil and potential direct physical trauma or toxicity to flora, fauna and GDEs that come into contact with contaminants. Any accidental release of contaminants is likely to be localised and would be unlikely to have a significant effect on the environments of the study area, particularly due to the implementation of mitigation measures to immediately address any spills.

Furthermore, excavations could mobilise any potential contaminants that could be present within subsurface soils and groundwater. EIS Proposal Area 1 is located near a petrol service station and Bankstown Airport, which are identified as potential sources of contaminants. EIS Proposal Area 2 is located about 150 metres south of Bankstown Airport and EIS Proposal Area 3 is located about 150 metres north of a former landfill site, now developed as the Flower Power complex.

Loss of breeding habitats

The loss of breeding habitat such a hollow-bearing trees and artificial structures (eg culverts) is likely to occur and has the potential to affect native animals such as:

- Hollow-dependent bats (including threatened species)
- Hollow-nesting and canopy-nesting birds
- Arboreal mammals
- Reptiles.

Three hollow-bearing trees were detected in the EIS proposal areas during vegetation integrity plots, hollow-bearing tree assessment and random meander surveys.

The study area contains culverts and drainage pipes, which may be used by cave-dwelling microchiropteran bats. Inspection of the culverts showed most culverts had little to no roosting niches for microbats, however Southern Myotis were found to be roosting in a culvert in the northern section of the overall proposal study area. This potential impact is relevant for proposed drainage culvert works in EIS proposal area 1 and EIS proposal area 2.

Trampling of threatened flora species

Although the EIS proposal would not require the removal of any threatened flora individuals, EIS proposal area 2 would be within 30 metres of recorded Downy Wattle individuals recorded within the study area. Although no Downy Wattle individuals nor areas of the species' species polygon require removal indirect impacts may eventuate given its location in respect to the EIS proposal area.

No direct or indirect impacts are anticipated to occur to Nettle Bottle Brush as a result of the EIS proposal.

Habitat fragmentation

The removal of native vegetation and splitting of habitat patches can result in habitat fragmentation which is to 'physical dividing up of once continuous habitats into separate smaller 'fragments'' (Fahrig, 2002). The EIS proposal is considered unlikely to result in a large increase to landscape scale fragmentation and to further limit connectivity and movement corridors than what already exists in the study area, as it largely follows existing roadways. The impacts from the EIS proposal would largely involve 'trimming' the edges of vegetation patches adjacent to the existing road corridor, which would not result in additional habitat fragmentation.

The EIS proposal is likely to result in a minor reduction in vegetation patch sizes resulting in minor increases in localised fragmentation of the regional wildlife patches along the Georges River. Due to the importance of connectivity, dispersal opportunities and habitat quality for species at a local scale, this impact has the potential to be negative to the dispersal of relatively sedentary species such as mammals, frogs, and reptiles. Considering the disturbed, urban setting of the EIS proposal, most, if not all native animal species which are sensitive to habitat fragmentation and predation (e.g. native ground-dwelling mammals, arboreal mammals (except for adaptable common possum species) and monitor lizards) are likely to have already been lost from the habitats in the study area.

The predicted level of fragmentation from the EIS proposal is not expected to be enough to prevent the breeding and dispersal of plant pollinators or the dispersal of plant propagules (i.e. seed or other vegetative reproductive material) between habitat patches. The existing functional connectivity for many species would remain in the study area.

Waterbodies, water quality and hydrological processes

The existing hydrological conditions of the EIS proposal area are already affected by altered landform and altered stormwater runoff and velocity as a result of surrounding land uses. The EIS proposal may result in further alteration to the hydrology of the study area due to changes in landform and increase in surface water runoff due to increase in impervious surfaces.

A summary of potential impacts to hydrology and associated biodiversity habitat is provided in Table 8-3.

Table 8-3 Summary of potential impacts to hydrology associated with biodiversity habitat

Potential impact	Construction of the EIS proposal (short-term impacts)	Operation of the EIS proposal (long-term impacts)
Reduction in water quality	• Unmanaged construction activities (such as earthworks, relocation of utilities and removal of vegetation) could result in: soil erosion, siltation and off-site movement of eroded sediments by stormwater, contributing to increased levels of turbidity and sediment deposition, decreased dissolved oxygen, and change pH levels in waterways. In addition, accidental fuel and chemical spills and contaminated runoff from construction vehicles, plant, equipment or chemical storage areas have the potential to reach waterbodies and streams within and adjacent to the study area.	• An increase in impervious surfaces (e.g. EIS Proposal Area 1) would likely result in an increased volume of runoff, which would lead to increased scouring, erosion and sedimentation. Run-off may carry increased sediment loads, pollutants and nutrients (such as nitrogen and phosphorus), discharging to surrounding waterbodies and streams (e.g. EIS Proposal Area 2) within and adjacent to the study area.
Changes to the geomorphology of watercourses	• Open channels occur in all EIS proposal areas. The water drains from the urban stormwater drains, Bankstown Airport and Bankstown Golf Course. In EIS proposal area 1, there is an open channel under Henry Lawson Drive that drains directly into the Georges River. In EIS proposal area 2, an open channel drains into Ashford Reserve and then flows into Milperra Drain along the northern edge of Bankstown Golf Course to bushland adjoining EIS proposal area 3 with the outflow to the Georges River. Temporary changes in water flow and velocities from the EIS proposal may result in a small increase in water flows downstream. Road widening work would be staged at each point the EIS proposal crosses any of the open channels to ensure water flows and velocities are not significantly changed and to avoid downstream erosion and bed and bank stability impacts to the open channels. EIS Proposal Area 2 is impacted as a result of using and extending existing stormwater drainage infrastructure that discharge to coastal wetlands. • Mobilised sediment could build up in the open channels in and downstream of the EIS proposal areas which flow into the Georges River.	• Changes to the geomorphology of watercourses from surface water runoff during operation of the EIS proposal is considered negligible, given that the proposed stormwater discharges would be via the stormwater network into the Georges River. Drainage works would be designed to prevent scouring of the open channels. Water quality treatment features such as vegetated swales and bioretention basins are proposed at stormwater outlets.

Potential impact	Construction of the EIS proposal (short-term impacts)	Operation of the EIS proposal (long-term impacts)
	• Impermeable surfaces created by the EIS proposal would lead to increases in the volume and rate of runoff, which could cause erosion at drainage outlets, within the instream channel discharging to Georges River and Milperra Drain, and downstream sedimentation of Georges River and Milperra Drain.	
Loss of freshwater and riparian habitat at mapped waterbodies and streams	• A small area of riparian vegetation would be removed at each mapped coastal wetland. The removal of riparian vegetation at these points, although minor in scale, has the potential to impact bank stability and surface water quality if mitigation measures are not implemented.	• Temporary disturbed areas within the riparian zone and areas of the proposal that would be landscaped would be revegetated with suitable local native vegetation species. Existing culverts would be either widened or additional culverts installed to improve flow capacity.

Vehicle strikes

All roads have potential to result in the mortality (roadkill) of native animals. The risk of vehicle strike and roadkill is higher where roads and/or associated landscaped areas:

- Traverse areas of substantial animal habitat
- Are located near natural or artificial water bodies
- Contain food sources (e.g. mown grass verges, nectar-producing shrubs) which attract animals to the road edge
- Have high speed limits
- Provide poor visibility of wildlife (e.g. due to bends, crests and poor lighting).

No threatened terrestrial fauna were predicted to occur within the study area due to the disturbed, urban setting of the EIS proposal. A large proportion of native animal species which are prone to vehicle and monitor lizards are likely to have already been lost from the habitats in the study area. Impacts due to vehicle strike would be greatest in areas where the EIS proposal is adjacent to larger tracts of native vegetation communities (for example, EIS proposal area 1) associated with riparian vegetation along the Georges River and remnant vegetation north west of the Bankstown Golf Course.

Due to the unlikely occurrence of majority of native ground-dwelling fauna the EIS proposal is unlikely to result in significant levels of roadkill mortality. In the BDAR, the only species at risk of vehicle strike was considered to be Powerful Owl (*Ninox strenua*). However, it was considered that the likelihood of vehicle strike would be low as the species are highly mobile, subsequently the impact would be minimal. Landscaping which encourages birds to fly higher over roads would reduce potential vehicle strike.

Assessment of prescribed biodiversity impacts

Clause 6.1 of the Biodiversity Conservation Regulation identifies actions that are prescribed as impacts to be assessed under the Biodiversity Offset Scheme (BOS). Prescribed biodiversity impacts must be assessed in accordance with Section 8.3 of the BAM. Through the design process, avoidance and minimisation of impacts to prescribed biodiversity impacts was undertaken to the greatest extent possible. However, it is noted that the EIS proposal site is highly constrained by coastal wetlands, TECs, residential and commercial/retail properties, properties identified as Airport Land, and properties subject to Aboriginal land claims. The overall proposal layout has been optimised to achieve a balance between all these constraints whilst meeting the overall proposal objectives. Direct impacts to Georges River, which provides important habitat features, has been avoided despite the overall proposal still being located in the Georges River riparian zone and floodplain. Given these considerations, the overall proposal's location in the landscape and achieving total avoidance of threatened entities is not possible.

A summary of the resultant prescribed biodiversity impacts of relevance to the EIS proposal is provided in Table 8-4. The prescribed biodiversity impacts that are not relevant to the EIS proposal are outlined in Section 9.3 of the BDAR (provided in Appendix C).

Table 8-4 Summary of prescribed biodiversity impacts listed under the BC Regulation

Prescribed biodiversity impact (BAM)	Relevance to EIS proposal
Impacts of development on the habitat of threatened species or ecological communities associated with human-made structures	Yes – human-made structures occur within and adjacent to the study area. Human-made structures such as culverts beneath surface roads and bridges, offer potential roosting habitat to locally occurring threatened microbat species. Direct and indirect impacts of the EIS proposal may affect threatened fauna species that could utilise these human-made structures. Specifically, for the Southern Myotis.
Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation	Partially – a small amount of non-native vegetation occurs within all of the EIS proposal areas. The majority are exotic shrubs and vines, which provide habitat for small passerine birds. A few non-native trees occur within EIS proposal area 3. These provide non-native vegetation which offers foraging, nesting and sheltering habitat to locally occurring threatened birds and Grey-headed Flying-fox. The removal of this non-native vegetation would have minor impacts upon native fauna.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Partially –EIS proposal areas 1 and 2 would involve the widening of Henry Lawson Drive and Milperra Road respectively. The widening of these two roads would increase the connectivity to a minor degree than currently occurring. The increase in habitat fragmentation may partially affect the movement patterns of some terrestrial fauna species, however it is unlikely to significantly affect the movement or life-cycle of species in which already occurs within EIS proposal area 1 and 2.
Impacts of the development on movement of threatened species that maintains their life cycle	
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	Partially - unmanaged construction activities in proximity to watercourses or waterbodies could increase levels of turbidity and sediment deposition, decrease dissolved oxygen, and change pH levels in receiving environments.

Prescribed biodiversity impact (BAM)	Relevance to EIS proposal
Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Yes – the proposal involves the widening of roads in proximity to areas of fauna habitat. The EIS proposal area 1 involves road widening near areas of fauna habitat within the riparian zone on the western side of Henry Lawson Drive and remnant vegetation within the Georges River Golf Course, occurring on the eastern side of Henry Lawson Drive. Similarly, EIS proposal area 2 is near Ashford Reserve and both areas are located on the southern side of Milperra Road. The northern side of Milperra Road is also vegetated and provides a vegetated buffer between the road and the Bankstown Airport Redevelopment. Terrestrial fauna species that attempt to cross these widened roads in the vicinity of EIS proposal areas 1 and 2 may be more susceptible to vehicle strike, as they move between areas of habitat on either side of the road to obtain food, shelter, and breeding resources, undertake seasonal migrations.

Serious and Irreversible Impacts

No TECs or threatened flora species listed as SAII (Serious and Irreversible Impacts) entities were considered to be impacted by the EIS proposal.

The TEC listed as SAII entity under the BC Act does not occur within the EIS proposal area and therefore would not be impacted upon by the EIS proposal.

No threatened flora species listed as SAII entities under the BC Act were recorded are considered likely to occur within the EIS proposal area.

The three threatened fauna SAII entities recognised earlier (Swift Parrot, Large Bent-winged Bat and Little Bent-winged Bat) were not considered to be impacted by the EIS proposal as no habitat components which form part of SAII entities for these species were identified within the EIS proposal areas.

Matters of National Environmental Significance Assessments of significance

Assessments of impact significance were conducted for all EPBC Act listed threatened species and ecological communities considered likely to be affected by the EIS proposal. This part of the impact assessment in the BDAR included reference to those matters identified in Section 8.1.2 above, including:

- Two listed TECs (Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community and River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria)
- One threatened flora species
- Two listed fauna species
- One listed migratory species
- Voyager Point Nationally Important Wetland (indirect impact).

These impact assessments determined that the EIS proposal is unlikely to lead to a significant impact on threatened species, populations, ecological communities or their habitats. The assessment of significance is shown in Table 9.14 of the BDAR (Appendix C).

In regards to the indirect impact on Voyager Point Nationally Important Wetland, the removal of the riparian vegetation adjoining the Georges River in EIS proposal area 1 and coastal wetland vegetation in EIS proposal area 2 have the potential to indirectly impact Voyager Point Wetland through increased levels of suspended sediments and potential bank erosion (EIS proposal area 1). Water quality treatment features such as vegetated swales, bioretention basins being proposed at stormwater outlets. Furthermore, an erosion and sediment control plan would be in place and a soil and water management plan to be implemented during construction.

In respect to MNES matters including threatened flora, fauna and communities, a referral of this proposal for consideration as a controlled action under the EPBC Act is not required.

8.1.5 Environmental management measures

Safeguards and management measures provided below in Table 8-5 would be implemented to minimise potential biodiversity impacts.

Table 8-5 Environmental management measures for biodiversity

Impact	Environmental management measure	Responsibility	Timing
Removal of native vegetation and habitat features/ Removal of threatened species habitat	Native vegetation removal will be minimised through detailed design processes in particular, to minimise impacts on Hollow-bearing trees, and Threatened Ecological Communities, where possible, with consideration to: • Placement of embankments and adopting alternative options such as retaining walls to minimise the construction footprint. .	Transport	Detailed design
Removal of native vegetation and habitat/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 (Roads and Traffic Authority, 2011).	Contractor	Prior to construction
Removal of native and non-native vegetation and habitat/Injury and mortality of fauna	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 (Roads and Traffic Authority, 2011).	Contractor	During construction
Removal of native vegetation and habitat	Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011) and the landscaping plans for the proposal.	Contractor	During construction
Removal of native vegetation and habitat/Wildlife corridors and connectivity	The unexpected species find procedure under Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (RTA 2011) will be implemented if TECs or threatened fauna, not assessed in the biodiversity assessment, are identified in the EIS proposal area.	Contractor	During construction
Removal of native vegetation and habitat/Impacts to habitat in human made structures	Fauna will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction

Impact	Environmental management measure	Responsibility	Timing
Impacts to habitat in human made structures	Develop options for providing microbat roosting habitat during detailed design processes for culvert structures particularly for the Southern Myotis (*Myotis macropus*).	Transport	Detailed design
Microbat survey and habitat	A targeted microbat survey of structures within the footprint and proposed for removal or modification would be undertaken in accordance with 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018b), prior to construction or as soon as feasible prior to disturbance. If threatened microbats are detected, a Microbat Management Plan will be developed as part of the Construction Environment Management Plan and implemented by a suitably qualified bat specialist. A copy of the Microbat Management Plan would be submitted to Canterbury Bankstown City Council for review.	Contractor	Pre-construction
Indirect impacts on 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 (Roads and Traffic Authority, 2011). This will include: • Demarcating riparian exclusions zones to protect aquatic habitats and riparian zones where works are not required. • Excluding portions of the mapped coastal wetlands along sections of the property boundary of EIS Proposal Area 3 to avoid any unnecessary disturbance, except for property site restoration works that may be needed at the end of construction in consultation with Council.	Contractor	During construction
Indirect impacts on native vegetation and habitat	Weed species will be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction
Invasion and spread of weeds	The Landscaping Plan and the Construction Flora and Fauna Management Plan, the latter comprising a Weed Management Sub-Plan will be prepared in accordance with the DPI Office of Water Guidelines for Vegetation Management Plans on Waterfront Land (2012).	Contractor	Pre-construction
Indirect impacts on native vegetation and habitat	Pathogens will be managed in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction

Impact	Environmental management measure	Responsibility	Timing
Indirect impacts on native vegetation and habitat	Shading and artificial light impacts will be minimised where practicable taking into account minimum luminescence requirements for: • Safety when constructing during the night-time period • An urban road as outlined in the Australian Standards through detailed design.	Transport/ Contractor	Detailed design/ during construction
Impacts to habitat in non native vegetation	Habitat will be replaced or re-instated in accordance with: • Urban design landscaping plans which will include revegetation with local native vegetation species, suitable for the riparian zone considering vegetation species that adopts existing communities and landscape character, and uses local provenance • Guide 5: Re-use of woody debris and bushrock • Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011). Canterbury Bankstown City Council will be consulted with at the detailed design stage in regard to the selection of vegetation species in the landscaping plans.	Transport/ Contractor	Detailed design/ during construction
Injury and mortality to fauna - vehicle strike	Opportunities to minimise road-kill will be identified in the design process with consideration to: • Available space. • Avoid creating features too close to the roadside that would attract fauna to the roadside. • Using landscaping techniques to create suitable buffers and to separate any potential attracting features from the roadside. • A roadside planting palette that does not intentionally attract fauna to the roadside.	Transport	Detailed design
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 (Roads and Traffic Authority, 2011) • Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (Department of Primary Industries, 2013) • Acid Sulfate Soil Management Plan (ASSMP) • Construction Soil and Water Management Plan Consultation with NSW DPI Fisheries Regional Conservation Manager will be undertaken to discuss the best approach to construction works within aquatic habitats and riparian zones. This will also help identify whether any trees to be removed for the proposal can be used to re-snag waterways.	Contractor	During construction

Impact	Environmental management measure	Responsibility	Timing
Coastal wetlands and Proximity Areas for coastal wetlands, and impacts to GDEs	Consider detailed design refinements and constructability options that minimise removal of riparian vegetation and disturbance of coastal wetlands and proximity areas for coastal wetlands along the western boundary of the existing Henry Lawson Drive wherever possible. This includes ensuring any access to the waterway, if required, minimises the removal of riparian vegetation and is restricted to the minimum amount of bank length required for the construction activity. Further consideration of minimising direct impacts to coastal wetlands and GDEs will be undertaken during detailed design and construction.	Transport	Detailed design

Biodiversity offset strategy

As detailed in the BDAR, the BC Act together with the Biodiversity Conservation Regulation 2017 outlines the framework for assessment of biodiversity impacts, and introduces a BOS. The BDAR uses the BAM established under these biodiversity reforms to provide a methodology for determining the number and type of biodiversity credits required to offset biodiversity impacts.

Although efforts have been made to avoid, minimise and mitigate potential ecological impacts from the EIS proposal, some residual impacts would occur. The EIS proposal's biodiversity offset obligation for impacts on biodiversity values were determined using the BAM-C (see subsection 9.2.1 of the BAM). The required ecosystem and species credit obligations are provided in Appendix F and Chapter 11 of the BDAR (in Appendix C). As detailed in the BDAR, only EIS proposal area 1 and 2 requires offsets due to the presence of native vegetation, while EIS proposal area 3 does not require offsets.

8.2 Aboriginal cultural heritage

Secretary's requirements	Where addressed in EIS
Heritage – including: • impacts on Aboriginal and non-Aboriginal heritage items (National, State and local) within and near the site, including built heritage and landscapes, and • an assessment of any other heritage items or issues not yet identified that may need to be considered during design development.	Section 8.2 and 8.3. Section 8.2 and 8.3.

The potential impacts on Aboriginal heritage during construction and operation of the overall proposal have been assessed as part of the Henry Lawson Drive – Hume Highway to M5 upgrade Aboriginal Cultural Heritage Assessment (Kelleher Nightingale Consulting Pty Ltd, 2020), provided in Appendix D.

8.2.1 Assessment methodology

A CHAR and associated consultation was undertaken in accordance with the following guidelines:

- Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime 2011)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (Department of Environment Climate Change and Water 2010)

- Guide to investigating, assessing, and reporting on Aboriginal Cultural Heritage in NSW (OEH 2011)
- Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (OEH 2010a).

The CHAR has been prepared in accordance with Stage 3 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation. Preparation of the CHAR has included:

- Aboriginal community consultation in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010
- An Aboriginal archaeological test excavation program undertaken in accordance with the Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales and Roads and Maritime's PACHCI.

Archaeological test excavation was undertaken across ten of the 12 sites/PADs identified within the Henry Lawson Drive and Milperra Road road corridors to fulfil recommendations of the Stage 2 PACHCI assessment (undertaken in 2018).

The methodology for the Aboriginal cultural heritage assessment included:

- A study area covering the 7.5 km section of Henry Lawson Drive between the M5 Motorway at Milperra and the Hume Highway at Lansdowne and a one kilometre section of Milperra Road between the intersection of Henry Lawson Drive and the intersection of Ashford Avenue.
- Searches of the Aboriginal Heritage Information Management System (AHIMS) to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area.
- Other Commonwealth and State registers, databases and the *Bankstown Local Environmental Plan 2015* were also searched for any known Aboriginal sites near the study area.
- A review of previous archaeological investigations undertaken near the study area and along the Georges River foreshores for proposed commercial, industrial and residential development projects.
- Archaeological test excavations were carried out by Kelleher Nightingale Consulting and field representatives of registered Aboriginal parties in July 2019 as recommended by the PACHCI Stage 2 assessment and in accordance with the NSW Office of Environment and Heritage (OEH) Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales and Roads and Maritime PACHCI. The test excavations were used to confirm the level of significance of the site and to identify potential management measures.
- Consultation with the Aboriginal community about the overall proposal has been carried out in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW, 2010) and the PACHCI and is detailed in Chapter 7 of this EIS.
- Identification of potential impacts of the overall proposal on Aboriginal heritage items and values and where required, identification of management measures.

Separate to this a Stage 1 PACHCI walkover was undertaken in March 2021 for one potential construction compound site on Auld Avenue, near to but outside of EIS proposal area 3, which was not captured in the Aboriginal heritage cultural assessment. No Aboriginal cultural heritage potential was identified as part of this assessment.

8.2.2 Existing environment

Land use history

The proposal study area (incorporating the overall proposal area) and surrounding region are known to have been important to and extensively used by past Aboriginal people. Early colonial interest in the area led to interactions between the British and the local Aboriginal people relatively soon after the arrival of the British in Australia. Aboriginal people's use of the region is well documented with historical figures associated with the Georges River including Pemulwuy, his son Tedbury and Kogi. The Aboriginal community who lived along Salt Pan Creek played an important role in the activism of the 20th Century and members of the contemporary Aboriginal community continue to experience connection with the area through cultural and family associations.

Archaeological evidence indicates that the area has been subject to Aboriginal occupation for at least the last 5,000 years. Archaeological sites near the study area comprise open artefact scatters, culturally modified trees, PADs and isolated artefacts. Within the wider region, a large number of midden sites and rockshelters with art or occupation deposits have also been identified. The spatial distribution of archaeological sites in the region is highly influenced by proximity to the aquatic and adjacent terrestrial resources along the Georges River and its tributaries.

Landscape context

The proposal study area is located in an area of relatively low relief unlike the steep sandstone banks of the Georges River to the east and west. The area is also in close proximity to freshwater resources in the upper reaches of the Georges River and Prospect Creek in addition to estuarine resources. The preservation of Aboriginal archaeological sites has been found to be highly influenced by geology, soil landscapes, fluvial activity and ground surface disturbance.

Database searches

A search of the AHIMS database was conducted on 26 September 2019 to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area. The AHIMS search results showed 33 Aboriginal sites recorded in or near the study area, twelve of which are located within the study area and four of which are located within the Stage 1A overall proposal area. In addition, Transport conducted another search of the AHIMS on 19 November 2020 concentrating on the area of the overall proposal south of Milperra Road and no items were recorded in or near the searched location.

The results of the database searches were reflective of the findings of the PACHCI Stage 2 site survey undertaken across the study area. The sites located within the Stage 1A overall proposal area consist of one open artefact site (HLD Site 5 (IF)), two PADs (HLD PAD 5 and HLD PAD 6) and one Aboriginal Resource and Gathering with associated PAD (HLD Resource Zone 1 with PAD).

The search results are attached as part of Appendix D. Of relevance to the EIS proposal, is that HLD Resource Zone 1 + PAD is located within EIS proposal area 1 and HLD PAD 6, which is located near to EIS proposal area 1 (across the road, on the eastern side of Henry Lawson Drive).

Archaeological test excavation

The proposal study area and adjacent lands have been subject to archaeological investigations to further investigate the findings of the PACHCI Stage 2 assessment.

The test excavation program confirmed no Aboriginal objects or further archaeological potential was found at HLD Zone 1 + PAD and HLD PAD 6. The areas were found to be low lying and variably disturbed by past land use activities, and did not constitute Aboriginal archaeological sites.

8.2.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- *National Parks and Wildlife Act 1974*
- National Parks and Wildlife Regulation 2009.

8.2.4 Assessment of potential impacts

Construction

As HLD Zone 1 + PAD and HLD PAD 6 were not classed as an Aboriginal archaeological site within the CHAR, they therefore did not receive an assessment of potential impacts. As such, the EIS proposal would not result in any impact to known Aboriginal heritage items. Due to the low archaeological significance of the PAD, no mitigation is warranted.

Should any previously unidentified Aboriginal heritage items be encountered during construction, mitigation measures outlined in Table 8-6.

Operation

No impacts to Aboriginal heritage during operation would occur.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

8.2.5 Environmental management measures

Safeguards and management measures for Aboriginal heritage are presented in Table 8-6.

Table 8-6 Safeguards and management measures for Aboriginal heritage

Impact	Environmental management measure	Responsibility	Timing
Aboriginal heritage – unexpected finds	The *Standard Management Procedure - Unexpected Heritage Items* (Transport for NSW, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. The construction workforce will be inducted and trained in the procedure. The procedure applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Transport Contractor	During construction
Additional Aboriginal heritage impacts	Any further impacts proposed beyond the proposal area must be subject to further assessment and consultation with Aboriginal stakeholders, consistent with the process in this report.	Transport/ Contractor	Detailed design/during construction

8.3 Non-Aboriginal cultural heritage

The potential impacts on non-Aboriginal heritage during construction and operation of the overall proposal have been assessed as part of the Non-Aboriginal Heritage Statement of Heritage Impact (SOHI)– Henry Lawson Drive Upgrade Stage 1a (Aurecon Australasia, 2021), provided in Appendix E. The SOHI also provides a targeted archaeological assessment.

8.3.1 Assessment methodology

The SOHI has been based on a previous SOHI to inform the strategic phase of the Henry Lawson Drive (M5 to Hume Highway) Strategic Phase Statement of Heritage Impact, prepared by GML Heritage for RMS in 2018. The SOHI was prepared for the overall proposal, including the EIS proposal areas, and the information from this has been used to understand the existing environment and impacts. The steps for the EIS area include:

- Review of applicable statutory heritage lists within the EIS proposal areas.
- Review of heritage reports and studies previously prepared for relevant items and areas within EIS proposal areas.
- Identification of the heritage items within the area with the potential to be affected by the EIS proposal, either through direct impacts and/or impacts on visual setting.
- Identification of heritage items that are likely to be physically impacted, or those that have a direct frontage to the overall proposal area.
- Evaluation of the historical archaeological potential associated with various phases of history within the overall proposal boundary.
- Field survey of the EIS proposal areas to inspect listed heritage items and potential archaeological sites and to identify potential heritage items that may be affected, undertaken by Aurecon Senior Heritage Specialist Emma McGirr.
- Desktop research and historical research to inform the impact assessment and historical overview sections, including review of relevant primary sources, archive materials, past reports and papers and Conservation Management Plans (where applicable).
- Review of the overall proposal concept design.

Geospatial Information Systems (GIS) was used as the tool for collating the applicable heritage listings across the overall proposal area, with data drawn from heritage registers.

8.3.2 Existing environment

The EIS Proposal is located to the east of the Georges River and surrounding recreational and riparian areas. There are areas of coastal wetlands within and surrounding the proposal area associated with the Georges River which contribute to the local character of the overall proposal area.

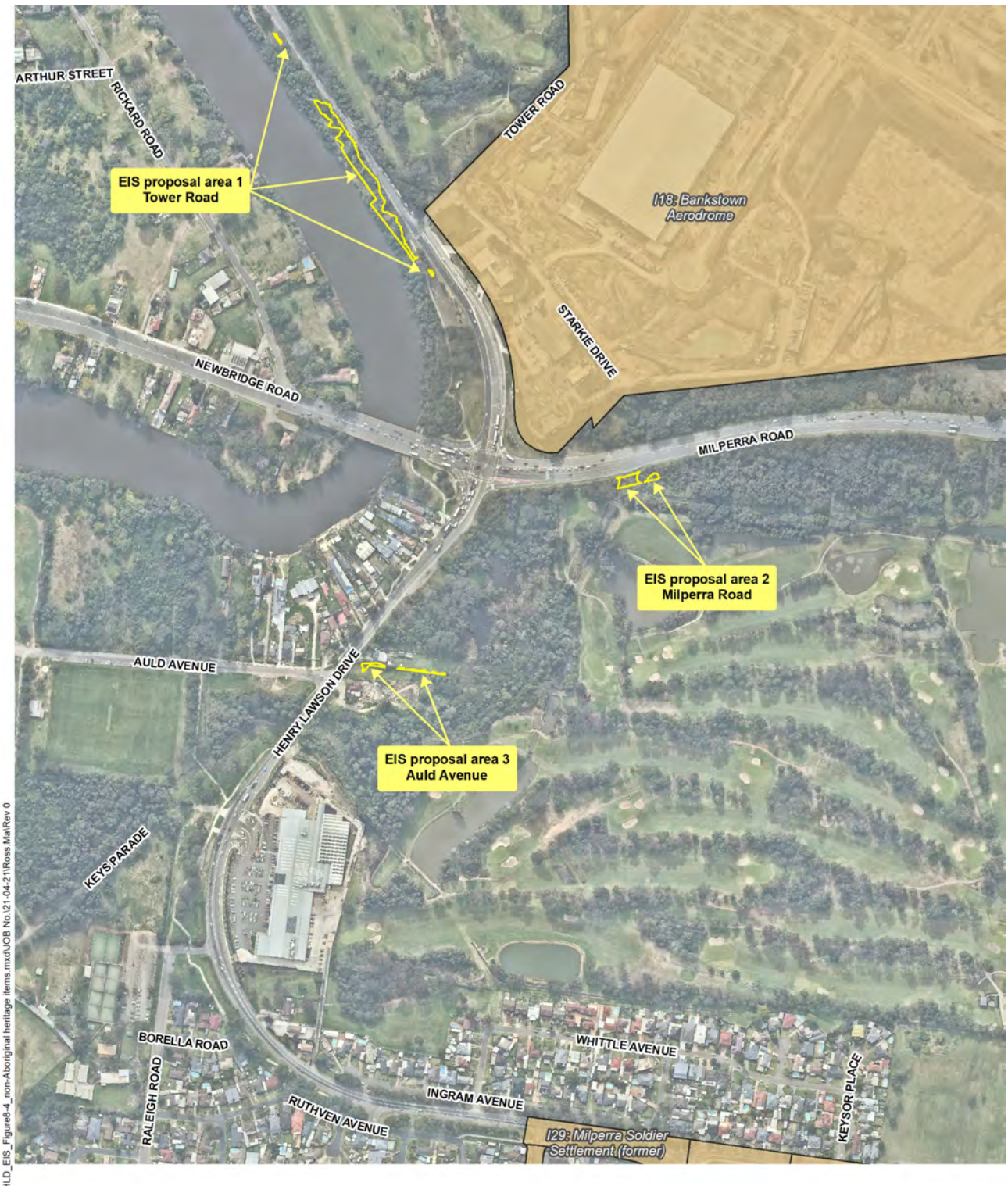
The overall proposal area extends across the Milperra suburb and the Bankstown Aerodrome site.

Milperra makes up the largest portion of the overall proposal area, and is characterised by light industrial development with the airport interspersed with parkland, natural waterways, and recreational areas surrounded by mid to late 20th Century residential developments. There are no heritage items in the vicinity of the overall proposal or the EIS proposal in this area.

The suburb of Bankstown Aerodrome is roughly thirty kilometres southwest of Sydney which makes up the other half of the proposal area. The suburb was gazetted in May 1994 and is the location of the Bankstown Airport. There are two heritage items in the vicinity of this area: the Bankstown Airport Traffic Control Tower and Bankstown Aerodrome.

The most substantial and noticeable landscape features in the locality of the overall proposal boundary and the EIS proposal areas is the Georges River, which runs nearly parallel with the current alignment of Henry Lawson Drive. Other landscape features include a number of small bushland corridors and nature strips which line Henry Lawson Drive to the east, and Milperra Road to the north and south, providing buffer zones from the thoroughfares to the extensive Bankstown Golf Course and the Bankstown Aerodrome. There are also two large recreational parks on the western side of the Drive, Gordon Parker Reserve and the Vale of Ah Reserve, which both are bounded by bushy vegetation to the east and the Georges River to the west.

The heritage and landscape items in relation to the EIS proposal are shown in Figure 8-4.



EIS proposal area

Local heritage item

P:\GIS\Project-4\project\510003_HenryLawsonDrive\HLD_EIS_Figure8-4_non-Aboriginal heritage items.mxd\JOB No.\21-04-21\Ross.Mai\Rev 0

Source: Aurecon, TfNSW, DPIE, Spatial Services, Nearmap

1:6,500

0 100 200 m

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-4: non-Aboriginal heritage items

The EIS proposal areas fall largely within the road corridor in areas that have experienced high levels of disturbance and change since early construction and development in the 1930s, and later widening projects in the late 1960s and 1970s. EIS proposal area 3 is also along a residential property.

8.3.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Heritage Act 1977*
- *Environmental Planning and Assessment Act 1979*
- *National Parks and Wildlife Act 1974*.

8.3.4 Assessment of potential impacts

There are no known non-Aboriginal heritage sites or places within the EIS proposal areas and therefore no non-Aboriginal heritage impacts anticipated for the EIS proposal. There are also no known or anticipated historical archaeological resources in the EIS proposal areas.

The likelihood of subsurface archaeological material and remains is based on the historic plans and materials gathered, information about disturbance over time and the surface conditions observed onsite. Archaeological materials may remain in the EIS proposal area, however, construction of existing roads, urban/residential development has resulted in a high level of disturbance, which translates to low to nil subsurface historical archaeological potential.

No heritage approvals are required for the EIS proposal. There is no requirement to notify local Council.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

8.3.5 Environmental management measures

Safeguards and management measures for Non-Aboriginal heritage are presented in Table 8-7. This environmental management measure is combined with the unexpected finds environmental management measure for Aboriginal heritage in Chapter 10.

Table 8-7 Safeguards and management measures for Non-Aboriginal heritage

Impact	Environmental management measure	Responsibility	Timing
Non-Aboriginal heritage – unexpected finds	*The Standard Management Procedure - Unexpected Heritage Items* (Transport for NSW, 2015) will be followed in the event that an unknown or potential Non-Aboriginal object/s, including skeletal remains, is found during construction. The construction workforce will be inducted and trained in the procedure. The procedure applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Transport/ Contractor	Detailed design During construction

8.4 Contamination and soil quality

Secretary's requirements	Where addressed in EIS
Contamination and soil quality – including: • an investigation to identify the extent and type of any contaminated materials or acid sulfate soils that may be encountered during construction of the proposal, and associated impacts, including those from uncontrolled historic filling; and • downstream impacts of contaminated soils on aquatic ecology.	Section 8.4 Section 8.1.4

A Preliminary Site Investigation (PSI) has been produced by Aurecon and is provided in Appendix F.

8.4.1 Assessment methodology

The following scope of works was completed to prepare the PSI:

- Collation and review of available desk study information relevant to the overall proposal area and immediate surrounds
- Review of previous reports and/or related documents, including council records
- Review of past and current activities on neighbouring properties and other potential on-site/offsite sources of contamination
- Review of available historical aerials from the 1930s to 2010s. One aerial photograph from each decade was reviewed
- Review of NSW Environment Protection Authority (EPA) databases, the Contaminated Land Record and POEO licences for the overall proposal area and Parramatta Council LGA
- Review of geology, soil, topography and registered groundwater bore maps
- Review of ASS and salinity risk maps
- Review of NSW EPA priority Per and Poly-Fluoroalkyl Substances (PFAS) investigation risk sites within 5 km of the overall proposal area
- Review Department of Defence Unexploded Ordinance Mapping Database
- Review previous Dial Before You Dig records
- Other searches of the NSW Government SEED[3] website as required to assess the potential for subsurface contamination to be present in the study area
- Preparation of the PSI report outlining the findings of the desktop study in accordance with Schedule B2 of the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) and the NSW EPA Contaminated Land Guidelines – Consultants Reporting on Contaminated Land (2020).

A Conceptual Site Model (CSM) for the EIS proposal area was prepared as part of the PSI which provides a summary of the potential risks to human health and the environment based on the information included in the PSI.

The preliminary risk assessment assessed qualitative risk by estimating the likelihood of each identified potential source-pathway-receptor (SPR) linkage occurring and the foreseeable consequence of the exposure. Consequences are broadly defined by the definitions in Table 8-8.

[3] Sharing and Enabling Environmental Data

Table 8-8 Consequence definitions

Classification	Human health	Ground/surface water	Ecological	Built environment
Severe	Irreversible damage to human health or death	Substantial pollution of sensitive water resources	Significant change to the number of one or more species or ecosystems.	Irreparable damage to buildings, structures or the environment.
Moderate	Non-permanent effects to humans	Substantial pollution of non-sensitive water resources or small-scale pollution	Change to population densities of non-sensitive species.	Damage to sensitive buildings, structures or the environment.
Mild	Slight short tern health effects to humans	Slight pollution to non-sensitive water resources	Some changes to population densities but with no negative effects on the function of the ecosystem	Easily repairable effects of damage to buildings or structures.
Negligible	No measurable health effects to humans	Insubstantial pollution to non-sensitive water resources	No significant changes to population densities in the environment or in any ecosystem	Very slight non-structural damage or cosmetic harm to buildings or structures.

Likelihood ratings are defined as:

- Rare – Has not occurred in the past 5 years OR may occur in exceptional circumstances, i.e. less than 10% chance of occurring in the next 24 months if the risk is not mitigated.
- Unlikely – May have occurred once in the last 5 years OR has a 10-30% chance of occurring in the future if the risk is not mitigated.
- Possible – Has happened during the past 5 years but not in every year OR has a 40-60% chance of occurring in the next 24 months if the risk is not mitigated.
- Likely – Has happened at least once in the past year and in each of the previous 5 years OR has a 60-90% chance of occurring in the next 24 months if the risk is not mitigated.
- Almost Certain – Has happened several times in the past year and in each of the previous 5 years OR has a > 90% chance of occurring in the next 24 months if the risk is not mitigated.

After consideration of likelihood and consequence, the overall risk ratings are assessed in accordance with Table 8-9.

Table 8-9 Risk ratings

Likelihood					
Consequence	**Rare**	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
Severe	Low	Low to Moderate	Moderate to High	Very High	Very High
Moderate	Negligible to Low	Low	Moderate	Moderate to High	High
Mild	Negligible	Low	Low	Low to Moderate	Moderate
Negligible	Negligible	Negligible	Negligible to Low	Low	Low

Risk ratings are defined as:

- Negligible – The presence of the identified source does not give rise to the potential to cause significant harm.
- Low – It is possible that harm could arise to a designated receptor from an identified source though this is likely to be mild.
- Moderate – It is possible that harm could arise to a specific receptor, but it is unlikely that such harm would be significant.
- High – A designated receptor is likely to experience significant harm from an identified source without remedial action.
- Very high – There is a high probability that severe harm could arise to a designated receptor from an identified source without appropriate remedial action.

8.4.2 Existing environment

The overall proposal area is currently used as a transport corridor consisting of a two-lane roadway with additional turning lanes at the major intersections of Milperra Road/Newbridge Road and at Tower Road. The Bankstown Aerodrome, located the north east of the overall proposal alignment, was constructed during WW2 and has remained an airport since that time. The surrounding land use has been increasingly developed with a mixture of low density residential, recreational areas and light industrial/commercial. The Georges River is located directly east of the proposal area. A summary of site features is presented in Table 8-10.

Table 8-10 Site features

Aspect	Details
Adjacent properties	**EIS Proposal Area 1** North East– Henry Lawson Drive is directly to the northeast of the site followed by Georges River Golf Course, recreational pathways and a small commercial business area South East – Henry Lawson Drive is directly to the southeast followed by Bankstown Aerodrome and a small area of commercial businesses bordering the major intersection of Milperra Road/Henry Lawson Drive. West – The Georges River lies to the west of the EIS Proposal Area 1. Recreational walkways and bike paths also border this area to the west.

Aspect	Details
	EIS Proposal Area 2 North – The major arterial road of Milperra Road immediately borders the site to the north followed by the Bankstown Aerodrome and a small commercial pocket. South/East/West – The Bankstown Golf Course is situated to the south, east and west of this area with the major Henry Lawson Drive and Milperra Road intersection also located to the west of the site. Ashford Reserve is located to the immediate south. The Reserve provides a vegetated buffer between Milperra Road and Milperra Drain.
	EIS Proposal Area 3 North – Residential dwellings lie in EIS Proposal Area 3 with bushland directly north of the EIS Proposal Area 3 boundary extending to Henry Lawson Drive. Residential dwellings exist further north west. East – Bushland is directly east of EIS Proposal Area 3 with The Bankstown Golf Course beyond that. South – A residential dwelling lies immediately south of the site with the Golf Course grounds and large commercial complex (Flower Power complex) further south. West – Henry Lawson Drive is situated directly west of the site with residential dwellings and recreational areas also to the west.
Nearby sensitive land uses	Surrounding the overall proposal, sensitive receivers include residences and public recreational golf courses.
Local water bodies	The overall proposal is located on the eastern floodplain of the Georges River at a point where it meanders. Newbridge Road crosses over the river at this meandering point, where the river bends and flows in a westerly direction away from the proposal and then meanders south. A small tributary of the Georges River (Milperra Drain) extends underneath Henry Lawson Drive between Auld Avenue and Keys Parade. Several small ponds are located within the Bankstown Golf Course (south east of the overall proposal alignment) and the Georges River Golf Course (north east of the overall proposal alignment). Coastal wetlands are located along the Georges River and east of the proposal (near the Bankstown Golf Course) and opposite the Auld Ave intersection.

The overall proposal area sits within a natural low point in the region, funnelling down into the Georges River. The overall proposal area itself is roughly zero to four metres Australian Height Datum (AHD) in elevation and is relatively flat and consistent across the overall proposal study area.

Aurecon undertook a site inspection on 28 September 2020 to observe general site conditions and identify any potential sources of contamination that may be present.

The geology of the overall proposal area is underlain by alluvium, gravel, sand, silt and clay, and a number of undifferentiated lithologies and alluvium. Alluvial floodplain deposits of quartz rich sands and clays dominate the southern portion of the overall proposal alignment. Unconsolidated alluvial clays, silts, sands and gravels are dominant in the northern portion of the overall proposal alignment and join with alluvial levee and overbank deposits along the Georges River to the north west of the overall proposal area. The Georges River itself on the western boundary of the overall proposal area consists of alluvial channel deposits of sand, gravel, silts and clays, which are also expected to be intersected on the overall proposal area. No structural features (dykes or veins) are mapped at the overall proposal area.

The overall proposal area lies in a flat floodplain area for the nearby Georges River and is underlain with poorly drained and low permeability soils. Several drainage channels carrying runoff underneath Henry Lawson Drive were identified during the site inspection discharging directly toward the Georges River.

History

Henry Lawson Drive and Milperra Road were constructed sometime between 1951 and 1961 and have remained road corridors since. The identified coastal wetlands appear not to be disturbed over time.

A search of the NSW EPA public register (notified sites and the contaminated land record) of contaminated sites identified four records of notified sites within one kilometre of the overall proposal area. The sites and their relationship with the EIS proposal areas are shown on Figure 7 within the PSI (in Appendix F). The closest ones to the EIS proposal are the 7-Eleven Service Station (which is across the road from EIS proposal area 1) and the Former Landfill (which is south of EIS proposal area 3 at the current Flower Power complex).

There are two PFAS sites subject to the NSW EPA investigation program within 10 kilometres of the overall proposal: the Bankstown Airport and Holsworthy Barracks.

A search conducted revealed one record of UXO (unexploded ordnance) within three kilometres of the overall proposal area.

Areas of Potential Environmental Concern

The Areas of Potential Environmental Concern (APECs) relevant to the EIS proposal therefore include:

- An operational petrol station is located along the commercial shopping strip at the intersection of Milperra Road and Henry Lawson Drive. This is of relevance to EIS proposal area 1 only.
- Bankstown Aerodrome is located to the north east of the overall proposal alignment and historical practices could have impacted the soil, groundwater and surface water across the overall proposal area. This is of relevance to EIS proposal area 1 only.
- Onsite fill materials observed during Aurecon's site inspection were noted to contain evidence of car oils and fuels from spills and car accidents along the road shoulder.
- A portion of the proposal area is in an area of high risk for encountering ASS. This is of relevance to EIS proposal area 1 only.

The ASS risks and boundaries were assessed as part of the PSI. The ASS risk mapping for the EIS proposal is shown in Table 8-11 and Figure 8-5.

Table 8-11 ASS risk mapping

ASS risk profile	Proposal area impacted
High risk 2-4 metres	EIS Proposal Area 1
High risk below 4 metres	EIS Proposal Area 3
Low risk 2-4 metres	EIS Proposal Area 2 and 3

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-5: Acid Sulfate Soil risks

8.4.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedules B1 and B2
- *NSW Contaminated Land Management Act 1997*
- *NSW Environmentally Hazardous Chemicals Act 1985*
- *NSW Protection of the Environment Operations Act 1997*
- *NSW Contaminated Land Management Amendment Act 2008 No 111*
- *NSW Waste Avoidance and Resource Recovery Act 2001*
- NSW Protection of the Environment Operations (Waste) Regulation 2014
- NSW Protection of the Environment (Operations) Excavated Natural Material Exemption 2014.

8.4.4 Assessment of potential impacts

Based on the preliminary CSM for potential sources of contamination in the proposal area, a preliminary risk assessment has been prepared for the EIS proposal (refer to Table 8-12).

There is one potential source that has been classed as 'Low to Moderate' risk, which is derived from the excavation of soils within the Parramatta/Georges River hydrogeological landscape that could expose ASS. EIS proposal area 1 and part of EIS proposal area 3 are in an area of high risk of encountering ASS (bgl two to four metres and bgl of deeper than four metres respectively). Once excavated, ASS, if left unmanaged, could cause harm to nearby waterways and coastal wetlands, flora and fauna in the area, and impact constructability of the road upgrade. Additionally, there are standard practices to manage ASS and PASS, particularly the small volumes anticipated to be produced during the EIS proposal. EIS proposal areas 2 and part of EIS proposal area 3 are in areas of low risk of encountering ASS.

All other potential sources were classed as 'Low' risk rating. Given the persistence of PFAS in the environment, soils and groundwater within EIS proposal area 1 may be PFAS impacted from the Bankstown Aerodrome, however, it is considered unlikely that significant impacts extend to off-site areas in soil or groundwater. In regard to the one record of UXO, the Department of Defence has indicated that there would be a very low likelihood of UXO, and construction activities can progress without the need for UXO remediation.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

Table 8-12 Preliminary risk assessment

Potential sources	Contaminant	Potential receptors	Assessment of potential impact	Likelihood	Consequence	Risk rating
Onsite filling	Heavy metals, TRH, BTEX, PAH, OC/OPs, PCBs, VOC, PFAS, asbestos	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	There may be intermittent contaminants of potential concern (CoPCs) present within uncontrolled fill presumed to have been used historically in and adjacent to these areas. Only small volumes of spoil would be generated in EIS proposal area works (0.9m^3) which can be easily managed with standard construction practices	Possible	Low	Low
Airport operations	Heavy metals, TRH, BTEX, PAH, OC/OPs, PCBs, VOC, PFAS	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	The use of the aerodrome as a Defence facility and then an operating airport could lead to a range of CoPCs being present in the soil and groundwater. Identified contaminants within the soil profile have the potential for leaching to groundwater and impacting the underlying groundwater table, particularly due to regular flooding of the site and stormwater infrastructure from the aerodrome which could cause migration to the overall proposal area. Given the extensive development around the Aerodrome, it is unlikely that significant impacts extend to off-site areas in soil. If gross	Unlikely	Negligible	Low

Potential sources	Contaminant	Potential receptors	Assessment of potential impact	Likelihood	Consequence	Risk rating
			contamination exists in groundwater, these could extend to EIS proposal area 1 and area 2 but are unlikely to be encountered during the proposed works.			
	UXO (explosive residues and inert industrial wastes)		UXOs would not be a CoPC for the EIS proposal areas due to their distance from the aerodrome.	Unlikely	Negligible	Low
Offsite residential and commercial land uses	Heavy metals, TRH, BTEX, PAH. OCP and OPPs, PCB, Asbestos	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	Any off-site fill (outside of the overall proposal boundary) from surrounding site construction is present below hard stand and not accessible to potential human or environmental receptors. It is unlikely that off-site fill material would be disturbed during construction activities.	Unlikely	Negligible	Low

Potential sources	Contaminant	Potential receptors	Assessment of potential impact	Likelihood	Consequence	Risk rating
Excavations intercepting groundwater and waterlogged soils	ASS, Sulphuric Acid, hydrogenated metals, heavy metals	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	Excavation of soils within the Parramatta/Georges River hydrogeological landscape across the alignment could expose ASS. EIS proposal area 1 is in an area of high risk of encountering ASS. Once excavated, ASS, if left unmanaged, could cause harm to nearby waterways and coastal wetlands, flora and fauna in the area, and impact constructability of the road upgrade. Relatively small volumes of spoil would be produced from shallow excavations in EIS Proposal Area 1. Additionally, there are standard practices to manage ASS and PASS, particularly the small volumes anticipated to be produced. EIS proposal areas 1 and 2 are in areas of low risk of encountering ASS.	Probable (EIS Proposal Area 1)	Low	Low to Moderate

Potential sources	Contaminant	Potential receptors	Assessment of potential impact	Likelihood	Consequence	Risk rating
Former Landfill operations	Heavy metals, PCBs, Nutrients, PAHs, TRH, Ammonia, BTEX, Landfill gases, Acids, and Inert landfill wastes	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	A range of CoPCs can be associated with former landfills. However, given the distance and direction of the landfill to all three EIS proposal areas, and the nature of proposed activities on the EIS proposal areas, there is negligible risk that they would be impacted by the former landfill.	Unlikely	Negligible	Low
Golf Course operations and maintenance	OCPs/OPPs and Nutrients	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	General upkeep and maintenance of the two golf courses in the area have the potential for pesticide, herbicide, and elevated nutrients from fertiliser use, to migrate offsite through surface runoffs and leaching into groundwater. It is possible that nutrients have migrated to EIS proposal areas 2 and 3 but if present, they do not pose a potential risk as construction activities in these areas are unlikely to intersect the groundwater table.	Possible	Negligible	Low

Potential sources	Contaminant	Potential receptors	Assessment of potential impact	Likelihood	Consequence	Risk rating
Current BP Truck Stop service station operations and infrastructure	Heavy metals, TRH, BTEX, PAH, VOCs, and PFAS	**Human** Future construction workers **Environmental** Surface water Groundwater Coastal wetland Flora and Fauna **Downstream Environmental** Surface water Groundwater Coastal wetland Flora and Fauna	The status of the BP Truck Stop service station's underground infrastructure is not currently known and there is a risk of underground storage tanks (USTs), which store petrol and other fuels, to have potentially leaked and impacted the surrounding soils and groundwater. If gross impacts are present below the service station it is possible they could migrate to EIS proposal area 1. Due to location of the service station, the potential risk to EIS proposal areas 2 and 3 is negligible.	Possible	Low	Low

8.4.5 Environmental management measures

Safeguards and management measures for contamination and soil quality are presented in Table 8-13.

Table 8-13 Safeguards and management measures for contamination and soil quality

Impact	Environmental management measure	Responsibility	Timing
Risk of contamination from APECs	A Detailed Site Investigation will be undertaken near the APECs showing a moderate risk of CoPCs at concentrations above the Tier I screening values. The scope of the DSI will be detailed in a Sampling Analysis and Quality Plan (SAQP) which is to include collection of soil, groundwater and landfill gas samples near moderate risk APECS. The scope of the DSI will be in accordance with the NEPM 2013 and analytical results will be compared to the applicable Tier I screening values in Schedule B2 of the NEPM 2013.	Transport	Detailed design
Contamination from onsite filling	Analytical results from any spoil requiring off-site disposal will be sorted in accordance with: • NSW EPA Waste Classification Guidelines Parts 1 to 4 and Addendum 1. If natural soil is disturbed, it may meet the definition of Excavated Natural Material and the analytical data will be compared to the concentrations and requirements with: • ENM Resource Recovery Order and Exemption under the Protection of Environmental Operations (Waste) Act 2000.	Contractor	During construction
Risk of potentially impacted soil migrating	A Contaminated Land Management Sub-Plan will be prepared and implemented as part of the CEMP. This will address the risk of potentially impacted soil migrating from site during construction and include standard practices for dust suppression, and erosion and sedimentation control. Other controls in the Contaminated Land Management Sub-Plan will include: • An Unexpected Finds Protocol (UFP) and the Construction Work Health and Safety (WHS) Plan will include a UXO risk assessment and any management measures. • Mitigation of the risk that contaminated groundwater is encountered during construction activities. During construction any intercepted groundwater will be managed under the CEMP to mitigate risks associated with the potential mobilisation or release of contamination to the groundwater, improper storage and disposal of intercepted groundwater. • Monitoring of excavations for volatile gases that may be present as a result of hydrocarbon contamination, which may pose a risk to human health and built environment.	Contractor	Pre-construction

Impact	Environmental management measure	Responsibility	Timing
	• Proper use of work health and safety (WHS) equipment and monitoring of works where asbestos or other contamination is identified. • Response plan if accidental major spills and leaks occur detailing remediation steps necessary to reduce impact to nearby coastal wetlands and GDEs.		
UXO	Prior to any ground disturbance directly west of the Bankstown Aerodrome property boundary, a risk assessment will be undertaken to determine the likelihood of UXO being present and the required management measures to mitigate the risk.	Transport/ Contractor	Detailed design/Pre-construction

8.5 Hydrology, flooding and coastal processes

Secretary's requirements	Where addressed in EIS
Coastal Processes – including: • the effects of coastal processes and coastal hazards including the effects of sea level rise and climate change, and • consistency with coastal zone management plans, floodplain risk management plans and flood hazards associated with the land.	Section 8.5.5 Section 8.5.3
Groundwater and surface water – including: • an assessment of hydrology, and potential impacts on the quality and quantity of surface and groundwater resources with reference to the ANZG (2018) Guidelines for Fresh and Marine Water Quality or equivalent water quality guidelines, • details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*, and flooding – consideration of the impacts of the proposal on the hydraulic and hydrologic regime of the area.	Section 8.5 Quality and quantity of surface and groundwater resources is discussed in Section 8.7. Water usage is discussed in Section 6.4.8. Section 8.5

A flooding assessment has been prepared to support the overall proposal and is provided in Appendix G and is summarised in the following sections.

8.5.1 Assessment methodology

The following activities have been undertaken in the preparation of the flooding assessment.

Data collection

A desktop review was undertaken to gather available data and review existing flood studies of the catchments relevant to the overall proposal.

Existing environmental modelling and analysis

The hydrologic and hydraulic models that were relied upon for the flooding assessment were based on models previously developed for the following Canterbury Bankstown City Council studies:

- Georges River Flood Study (BMT 2020a)
- Milperra Catchment Flood Study (BMT WBM 2015).

BMT 2020a investigated hydrologic modelling approaches based on ARR1987 and a draft version of ARR 2019 that was released in 2016 (ARR 2016). Based on a comparison of peak flow estimates from the two modelling approaches it was decided to adopt the procedures in ARR 1987 as it gave a better match to peak flows derived from a flood frequency analysis of stream gauge records at the Liverpool Weir and was also consistent with Canterbury Bankstown City Council's existing flood mapping and flood planning levels.

For consistency with BMT 2020a, the assessment of flood behaviour in the Georges River as part of the present investigation was also based on ARR 1987 procedures.

As WBM BMT 2015 was prepared prior to the release of both ARR 2016 and ARR 2019 it was based on the procedures in ARR 1987. For the purpose of the present investigation the flood models that were developed as part of WBM BMT 2015 have therefore been updated using the procedures in ARR 2019.

Annexure A of the flooding assessment in Appendix G provides greater details on how the models were updated for the purposes of assessing the overall proposal.

The relevant Commonwealth guideline for the assessment is the Australian Rainfall and Runoff (ARR), which is a National guideline for the estimation of design flood characteristics in Australia.

There are various other guidelines that have guided the assessment including state legislation, policies and guidelines comprising the NSW Government's Floodplain Risk Management Guideline: Practical Considerations of Climate Change (DECC 2007). This guideline provides specific recommendations in relation to the climate change impacts on rainfall intensities. Based on the recommendations set out in DECC 2007, the 0.5% annual exceedance probabilities (AEP) and 0.2% AEP design storms were adopted as being analogous to an increase in 1% AEP design rainfall intensities of 10 and 30 per cent respectively, for assessing the impact future climate change could have on flooding conditions near the proposal.

Once the set of hydrologic and hydraulic models ('flood models') were developed, flood modelling showing flood behaviour under present day (ie pre-proposal), and under proposal (construction and operation) was prepared for design floods with AEPs of 50%, 20%, 10%, 2%, 1%, 0.5% and 0.2% as well as the Probable Maximum Flood (PMF).

Coastal processes

In the absence of a formal State Government policy on sea level rise benchmarks (noting that in 2012, the NSW Government recommended against state-wide sea level rise benchmarks), the previously recommended rises in sea level of 0.4 metres by 2050 and 0.9 metres by 2100 have been adopted for assessing the impact future climate change could have on flooding conditions in the vicinity of the proposal. This approach is consistent with both the Georges River Estuary Coastal Zone Management Plan (Georges River Combined Councils' Committee (GRCCC) 2013) as well as the Georges River Tidal Inundation Study (BMT 2018) that was prepared on behalf of Georges River Council to assess the impact of sea level rise on an increase in tidal inundation in the lower reach of the Georges River.

Tidal conditions in Botany Bay that were adopted in the flood assessment were based on those in the Georges River Flood Study (BMT 2020a).

Impact assessment

An assessment was carried out of the flood risk associated with the construction of the proposal as well as the potential impacts that proposed construction activities could have on flood behaviour. An assessment was also carried out of the flood risk to the proposal and the impact it would have on flood behaviour during operation if appropriate mitigation measures are not incorporated into its design. Scenarios were also run of flood impacts under a partial blockage of major hydraulic structures and future climate change conditions.

The potential cumulative impacts on flooding patterns that would result from the EIS proposal and the overall proposal in combination with other proposals nearby was also described. Detail on the potential cumulative impacts is provided in Section 9.6.

In regards to the SEARs, the flooding assessment has addressed the requirement to consider the effects of coastal processes and coastal hazards including the effects of sea level rise and climate change, checked for consistency with relevant plans (such as coastal zone management plans) and considered the impacts of the proposal on the hydraulic and hydrologic regime of the area.

8.5.2 Existing environment

The proposal is located within the following two catchments:

- Georges River
- Milperra Drain.

Georges River

Catchment overview

The Georges River is about 100 kilometres long and has a total catchment area of around 960 kilometres squared. The land use of the upper catchment, south of Campbelltown, is primarily in its natural forested state. Development on either side of the river becomes more prevalent towards Liverpool however riparian vegetation remains along significant lengths of its banks, including near the overall proposal.

EIS proposal area 1 runs along the eastern bank adjacent to the Georges River. The section of Henry Lawson Drive between Milperra Road and Tower Road is kerb and guttered, with runoff controlled by a series of pit and pipe drainage systems that include two outlets that discharge into the Georges River along its eastern bank. The section of Henry Lawson Drive to the north of Tower Road that lies within the proposal area is on fill embankment where runoff flows off the road as relatively shallow 'sheet' flow into the adjoining areas where it is conveyed overland to the Georges River. Part of EIS proposal area 1 north of Tower Road is located on this adjoining area.

There is a 2.4 metre wide by 1.2 metre high box culvert which crosses Henry Lawson Drive about 100 metres to the north of Tower Road where it discharges into the Georges River. The box culvert controls runoff from a portion of the Georges River Golf Course and Bankstown Aerodrome. Runoff is conveyed to the box culvert via a grassed lined channel that runs through the golf course. The outlet of the box culvert is located within EIS proposal area 1 and discharges to Georges River.

Existing flooding

The nature of flooding under present day conditions in the Georges River catchment was modelled and found:

- The section of Henry Lawson Drive to the north of Tower Road is impacted by flooding from the Georges River during a 5% AEP event over a length of about 1.2 kilometres (200 metres of which is located within the overall proposal boundary) and to a maximum depth of about 0.9 metre. Flooding from the Georges River during a 5% AEP event would also inundate a 1.2 kilometres length of Milperra Road to the east of Henry Lawson Drive to a maximum depth of about 1 metre.
- Floodwater that surcharges the eastern bank of the Georges River during a 1% AEP event would inundate the full length of Henry Lawson Drive and Milperra Road within the proposal area to a maximum depth of over 3 metres. The floodwater would also inundate Henry Lawson Drive a distance of 1.1 kilometres to the north and 300 metres to the south of the proposal, while flooding along Milperra Road would extend over a distance of 1.1 kilometres to the east of the overall proposal.
- The extent and depth of flooding to Henry Lawson Drive and Milperra Road, both within the proposal area and in its immediate vicinity, would limit the ability to improve the road corridor's level of flood immunity.

- All of the EIS proposal areas would experience frequent inundation from floodwaters that originate in the Georges River, due to the low lying nature of the proposal areas.

Milperra Drain

Catchment overview

Milperra Drain has a catchment area of about 10 square kilometres. Milperra Drain runs from east to west over a length of about 4.5 kilometres and joins the Georges River on its left (eastern) bank a distance of about 1.7 kilometres downstream of the Newbridge Road Bridge.

A large part of the catchment lies to the north of Milperra Road and is drained by four small tributaries that run through Bankstown Aerodrome land. A fifth tributary drains the south-eastern portion of the catchment.

The catchment contains a variety of land usage, with extensive areas of open space, which includes the Bankstown Aerodrome at its centre. A heavy concentration of industry is present adjacent to the middle to lower reaches of Milperra Drain between Milperra Road and Ashford Avenue. Areas of residential development are located in the upper reaches of the drainage system which is typically piped along most of its length.

The section of Milperra Drain where it runs through the Bankstown Golf Course to the south of the proposal area comprises a vegetated channel of varying width. Canterbury Bankstown City Council is in the process of widening the channel over a 570-metre length of the drain where it runs through the northern portion of the golf course.

The existing drainage system for Henry Lawson Drive and Milperra Road is that runoff is controlled by a series of pit and pipe drainage systems that discharge to Milperra Drain along its northern bank.

There is a 1.5 metre by 1.2 metre high box culvert which crosses Milperra Road about 190 metres east of its intersection with Henry Lawson Drive where it discharges into Milperra Drain. The box culvert controls runoff from an area of reserve to the north of Milperra Road, as well as a portion of Bankstown Aerodrome. EIS proposal area 2 is located in the area into which this box culvert discharges.

Existing flooding

The nature of flooding under present day conditions in the Milperra catchment has been modelled and found:

- The section of Milperra Road to the east of Henry Lawson Drive is impacted by floodwater that surcharges the main channel of Milperra Drain where it runs through the Bankstown golf course during a 10% AEP storm event. It is noted that flooding would be confined to the outer traffic lanes and to relatively shallow depths of 0.2 metres or less.
- During a 1% AEP storm on the Milperra catchment in the absence of elevated flood levels in the Georges River, flooding from the Milperra Drain would inundate the section of Milperra Road to the east of Henry Lawson Drive across its full width. Flooding due to runoff from the Milperra catchment would pond in the Georges River golf course to a level that is about 0.1 metres below the adjacent level of Henry Lawson Drive.
- During a 1% AEP storm on the Milperra catchment in combination with a 5% AEP flood in the Georges River, peak flood levels in the vicinity of the proposal area are controlled by flood levels in the Georges River. Under this combination of flooding, the peak flood level at the Milperra Drain (Auld Avenue) bridge is about 0.3 metres above its deck level. Floodwaters would also inundate the northern and eastern portions of the proposal area as a result of peak flood levels in the Georges River.
- All three EIS proposal areas would experience frequent inundation due to runoff from the Milperra catchment.

- EIS proposal area 1 is inundated by runoff that is conveyed by the box culvert that crosses Henry Lawson Drive to the north of Tower Road to depths greater than one metre during the 1% AEP and PMF events.
- EIS proposal area 2 is inundated by runoff that is conveyed by the box culvert that crosses Milperra Road to the east of Henry Lawson Drive, to depths greater than one metre during the 1% AEP and PMF events.
- Due to its low lying nature, EIS proposal area 3 would be inundated by flow that originates from the section of Milperra Drain where it runs through the Bankstown golf course, to depths greater than one metre during the 1% AEP and PMF events. The eastern side of EIS proposal area 3 would also be inundated during the 10% AEP event

Flood evacuation routes

Consultation with the NSW State Emergency Services (SES), indicated that flood evacuation routes through the area include both Henry Lawson Drive and Milperra Road.

8.5.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- Australian Rainfall and Runoff (ARR) – third edition 1987 and fourth edition 2019
- Floodplain Development Manual (FDM) (DIPNR 2005)
- NSW Government issued Planning Circular PS 07-003 New guideline and changes to section 117 direction and EP&A Regulation on flood prone land (2007)
- EP&A Act, including Direction 4.3 - Flood Prone Land (2009)
- Bankstown Local Environmental Plan 2015
- Bankstown Development Control Plan 2015.

Consistency with Council floodplain risk management plans

The following council and state government flood related plans were analysed in the flooding assessment:

- Georges River Floodplain Risk Management Study and Plan (Volumes 1 & 2) (BC 2004)
- Floodplain Risk Management Study and Plan for Sub-Catchments of the Mid Georges River (BMT WBM 2017)
- Greater Metropolitan Regional Environmental Plan No 2 -Georges River Catchment.

The overall proposal, including the EIS proposal, was considered to be consistent with the floodplain risk management plans set out in BC 2004 and BMT WBM 2017 for the following reasons:

- The findings of the flooding assessment show that subject to the implementation of mitigation measures during detailed design, the proposal would have only a minor impact on peak 1% AEP flood levels and flow velocities within areas outside the proposal area. Increases in PMF levels are also considered minor in terms of the relative increase in flood hazard and changes in the extent of inundation.
- Subject to the implementation of mitigation measures during detailed design, it is also considered that the overall proposal is consistent with the objectives of the Bankstown LEP in terms of managing its impact on flood behaviour.
- The overall proposal would maintain the existing level of flood immunity to Henry Lawson Drive, Milperra Road and Newbridge Road and therefore would not adversely affect existing emergency response arrangements and flood access.
- The proposed acquisition of No. 439 Henry Lawson Drive for the overall proposal would provide the opportunity to restore the site in a flood compatible manner.
- The proposal would not preclude or limit any of the structural measures identified in BC 2004 and BMT WBM 2017.

The overall proposal, including the EIS proposal, was considered to be consistent with the Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment for the following reasons:

- The proposal would result in no significant change to the periodic flooding to Milperra Drain and other riverine ecosystems.
- There would be no change to the pollution hazard posed by the upgrade of the existing road during times of flood.

Subject to the provision of suitable mitigation measures during detailed design, the overall proposal would have only a minor impact on flood behaviour, including those resulting from the filling of flood prone land.

8.5.4 Criteria

In accordance with the FDM, the hydrologic standards adopted are based on matching the level of protection to the likelihood and consequence of flooding. A merits based approach has been adopted in the assessment of impacts on existing flood behaviour. This same approach has been applied in the development of mitigation measures to minimise impacts on the existing environment.

The adopted assessment criteria and standards are summarised in Table 8-14.

Table 8-14 Adopted assessment criteria and standards for the EIS proposal

Aspect	Requirement
Flood risks to the proposal	
Impact of flooding on proposed construction activities	• Construction related flood risks need to be evaluated in the context of the construction period in order to set requirements that are commensurate to the period of time that the risk exposure occurs. To this end, this report identifies the risks associated with each construction activity such that informed decisions can be made on the flood criteria that are set as part of the CEMP for the proposal.
Upgrade of the existing road	• As a minimum, the upgrade of the existing road is to ensure the existing level of flood immunity (ie. the magnitude of flood that does not cause inundation to the travel lanes) is not reduced by the proposal. • Ideally, the upgrade of the existing road is to provide a 1% AEP level of flood immunity where feasible based on the extent of upgrade requirements, the hydrologic standard of the existing local road network and site constraints.

Impact of future climate change on flooding to the proposal	• The assessment of the potential impact future climate change could have on flood behaviour in the vicinity of the proposal was based on:
	  • Increases in 1% AEP design rainfall intensities ranging between 10 and 30 per cent in accordance with the NSW Government's Floodplain Risk Management Guideline: Practical Considerations of Climate Change (DECC 2007)
	  • Rises in sea level of 0.4 metres by 2050 and 0.9 metres by 2100 based on the NSW Government's Sea Level Rise Policy Statement (NSW Government 2009)

Impact of construction activities on flood behaviour	• Construction related flood impacts are to be evaluated in the context of the construction period in order to set requirements that are commensurate to the period of time that the exposure to the potential impacts occurs. To this end, this report identifies the potential impacts associated with the proposal such that informed decisions can be made on the flood criteria that are set as part of the CEMP.

Aspect	Requirement
Impact of proposal on flood behaviour in neighbouring properties	• Floods up to 1% AEP in magnitude are to be considered in the assessment of measures that are required to mitigate any adverse impacts on flood behaviour attributable to the proposal. • Changes in flood behaviour under larger floods up to the PMF event are also to be assessed in order to identify impacts on critical infrastructure (such as hospitals) and vulnerable properties (such as aged care facilities and schools), as well as to identify potentially significant changes in flood hazard as a result of the proposal.
Impact of the proposal on flood behaviour under future climate change conditions	• The assessment of the impact the proposal would have on flood behaviour under future climate change conditions was based on assessing the effect of the proposal on pre-proposal flood behaviour during a 0.5 % and 0.2 % AEP event.

8.5.5 Assessment of potential impacts

Construction impacts

The potential flooding and hydrology impacts during construction that have been assessed include:

- Increased flood risk to construction activities
- Exacerbation of flooding conditions due to the proposed construction activities.

Construction of the overall proposal area has been split into three areas of work to assess impacts to different areas of construction. Assessment of each section is discussed in Table 8-15.

The range of construction activities that would be undertaken in the EIS proposal areas that are relevant to potential flood risk include earthworks (all EIS proposal areas) and ancillary facilities (EIS proposal area 3 only).

Increased flood risk during construction activities

Construction ancillary facilities located on the floodplain, particularly in areas of high hazard, pose a safety risk to construction personnel. All of the proposed construction ancillary sites of the overall proposal include land that would be suitable for site facilities that is located outside areas of high hazard flooding due to a 1% AEP Milperra catchment flood event in the absence of elevated flood levels in the Georges River. As shown in Figure 5.1 of the flooding assessment in Appendix G, the Henry Lawson Drive Site (construction ancillary site C3) is located partially within EIS proposal area 3. The C3 site would be within the 1% AEP Georges River flood event extent, which could pose safety risks during construction to personnel. There is the potential for materials stored within this ancillary site to be displaced and transported along the Georges River and Milperra Drain should a 5% AEP event or greater occur during the construction of the proposal.

The inundation of construction earthworks by floodwater has the potential to cause scour of disturbed surfaces and the transport of sediment and construction materials into the receiving waterways. It would therefore be necessary to plan, implement and maintain measures that are aimed at managing the diversion of floodwater either through or around the construction areas and to stabilise exposed surfaces. This is relevant for all EIS proposal areas.

Construction ancillary site C3 includes land that would be inundated during a 5% AEP flood. In accordance with standard Transport procedures contingency planning would be required should site facilities be located in these areas.

Table 8-15 Summary of assessed flood risks and potential impacts at proposed construction work areas for the EIS proposal

EIS proposal area	Construction work area	Description of existing flood behaviour (pre-mitigation)	Potential flood risk during construction and impacts of construction activities on flood behaviour
1	Henry Lawson Drive north	Should a 20% AEP Georges River flood occur during construction, the portion of Henry Lawson Drive north to the north of Tower Road would be inundated to depths typically between 0.5 and 1.5 metres. Should a 1% AEP Georges River flood occur during the construction, the full extent of earthworks within Henry Lawson Drive north would be inundated to a maximum depth of over 3 metres. The proposed earthworks along the western side of Henry Lawson Drive within EIS proposal area 1 is located on land that is frequently inundated by runoff that discharges from the box culvert that crosses the road corridor to the north of Tower Road.	Should a flood occur on the Georges River during construction, there is a risk of scour to any exposed surfaces and the transport of sediment into the Georges River. The impact of the proposed earthworks on changes to flood behaviour in the Georges River is not expected to be significantly greater than those under existing conditions in this area. The proposed earthworks within EIS proposal area 1 have the potential to impact on local catchment runoff discharging from the box culvert under the road to the north of Tower Road unless the works are staged in a manner that maintains a temporary flowpath through the site during the extension of the box culvert.
2	Milperra Road	Should a 10% AEP Georges River flood occur during construction, floodwater would back up the Milperra Drain and inundate an area of proposed earthworks along the southern side of Milperra Road including EIS proposal area 2. Should a 5% AEP Georges River flood occur during the construction of the proposal then the full extent of earthworks along the section of Milperra Road would be inundated to a maximum depth of about 2 metres, increasing to 3 metres during a 1% AEP event. The proposed earthworks along the southern side of Milperra Road would be inundated by runoff that surcharges the section of Milperra Drain that runs through the Bankstown golf course during storms as frequent as 50% AEP.	Should a flood occur on the Georges River during construction of 10% AEP magnitude or greater, there is a risk of scour to any exposed surfaces and the transport of sediment into the Georges River. The impact of the proposed earthworks on changes to flood behaviour in the Georges River is not expected to be significantly greater than those under existing conditions in this area. The proposed earthworks within EIS proposal area 2 have the potential to impact on local catchment runoff discharging from the box culvert that crosses Milperra Road unless the works are staged in a manner that maintains a temporary flow path through the site during the extension of the box culvert.

EIS proposal area	Construction work area	Description of existing flood behaviour (pre-mitigation)	Potential flood risk during construction and impacts of construction activities on flood behaviour
		The proposed earthworks along the southern side of Milperra Road, also including EIS proposal area 2, would be frequently inundated by runoff from the box culvert that crosses Milperra Road.	
3	Henry Lawson Drive south	Should a 20% AEP Georges River flood occur during construction, a relatively localised area in the south-east corner of the site would be inundated, (about 280 m^2) to a maximum depth of 0.4 metres. Should a 5% AEP Georges River flood occur during construction, the majority of the site would be inundated to a depth of between 0.5 and 2.2 metres, increasing to between 1.5 and 3.3 metres during a 1% AEP event. Due to the low lying nature of the south-eastern portion of the site it would be inundated by flow from the Milperra Drain through the Bankstown Golf Course during storms more frequently than 50% AEP. Should a 5% AEP storm event occur on the Milperra catchment during construction, almost half of the site would be inundated to a maximum depth of 1.1 metres, while the majority of the site would be inundated to a maximum depth of 1.4 metres during a 1% AEP storm event.	While facilities and materials located within the ancillary site have the potential to displace floodwater that backs up from both the Georges River and Milperra Drain, impacts on flood behaviour for events up to 1% AEP are likely to be minor given the extent of flooding relative to the extent of the ancillary site. However, there is the potential for materials stored within the ancillary site to be displaced and transported along Milperra Drain and the Georges River in a 5% AEP flood or greater.

Exacerbation of flooding conditions due to construction activities

Construction activities have the potential to exacerbate flooding conditions as they typically impose a larger footprint on the floodplain outside of the operational proposal footprint.

The flooding assessment generally found that the potential impact of proposed construction earthworks in all three work areas on flood behaviour was not expected to be significantly greater than those under operational conditions due to the limited extra footprint within the floodplain. However, there is an exception with construction earthworks at the outlet of transverse drainage structures located within EIS proposal area 1 and EIS proposal area 2. These have the potential to impact on local catchment runoff discharging from the culverts. Mitigation measures would be required to maintain temporary drainage paths so that existing flood behaviours are not substantially modified in the surrounding area of these outlets.

It is acknowledged that the findings of the assessment provide an indication of the potential impacts of construction activities on flood behaviour, but that further investigation would need to be undertaken during detailed design, as layouts and construction staging diagrams are further developed.

Operational impacts

Potential flood risk to the proposal

The potential flood risk to the EIS proposal includes the following:

- While the upgrade of the roads within the overall proposal area would maintain the existing level of flood immunity, opportunities to improve the level of immunity is constrained. The constraint is the influence of any new road levels affecting flood behaviour in existing residential and commercial land uses surrounding the overall proposal. This is relevant for all EIS proposal areas.
- In regard to Georges River flood events, the assessment found:
  - The proposed upgrade of the section of Henry Lawson Drive to the north of Milperra Road would be inundated by floodwater that surcharges the river during storms more frequent than 20% AEP. This is relevant for EIS proposal area 1. The depth of flooding along the road during a 10% and 1% AEP Georges River flood would be hazardous to persons and vehicles, but no worse than that under pre-proposal conditions.
  - The proposed upgrade of the sections of Milperra Road and Henry Lawson Drive to its south would both have a 10% AEP level of flood immunity against Georges River flooding. This is relevant for EIS proposal area 2 and 3. The depth of flooding along the road during a 1% AEP Georges River flood would be hazardous to persons and vehicles, but no worse than that under pre-proposal conditions.
- In regard to Milperra catchment flooding the investigation found:
  - The proposed upgrade of Henry Lawson Drive to the north and south of Milperra Road would have a 1% AEP level of flood immunity against Milperra catchment flooding in the absence of elevated flood levels in the Georges River. This is relevant for EIS proposal area 1 and 3. This is no worse than that under pre-proposal conditions.
  - The proposed upgrade of Milperra Road would have about a 10% AEP level of flood immunity against Milperra catchment flooding. This is relevant for EIS proposal area 2. This is no worse than that under pre-proposal conditions.
- Floodwater that surcharges the Georges River during a 1% AEP event and inundates Milperra Road and the sections of Henry Lawson Drive to its north and south would be hazardous to persons and vehicles using these sections of road, but would be no worse than under pre-proposal conditions. This is relevant to all EIS proposal areas.

Impact of the proposal on flood behaviour

The potential impacts on flood behaviour from the operation of the EIS proposal areas, can be summarised as follows:

- The road widening and associated fill embankment within EIS proposal area 1 in isolation would be expected to have a relatively localised impact on flood behaviour in the Georges River and the local drainage lines that cross the proposal to the north of Milperra Road. However, in combination with the overall proposal the works within EIS proposal area 1 would contribute to the changes in flood behaviour over areas to the north of Milperra Road.
- During a 2% AEP and 1% AEP Georges River flood event, there would be an increase in peak flood levels in an area to the west of Henry Lawson Drive, north of Milperra Road (EIS proposal area 2). The greatest increase would occur during a 2% AEP flood event where peak flood levels would be increased by a maximum of 0.15 metres on existing depths of about 0.2 metres. During a 1% AEP Georges River flood event, peak flood levels would be increased by a maximum of 0.06 metres on existing depths of between 0.2 and 0.6 metres.
- There would be negligible change in peak flood levels during a PMF. The overall proposal, including the EIS proposal, would have negligible impact on flow velocities during Georges River flooding.
- The road widening and associated fill embankment within EIS proposal area 2 in isolation would be expected to have a relatively localised impact on flood behaviour in Milperra Drain and the local drainage lines that cross the proposal to the east of Henry Lawson Drive. However, in combination with the overall proposal, the works within EIS proposal area 2 would contribute to the changes in flood behaviour along the section of Milperra Drain to the east of Henry Lawson Drive that are described in this section of the report.
- The provision of new or upgraded drainage infrastructure in EIS proposal areas 1 and 2 to accommodate the proposed road widening has the potential for a localised increase in scour potential due to a localised increase in flow velocities at the outlet of new, upgraded or extended drainage structures. During detailed design, scour protection and energy dissipation measures would be incorporated into the design of the drainage outlets to manage localised increases in flow velocity.
- Works within EIS proposal area 3 are related to the provision of a temporary ancillary site to support the construction of the proposal. Subject to the suitable reinstatement of the site following the construction of the proposal the works within EIS proposal area 3 would have no significant impact on existing flood behaviour.

The overall proposal would have only a minor impact on peak flows in the Georges River and Milperra Drain catchments. However, there is the potential for localised increases in scour potential due to localised increases in flow velocities at the outlet of new, upgraded or extended drainage structures (such as at EIS proposal areas 1 and 2).

Partial blocking of hydraulic structures could impact flood levels experienced for the Georges River and Milperra Road catchment. Assessment of partial blocking of the transverse drainage structure crossing Henry Lawson Drive in EIS proposal area 1, showed that peak 1% AEP flood levels would result in increased levels by 0.12 metres AHD due to a partial blockage. However, this would not further increase flood hazard, with the resulting flood level at the same level as the edge of Henry Lawson Drive. Partial blockage of the Milperra Road drainage structure would not result in any change to peak flood levels during a 1% AEP flood event.

Impact of future climate change on flood behaviour

The increase in rainfall intensities attributable to future climate change has the potential to increase the frequency to flood events in the EIS proposal areas. These include:

- The section of Henry Lawson Drive to the north of Tower Road is presently inundated during a 20% AEP Georges River flood (which occurs on average once every 5 years), whereas under future climate change it could be inundated during a 40% AEP Georges River flood (which occurs on average once every 2 years).

- The section of Milperra Road to the east of Henry Lawson Drive is presently inundated during a 5% AEP Georges River flood (which occurs on average once every 20 years), whereas under future climate change it could be inundated during a 10% AEP Georges River flood (which occurs on average once every 10 years).
- The section of Henry Lawson Drive to the south of Milperra Road is presently inundated during a 5% AEP Georges River flood (which occurs on average once every 20 years), whereas under future climate change it could be inundated during a 10% AEP Georges River flood (which occurs on average once every 10 years).

The increase in rainfall intensities attributable to future climate change has the potential to increase the depth of inundation to the overall proposal. This has been taken into account in the assessment of the peak 1% AEP flood levels for the overall proposal (e.g. both current climatic conditions and future climate change scenarios have been assessed).

Sea level rise under future climate change conditions would only have a minor impact on peak flood levels near the overall proposal area. A summary of the peak 1% AEP flood levels in regard to current and future climate change conditions indicates that the EIS proposal would have the following impacts:

- At Henry Lawson Drive north of its intersection with Milperra Road (relevant for EIS proposal area 1), the depth of inundation due to Georges River flooding would be increased from 1.9 metres under current climatic conditions, to between 2.1 and 2.4 metres under future climate change conditions.
- At Milperra Road and Newbridge Road (relevant for EIS proposal area 2), the depth of inundation due to Georges River flooding would be increased from 1.8 metres under current climatic conditions, to between 2.0 and 2.4 metres under future climate change conditions.
- At Henry Lawson Drive south of its intersection with Milperra Road (relevant for EIS proposal area 3), the depth of inundation due to Georges River flooding would be increased from 1.9 metres under current climatic conditions, to between 2.1 and 2.5 metres under future climate change conditions.

In regards to the impact of the proposal on flood behaviour under future climate change conditions, the 0.5% and 0.2% AEP events were adopted as proxies for assessing the sensitivity to an increase in 1% AEP design rainfall intensities of between 10% and 30% due to future climate change.

Regarding Georges River flooding:

- The assessment of flood impacts across a range of events has identified that the overall proposal has the greatest potential for increases in peak flood levels in neighbouring properties as a result of Georges River flooding during a 2% and 1% AEP event. The increase in rainfall intensities under future climate change would mean that the rainfall intensities that produce these flood events would occur more frequently. That is, unless suitable mitigation measures are incorporated into the overall proposal, then the impacts would occur on a more frequent basis than once every 100 years on the average.
- There would be either no change or a reduction in the flood impacts during a 1% AEP flood that are attributable to the overall proposal under the lower and upper bound future climate change scenarios.
- The following impacts of future climate change on flood behaviour were found for the different EIS proposal area locations:
    - Henry Lawson Drive north of its intersection with Milperra Road (EIS proposal area 1): depth of inundation due to Georges River flooding would be increased from 1.9 metres under current climatic conditions, to between 2.1 and 2.4 metres under future climate change conditions.
    - Milperra Road and Newbridge Road (EIS proposal area 2): depth of inundation due to Georges River flooding would be increased from 1.8 m under current climatic conditions, to between 2.0 and 2.4 metres under future climate change conditions.

- Henry Lawson Drive south of its intersection with Milperra Road (EIS proposal area 3): depth of inundation due to Georges River flooding would be increased from 1.9 m under current climatic conditions, to between 2.1 and 2.5 metres under future climate change conditions.

Regarding Milperra catchment flooding:

- The assessment of flood impacts across a range of events in combination with and without elevated flood levels in the Georges River has identified that the overall proposal has the greatest potential for increases in peak flood levels in adjoining development as a result of flooding in the Milperra catchment during 1% AEP event, in combination with a 5% AEP flood on the Georges River. The increase in rainfall intensities under future climate change would mean that the rainfall intensities that produce these flood events would occur more frequently. That is, unless suitable mitigation measures are incorporated into the proposal, then under future climate change conditions the impacts would occur on a more frequent basis when compared to current climatic conditions.
- There would be either no change or a reduction in the flood impacts during a 1% AEP flood that are attributable to the proposal under the lower and upper bound future climate change scenarios.
- The following impacts of future climate change on flood behaviour were found for the different EIS proposal area locations:
  - Henry Lawson Drive north of its intersection with Milperra Road (EIS proposal area 1): While this section of road is not inundated under current climatic conditions, under future climatic conditions it would be inundated by between 0.06 and 0.13 metres.
  - Milperra Road and Newbridge Road (EIS proposal area 2): The depth of inundation due to Milperra catchment flooding would be increased from 0.4 metres under current climatic conditions, to between 0.45 and 0.54 metres under future climate change conditions.
  - Henry Lawson Drive south of its intersection with Milperra Road (EIS proposal area 3): The depth of inundation due to Milperra catchment flooding would be increased from 0.05 metres under current climatic conditions, to between 0.1 and 0.22 metres under future climate change conditions.

Impact of a partial blockage of major hydraulic structures on flood behaviour

The flooding assessment showed that a partial blockage of major hydraulic structures (the culverts within EIS proposal areas 1 and 2) would generally have only a minor impact on flooding to the proposal.

8.5.6 Environmental management measures

Safeguards and management measures for hydrology, flooding and coastal processes are presented in Table 8-16.

Table 8-16 Environmental management measures for hydrology, flooding and coastal processes impacts

Impact	Environmental management measure	Responsibility	Timing
Construction and management of ingress, changes to surface water flows and scour	A Construction Soil and Water Management Plan will be prepared to guide construction methods in implementing the following measures in accordance with Blue Book (Managing Urban Stormwater, Soils and Construction Volume 2D Main Road construction): • Intercepting clean water flows from areas upslope of the EIS proposal areas and diverting it in a controlled manner whether through or around the construction work areas to avoid or minimise mixing of 'clean' water flows with 'dirty' sediment-laden runoff from work areas. • Minimise the potential for scour by implementing surface stabilisation, scour protection measures and energy dissipation measures • Implement a 'wet weather' Erosion and Sediment Control Plan that includes stabilisation of exposed earthworks prior to the onset of heavy rainfall or predicted flooding. In addition, changes to surface water flows (volume and velocity) will be minimised by: • Detailed design of drainage infrastructure that provides sufficient capacity and energy dissipation controls.	Transport/ Contractor	Detailed design/Pre-construction
Site facilities and flood emergency management within ancillary sites, management of adverse flood impacts on neighbouring properties	The CEMP will include a Construction Flood Management Plan Sub-Plan. This Sub-Plan will include details and procedures to minimise the potential for construction activities within EIS proposal areas 1, 2 and 3 to adversely impact on flood behaviour in neighbouring properties. Measures to manage residual flood impacts will include: • Staging construction to limit the extent and duration of temporary works on the floodplain • Ensuring construction equipment and materials are removed from floodplain areas at the completion of each work activity or should a weather warning be issued of impending flood producing rain • Providing temporary flood protection to properties identified as being at risk of adverse flood impacts during any stage of construction of the proposal • Developing flood emergency response procedures to remove temporary works during periods of heavy rainfall. For the ancillary facility in EIS proposal area 3, a Construction Flood Management Sub-Plan will include the following additional components: • Limit the extent of works located in floodway areas • A procedure to monitor weather conditions (existing and forecast conditions), including minor rain events, local weather warnings and river water level data	Contractor	Pre-construction

Impact	Environmental management measure	Responsibility	Timing
	• A communication protocol to disseminate warnings to construction personnel of impending flood producing rain or predicted flooding in the Georges River and actions required to make construction areas stable and safe. • An evacuation plan for construction personnel should a severe weather warning or flood alert for the Georges River be issued.		
Material storage and stockpiling within ancillary sites	The storage of hazardous material in EIS proposal area 3 will be confined to areas that are not subject to flooding during a 1% AEP extent or either: • Stored in a manner that prevents their mobilisation during times of flood • Be removed from the floodplain when minor rain events are predicted to inundate storage areas and at the onset of a flood. The Construction Flood Management Sub-Plan will define the flood immunity criteria (including consideration of inundation from minor rain events) for material storage and stockpile areas proposed to be located in EIS proposal area 3. Erosion and sediment (ERSED) controls are to be installed around the ancillary site in EIS proposal area 3 to reduce the risk of sediment runoff to the east into Milperra Drain near the Bankstown Golf Course. These ERSED controls are to be integrated into any exclusion zone or property boundary demarcation.	Contractor	Pre-construction/ Construction
Management of adverse flood impacts on neighbouring properties	A detailed hydrologic and hydraulic (flood) assessment will be undertaken during detailed design to assess the impacts of the EIS proposal on flood behaviour and the associated measures which are required to mitigate those impacts. Subject to the flood assessment during detailed design a detailed ground survey (including floor levels of buildings) may need to be undertaken in affected areas to determine whether the proposal would increase flood damages in adjacent development (i.e. in properties where there is a potential for increases in peak flood levels for events up to 1% AEP in magnitude).	Transport	Detailed design

Impact	Environmental management measure	Responsibility	Timing
Management of adverse flood impacts on the existing environment	During detailed design, the following measures will be implemented to manage adverse flood impacts: • The road alignment will be further refined to minimise the increase in road levels and peak flood levels compared to pre-proposal conditions. • Works within the floodplain will be designed to minimise adverse impacts on surrounding development for flooding up to the 1% AEP event in magnitude. This is relevant for the EIS proposal as all EIS proposal areas are within either the 1% AEP Georges River event and/or the 1% AEP Milperra catchment event. Assessment will also be made of impacts during floods up to the PMF in the context of impacts on critical infrastructure and flood hazards. • Incorporate measures that are aimed at mitigating its impact on flood behaviour in properties where existing buildings would experience above-floor inundation during floods up to the 1% AEP event. • The provision of scour protection and energy dissipation measures will be included in order to mitigate the localised increases in flow velocities at the outlets that are to be upgraded, relocated or new stormwater drainage systems. This is relevant for EIS proposal areas 1 and 2 as the outlet to transverse drainage structures are located within these areas.	Transport	Detailed design

8.6 Land use and development

Secretary's requirements	Where addressed in EIS
Land-use and development – including: • the assessment for impacts of construction and operation on and from surrounding land uses, • an assessment of safety and access to intersections and properties during construction, and • consideration and details to whether the proposed development is within, adjacent to, or in proximity to, or in proximity to a watercourse that flows directly into EES Group-managed conservation estate (e.g. a national park, nature reserve, state conservation area, land which is declared wilderness under the *Wilderness Act 1987*), requirements for consultation with EES and consistency with relevant guidelines.	Section 8.6.4 and Section 9.1.3 Section 8.6 'access and connectivity' and in Section 9.1 for active transport. Section 8.6.2

A socio-economic impact assessment has been produced by Aurecon Australasia and is provided in Appendix H.

The socio-economic impact assessment has included a discussion of the land use and development impacts from the proposal.

8.6.1 Assessment methodology

The assessment methodology of the socio-economic impact assessment included the identification and assessment of the property impacts (such as temporary and permanent access impacts and perceived economic impacts associated with proposed property acquisition), and consideration of the land use and development impacts, as specified in the SEARs. Consideration of the impacts of the property acquisition is provided in Section 9.3.

The impact assessment implements the following methodology as per the *Environmental Impact Assessment Practice Note – Socio-economic assessmen*t (EIA-N05) (Transport, 2020). The socio-economic impact assessment has been prepared for a 'moderate' level assessment (as per Transport's EIA-N05 Environmental Impact Assessment Practice Note – Socio-economic Assessment (Transport, 2020)). The moderate level of assessment is used as it reflects the scale and magnitude of potential impacts to the socio-economic environment. The assessment includes:

- Review of statutory planning and legislative requirements
- A site visit, undertaken on 15 july 2020 between 10am to 2pm, to understand the existing environment
- Description of the existing socio-economic environment of the study area to establish the baseline
- Identification and assessment of the potential socio-economic impacts of the proposal
- Measures to avoid, minimise and manage potential construction and operation impacts on the socio-economic environment and maximise potential benefits of the proposal.

The impact assessment has been prepared in accordance with the methodology of assessing impacts based on sensitivity and magnitude to determine potential significance of impacts prescribed in the Transport EIA-N05 Environmental Impact Assessment Practice Note – Socio-economic assessment (2020). This includes:

- Identification and analysis of likely changes to existing socioeconomic conditions of the direct study area and socio-economic study area during construction and operation
- Determination of the significance of likely impacts, based on the sensitivity and magnitude of the impacts
- Sensitivity refers to the qualities of the receptor which influence its vulnerability to change and capacity to adapt

- Magnitude refers to the scale, duration, intensity and scope of the overall proposal including how it would be constructed and operated.

The impact grading matrix utilised to assess the level of significance for potential negative impacts is shown in Table 8-17.

Table 8-17 Grading matrix to assess the level of significance

		Magnitude			
		High	**Moderate**	**Low**	**Negligible**
Sensitivity	High	High	High-moderate	Moderate	Negligible
	Moderate	High-moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

8.6.2 Existing environment

Regarding the existing land use, the Henry Lawson Drive road corridor is a highly developed urban environment, south west of the Sydney CBD. Most of the overall proposal is mapped as SP2 – Infrastructure. Henry Lawson Drive is zoned as SP2 – Infrastructure, as a key connection for traffic moving between the Hume Highway, Milperra Road /Newbridge Road and the M5 Motorway. Georges River is zoned W1 - Natural Waterways.

As stated in Section 2.3 of this EIS report, the zoning of the three EIS proposal areas under the Bankstown Local Environmental Plan 2015 are as follows:

- EIS proposal area 1 is zoned as a mix of RE1 (Public Recreation) and SP2 (Road Infrastructure Facility).
- EIS proposal area 2 is zoned as a mix of RE1 (Public Recreation) and SP2 (Road Infrastructure Facility).
- EIS proposal area 3 is zoned as RE1 (Public Recreation).

As stated in Section 2.2 of this EIS report:

- EIS proposal area 1 is partly owned by local government (Lot:14/DP1128950) and partly Crown land adjacent to the river.
- EIS proposal area 2 is partly owned by NSW government (Lot:6//DP1103168) and partly owned by the Crown (Lot:3//DP1103168).
- EIS proposal area 3 is currently in two parcels of land that are in private ownership and owned by council (Lot:16/DP18399 and Lot:17//DP18399).

Henry Lawson Drive is zoned as SP2 – Infrastructure, as a key connection for traffic moving between the Hume Highway, Milperra Road /Newbridge Road and the M5 Motorway.

Georges River is zoned W1 - Natural Waterways. Land adjacent to the Georges River is zoned as RE1 – Public Recreation. There is a range of open space and recreational activities including the Georges River Golf Course, Gordon Parker Reserve, Vale of Ah field, Bankstown Golf Club.

The eastern side of Henry Lawson Drive, north of Milperra Road is also zoned SP2 – Infrastructure and is comprised of the Bankstown Airport. The airport includes three runways and a variety of ancillary services.

The area south of Milperra Road is largely zoned as RE2 – Private Recreation and R2 – Low Density Residential. There are a range of industrial services within the area, comprised of warehouses and industrial activities, however these are further east in the broader study area.

It should be noted that the EIS proposal areas are not within or in proximity to, or in proximity to a watercourse that flows directly into EES Group-managed conservation estate.

The property ownership of the EIS proposal areas is provided in Section 2.2.

Transport will go through a property acquisition process to acquire property that is not owned by NSW government prior to construction. The necessary property acquisition for the EIS proposal is described in Section 6.2.8.

8.6.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- NSW Premier's Priorities
- NSW Road Safety Strategy 2012-2021
- Greater Sydney Region Plan: A Metropolis of three cities – connecting people
- Future Transport Strategy 2056
- Building Momentum - State Infrastructure Strategy 2018 – 2038
- Road Safety Plan – Towards Zero
- Community Strategic Plans
- Local Strategic Planning Statements
- Other City of Canterbury Bankstown Plans.

8.6.4 Assessment of potential impacts

Construction

The EIS proposal is expected to have some adverse impacts during the construction phase, including:

- Property and land use impacts, such as property acquisition and property adjustments for residences, businesses and social infrastructure.
- As detailed in Section 2.2, the property in EIS proposal area 3 is subject to Canterbury Bankstown City Council voluntary purchase scheme. Property acquisition can result in varying impacts to landowners and occupiers, with some people being more vulnerable to impacts than others. The property acquisition may be viewed as a negative or positive impact from a land use point of view.
- Changes in access and connectivity for all road users as a result of traffic delays and congestion around construction areas, temporary alternate traffic arrangements including lane closures, detours and reduced speed limits and use of ancillary facilities. In particular, construction work within EIS proposal area 2 would require the temporary relocation of the existing bus stop on Milperra Road. Construction would introduce changes in access along the shared user path on Henry Lawson Drive that would impact residents and the broader community that use these areas.
- The temporary relocation of bus stops and temporary adjustment of footpaths may affect accessibility, and some resident and visitor enjoyment of public spaces.

Operation

The EIS proposal is expected to have both positive and adverse impacts during the operational phase, including:

- Some changes in land use in the road corridor. This would include areas that were previously vacant or vegetated land alongside Henry Lawson Drive (EIS proposal area 1) and Milperra Road (EIS proposal area 2) and would now form part of the built road environment.
- Improvement in pedestrian connectivity through the construction of new footpaths and relocated bus stops.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

Evaluation of impacts

Table 8-18 outlines the land use and planning issues and potential impacts of the activities to be undertaken in the EIS proposal areas. However, it is acknowledged that the EIS proposal would be constructed together with the REF proposal, as such, the potential impacts are similar to the REF proposal, but at a much smaller scale.

Table 8-18 Evaluation of land use and development impacts

Aspect	Construction impact assessment	Significance of impact			Operation	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
Property acquisition	Acquisition in EIS proposal area 1 would be required for the new road, earthwork and road furniture. Land to be acquired in this area would be from The Crown and Council. Property acquisition in this area may impact the use of this area during construction due to the presence of construction plant and machinery. Acquisition in EIS proposal area 2 would be required for the installation of a new bus stop and footpath, installation of fill embankments along the edge of the new carriageway on Milperra Road, utility works and the installation of road furniture. Land to be acquired in EIS proposal area 2 would be a small portion of private land owned by the Bankstown Golf Club and Council land. The Council owned land forms part of Henry Lawson Drive and also part of the vegetated corridor between Henry Lawson Drive and the Georges River. Property acquisition is	Low	Low	Low	During operation of the EIS proposal there would not be any property acquisition or adjustments. EIS proposal area 3 would be returned to council as part of the NSW Government's Floodplain Management Program.	Negligible	Negligible	Negligible

Aspect	Construction impact assessment	Significance of impact			Operation	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	not expected to impact the use of the golf club (discussed further in land use changes and development section in this table). Acquisition in EIS proposal area 3 would be required for the establishment of an ancillary facility and construction area, installation of fill embankments along the edge of the new carriageway and surface stabilisation to minimise erosion in the area. Land to be acquired in EIS proposal area 3 would be private residential land.							
Access and connectivity	During construction within EIS proposal area 1 the shared user pathway on the northbound side of Henry Lawson Drive would be impacted. Alternate arrangements for the pathway would be required during widening works, utilities work and earthwork. The temporary closure or adjustment of pathways and shared user connections may affect accessibility, community cohesion and some resident	Low	Moderate	Moderate-low	The EIS proposal would result in improved traffic flow and efficiency in conjunction with the works required for the REF proposal. The reinstatement of the shared user pathway within EIS proposal area 1, the establishment of footpaths and relocated bus stop on Milperra Road in EIS proposal area 2 are expected to have a positive impact on access for all road users.	Negligible	Negligible	Negligible

Aspect	Construction impact assessment	Significance of impact			Operation	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	and visitor enjoyment of public spaces in the study area. This would mostly be experienced around the main structural widening works. Changes in pedestrian or recreational access and connectivity would reduce the overall amenity of the direct study area. Construction work within EIS proposal area 2 would require the temporary relocation of the bus stop on Milperra Road. This bus stop would be moved to facilitate the widening works and proposed relocation of the bus stop 20 metres to the west. The relocation of the bus stop may result in commuters having to travel further distances to access alternative bus stop locations. It may also cause some confusion for commuters that are unfamiliar with services within the area.							
Land use changes and development	In EIS proposal area 1, land use changes would occur within the vegetated corridor between the Georges River and Henry Lawson Drive. This area is currently used for active and passive recreation	Low	Low	Low	In EIS proposal areas 1 and 2, leased land that is not required for the road footprint and associated road furniture would be returned to Council and private owners. At the time of writing, arrangements	Low	Low	Low

Aspect	Construction impact assessment	Significance of impact			Operation	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	by the community. During construction, EIS proposal area 1 would be used for construction activities, restricting the use of this area by the public. This may have flow on effects to people travelling within and through EIS proposal area 1 as construction areas would be fenced to ensure the community's safety from plant, machinery, excavations, and other activities. Land use changes in EIS proposal 2 would include the use of a portion of the vegetated road reserve for transverse drainage infrastructure, embankment works and road widening. Construction would require land use changes within the residential property on Henry Lawson Drive, north of Auld Avenue for use as an ancillary facility during construction (EIS proposal area 3). A portion of this property would be acquired for the EIS proposal. A small section of road reserve and the property to the south				for EIS proposal area 3 were still to be confirmed. Vegetation removal would occur in all three EIS proposal areas during construction. EIS proposal areas 1 and 2 would be revegetated prior to the completion of construction, however revegetation in EIS proposal area 3 would be subject to further discussions with council depending on the requirements of the Floodplain Management Program. The vegetation removal required for the EIS proposal may impact the use of certain areas, particularly EIS proposal area 1 which is used for recreation and active transport connectivity. Vegetation removed and replanted would need time to re-establish and grow, resulting in some temporary visual impacts. It should be noted that the proposal has been developed in consideration of large traffic			

Aspect	Construction impact assessment	Significance of impact			Operation	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	of the proposed ancillary facility would also be used for construction of the road and embankment works. Other surrounding proposed development in the socio-economic study area and broader study area would not be impacted by construction activities within the EIS proposal areas. Impacts would be minor in nature.				generating developments that would be constructed/have been constructed near the proposal that would place increased traffic demand on Henry Lawson Drive. This is further discussed in traffic and transport section in Chapter 9.			

8.6.5 Environmental management measures

Safeguards and management measures for land use and development impacts are presented in Table 8-19. Additional safeguards and managements measures for property access and active transport are considered in Chapter 9.

Table 8-19 Environmental management measures for land use and development impacts

Impact	Environmental management measure	Responsibility	Timing
Property acquisition requirements including private and crown land acquisition	Land acquisition will occur in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.	Transport	Pre-construction

8.7 Groundwater and surface water

Secretary's requirements	Where addressed in EIS
Groundwater and surface water – including: • an assessment of hydrology, and potential impacts on the quality and quantity of surface and groundwater resources with reference to the ANZG (2018) Guidelines for Fresh and Marine Water Quality or equivalent water quality guidelines, • details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*, and • flooding – consideration of the impacts of the proposal on the hydraulic and hydrologic regime of the area.	Hydrology is discussed in Section 8.5. Section 8.7 Section 6.4.8 and Section 8.7.5 Consideration of the impacts of the proposal on hydraulic and hydrologic regimes is provided in Section 8.5.

The following reports have been prepared to provide an assessment of the groundwater and surface water impacts:

- Groundwater impact assessment, produced by Aurecon Australasia, is provided in Appendix I.
- Surface water assessment, produced by NGH Pty Ltd, is provided in Appendix J. This includes the Operational water quality strategy and the Erosion and Sediment Control Strategy, both produced by Lyall & Associates.

8.7.1 Assessment methodology

Groundwater

The assessment methodology undertaken for the groundwater impact assessment involved a two-stage approach. Stage 1 was a desktop assessment to determine the hydrogeological characteristics of the groundwater flow system associated with the overall proposal. The following was assessed as part of Stage 1:

- Characterisation of the catchment (including surface, hydrogeological, geological, water quality and groundwater systems) including:
  - Local topography (based on available +/- 2 metre resolution state contours – NSW Spatial Services)
  - Drainage (Public NSW Hydrography)
  - Soil landscapes (DPIE 2020)
  - ASS (Naylor et al 1998)
  - Hydrologic soil groups (OEH 2017)
  - Geology (Penrith 1:100 000 Geological Sheet, Clark and Jones 1991)

    - Hydrogeology (based on data supplied on eSpade and SEED Mapping, OEH 2002 and DPIE 2020).
- A description of groundwater conditions within the study area, including occurrence, flow, and quality/chemistry through review of available public access data and from proposed/completed geotechnical investigations.
- A review of available public access data to identify boreholes, GDEs and groundwater users (if any) within one kilometre of the proposal area.
- Review of the preliminary site investigation to reference any known existing water quality issues
- Review of relevant planning instruments, including the Bankstown Local Environmental Plan and DCP, and relevant Water Sharing Plans (WSPs) to contextualise the site relative to sensitive groundwater receiving environments potential constraints on construction and operation of the proposed link road, along with any requirements for licencing/approvals to undertake works.
- Review of potential constraints and impacts relevant to key legislation, including the *National Environment Protection Act 2013,* National Water Quality Management Strategy 2000, *Water Management Act 2000*, NSW State Groundwater Quality Protection Policy (1998), NSW Groundwater Dependent Ecosystems Policy (2002), *Protection of the Environment Operations Act 1997*, and NSW Aquifer Interference Policy (2012).

Stage 2 was an impact assessment, where the outcome from Stage 1 is used to develop a hydrogeological conceptual model (HCM) for the basis of the assessment of the presence of absence of impacts in accordance with the procedures in the Practice Note, Aquifer Interference Policy and other relevant legislation and policies assessed in Stage 1. This includes:

- Assessment of potential impacts to groundwater resource/quality and groundwater users/receiving environments from construction stage and operational stage activities (including excavations, surface water diversions, temporary changes to drainage conditions) in consideration of Local Environment Plans (LEPs), Water Sharing Plans (WSPs) and relevant legislation.
- Assessment of suitable management measures/mitigation strategies to control potential risks to groundwater resource/quality and groundwater users/receiving environments from construction and operation of the proposal. Development of mitigation strategies following a hierarchy of priority based on the level of potential risk to the environment.

The impact rating used to assess the groundwater impacts were:

- Very Low/Minimal: Potential adverse impact could result in a minimal decline in the resource in the study area during the life of the proposal. Probability of event occurring may be not anticipated.
- Low: Potential adverse impact could result in a slight decline in the resource/quality of a resource in the study area during the life of the project. Probability of event occurring may be unlikely. Research, monitoring, and/or recovery initiatives would not normally be required.
- Moderate: Potential adverse impact could result in a decline in the resource resource/quality of a resource to lower-than-baseline/worse-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Probability of event occurring may be probable/possible. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
- High: Potential adverse impact could threaten sustainability of the resource/quality of a resource and should be considered a management concern. Probability of event occurring may be likely. Avoidance of this impact through mitigation strategies is recommended. Research, monitoring and/or recovery initiatives should be considered.

Surface water

The Construction Surface Water Quality Assessment included:

- A literature review of the water quality conditions of the Georges River and Milperra Creek.
- A literature review of turbidity impacts on waterways and riparian environments.
- Establishment of ecological values of each waterway.

- Identification of an indicative protection level for each waterway using ANZG (2018) Guidelines for Fresh and Marine Water Quality and the Water Quality Objectives in NSW.
- Identification of indicators to the risks to environmental values.
- Prediction and assessment of the potential impact of possible proposed discharges of construction water to the waterways with consideration to the concept design Erosion and Sediment Control Strategy.

The Operation Surface Water Quality Assessment consisted of a qualitative surface water quality assessment of the overall proposal in operation. Lyall & Associates prepared an Operational Water Quality Strategy, which informed the surface water assessment. MUSIC rainfall runoff modelling software was used to investigate the impact of the overall proposal, incorporating the increase in pavement (i.e. impervious area) and the increase of future traffic use. Two scenarios were run through the MUSIC software to compare water quality results between the 'pre-upgrade scenario' and the 'post-upgrade scenario', and the post-upgrade scenario with and without mitigation.

8.7.2 Existing environment

The overall proposal is located within the Georges River catchment which drains a 930 square kilometres area, including parts of 14 LGAs, and covers a significant portion of the Greater Metropolitan Region (Department of Planning, Industry and Environment, 2018). The Georges River itself extending about 60 kilometres south-west of Sydney. The waters of the Georges River catchment, having come together from such widespread sources as Wollongong and Wollondilly in the south and Blacktown in the north, ultimately flows eastwards into Botany Bay.

The Georges River catchment is one of Australia's most urbanised and developed catchments and this has led to poor health throughout most of the catchment. Land use within the catchment varies, and includes residential, industrial, agricultural, mining and Defence activities and protected areas such as drinking water catchments and conservation areas.

Soil landscapes, geology and hydrogeology

All of EIS proposal area 1 has been classified as hydrologic group C soils. Hydrologic group C soils have slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. Soils around EIS proposal areas 2 and 3 are considered disturbed and any natural hydrologic properties have not been assessed.

The Parramatta/Georges River landscape (across EIS proposal area 1 and part EIS proposal area 3) are characterised by low lying Quaternary and Tertiary alluvial floodplains of the Georges River and areas of reclaimed land around the river. This landscape is heavily influenced by ASS and has generally a higher-than-average salinity, primarily due to cyclic flows with estuarine and acid sulfate influences. Salinity risk for the EIS proposal is shown in Figure 8-6.

The western portion of the overall proposal area where the roadway is parallel to the Georges River falls within the Parramatta/Georges River hydrogeological landscape (HGL). The northern, eastern and southern portions of the area further from the river are within the Moorebank hydrogeological landscape.

Groundwater dependent ecosystems

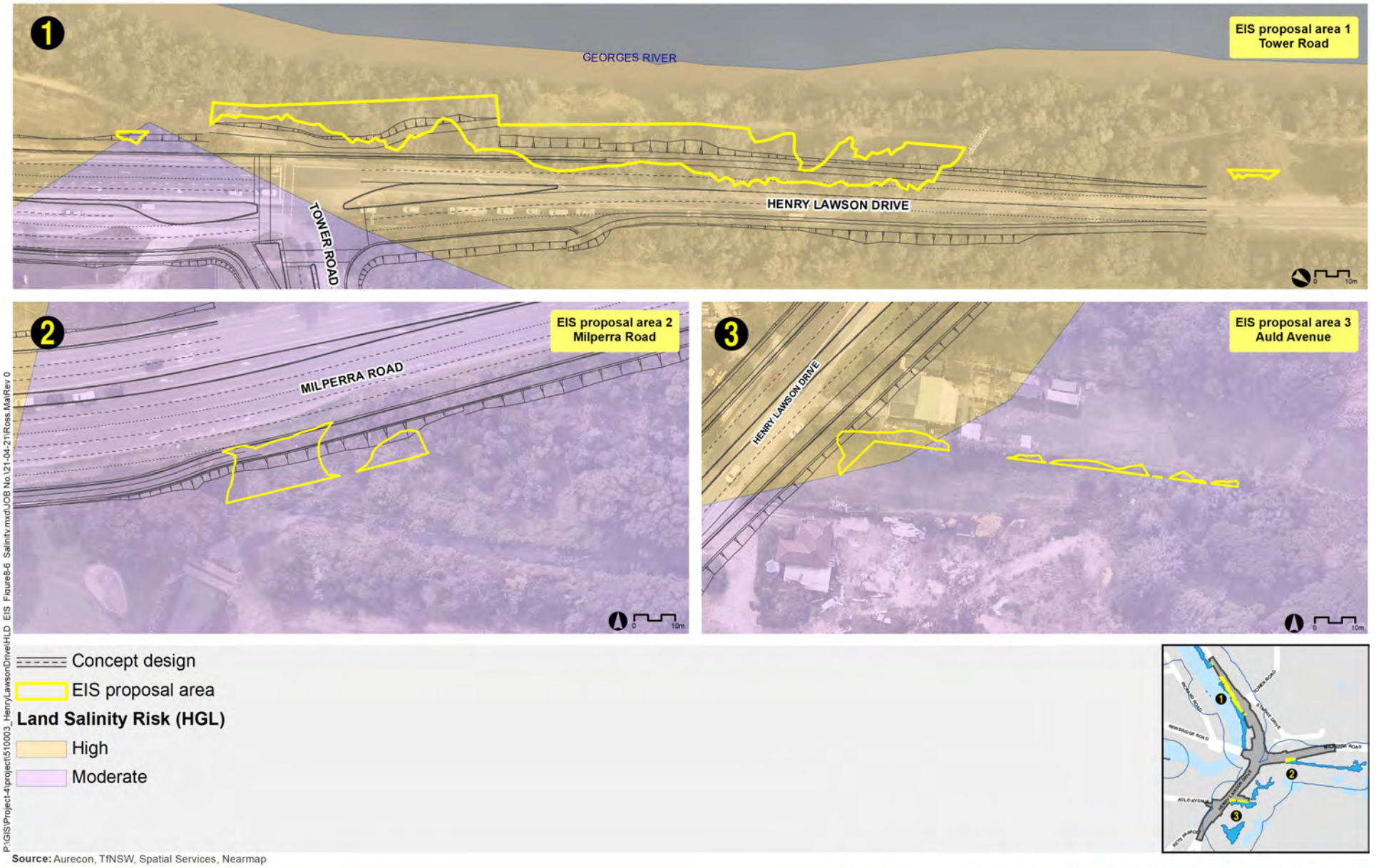
GDEs rely on groundwater for some or all of their water requirements and are considered a component of the groundwater environment. The biodiversity value of GDE's and potential impacts are assessed in Section 8.1.

A search of the Bureau of Meteorology (BOM) GDE Atlas found that a number of GDE's are present within the study area.

The search identified high potential aquatic GDEs within the study area (shown in Figure 8-7). A high potential for terrestrial GDEs was also noted within the study area, particularly to the south of the Milperra Road intersection, and west of Keys Parade within the parkland areas abutting the Georges River. Areas of subterranean GDEs were not mapped within the study area.

The coastal wetlands along the riparian zone of the Georges River (EIS proposal area 1) comprise (in part) aquatic GDEs.

In addition, as recognised earlier in Section 8.1.4, GDEs near the overall proposal study area include the Georges River. Other GDEs which are reliant on subsurface groundwater in the EIS proposal area includes Cumberland River-flat Forest, Coastal Freshwater Lagoon, Coastal Swamp Paperbark – Swamp Oak Scrub and Estuarine Swamp Forest.



Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-6: Salinity

Source: Aurecon, TfNSW, Spatial Services, BoM, Nearmap

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-7: Groundwater Dependent Ecosystems

Flow is generally unconfined through the alluvial soils into the Georges River; hence groundwater flow direction is expected to the west. Surface water runoff is also expected in this direction towards the river, due to the flat nature of the proposal area and increasing elevation away from the river.

The Moorebank hydrogeological landscape (across EIS proposal area 2 and part of EIS proposal area 3) present in the north, east and south of the overall proposal's alignment is characterised by moderate salinity shale layers that cyclically flush salts into the lower lying Parramatta/Georges River hydrogeological landscape. The Moorebank landscape is distinguished by its terminal-like ponding of the river with minimal acid sulfate influences.

The Moorebank hydrogeological landscape differs from other hydrogeological areas within the Sydney region due to its very flat and low-lying alluvial plains and ponding in the river bend areas. Ponding and slow drainage is particularly notable in the Chipping Norton area, to the north west of the overall proposal alignment. This area is dominated by Tertiary alluvium which is distinguishable from the Parramatta/Georges River HGL by a lower salinity signature and less influence from ASS.

Groundwater levels throughout the overall proposal area are expected to be shallow due to the location on alluvium and the close proximity of the Georges River, between zero to eight metres below the surface, varying seasonally (higher in winter, lower in summer). A review of groundwater bores in the area reported groundwater levels near the overall proposal area of between 4.6 to 5.0 metres below ground level (m bgl), with a drilled bore around 100 metres south east of the EIS proposal area 3 detecting groundwater at 2.8 metres bgl.

Groundwater flow through the alluvial sediments is anticipated to be towards the Georges River. Elevation data indicates that the Georges River forms a local groundwater discharge point (gaining conditions). This preliminary indication would need to be confirmed through groundwater monitoring and baseflow analysis of the Georges River within and around the overall proposal.

Three stormwater drains are present beneath Henry Lawson Drive (near to EIS proposal area 1) and Milperra Road (EIS proposal area 2) that were identified during an Aurecon inspection on September 28, 2020. Stormwater drains were observed to flow into the Georges River. These drains may locally alter groundwater flow paths where they intersect groundwater or act as recharge zones for groundwater from leakage or discharge.

Surface water

The Georges River is located to the west of the overall proposal area and Milperra Drain to the east. The Georges River is categorised as a 7th order stream under the Strahler Stream Categorisation (DoI 2018) system. The Milperra Drain is a minor tributary of the Georges Rivers and is classified as a 2nd order stream.

The estuary is delimited by the Liverpool Weir. The tidal range within the Georges River is less than 0.1 metres from the Liverpool Weir to Botany Bay (BMT WBM 2013).

Coastal wetlands are mapped adjacent to and within the EIS proposal areas. EIS proposal area 1 coastal wetlands are associated with the Georges River and EIS proposal areas 2 and 3 are associated with Milperra Drain.

Surface water quality of waterways within the study area has been heavily impacted over the last two centuries due to changing land uses within the catchment and in-channel works (BMT WBM 2013). The Georges River catchment in the study area is categorised as 'waterways affected by urban development'. Due to the historical anthropogenic impact to the estuary of the last two centuries, the natural variability of the receiving waters is already highly disturbed. The local catchment group 'Georges Riverkeepers', through local government and state legislation, have been working to improve water quality and wetland environments of the estuary through ongoing monitoring and education programs.

Vertically mixing occurs within the water column of the Georges River and its tributaries resulting in minor differences between the top and bottom profiles of the water column. The surface water in the study area is considered to be brackish with typical salinity values of 5 -10 parts per thousand (ppt) (BMT WBM 2013). This indicates that the tidal exchange starts to diminish in the Georges River reach in the study area. As the tidal exchange diminishes, tidal flushing also diminishes reducing pollution dispersion (BMT WBM 2013). It is noted that on occasion water quality monitoring occurs following rainfall, which sometimes explains the large differences in monitoring results.

8.7.3 Policy and planning setting

The following policies and plans have been referred to in the groundwater impact assessment and the construction and operation surface water assessment:

- *Water Management Act (2000)*
- *Protection of the Environment Operation Act (1997)*
- *Fisheries Management Act 1994*
- *Coastal Management Act 2016*
- State Environmental Planning Policy 2018 – Coastal Management
- Aquifer Interference Policy (2012)
- The NSW Groundwater Protection Policy (NSW GQPP)
- National Water Quality Management Strategy (NWQMS)
- NSW Groundwater Dependent Ecosystem Policy
- National Environmental Protection Measures (2013)
- Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (1999)
- Bankstown Local Environmental Plan 2015
- Bankstown Development Control Plan 2015
- Georges River Estuary Coastal Zone Management Plan 2013.

8.7.4 Criteria

Groundwater

The groundwater impact assessment used an impact rating to assess the level of impact. The definitions are:

- Very Low/Minimal: Potential adverse impact could result in a minimal decline in the resource in the study area during the life of the proposal. Probability of event occurring may be not anticipated.
- Low: Potential adverse impact could result in a slight decline in the resource/quality of a resource in the study area during the life of the project. Probability of event occurring may be unlikely. Research, monitoring, and/or recovery initiatives would not normally be required.
- Moderate: Potential adverse impact could result in a decline in the resource resource/quality of a resource to lower-than-baseline/worse-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Probability of event occurring may be probable/possible. Regional management actions such as research, monitoring and/or recovery initiatives may be required.
- High: Potential adverse impact could threaten sustainability of the resource/quality of a resource and should be considered a management concern. Probability of event occurring may be likely. Avoidance of this impact through mitigation strategies is recommended. Research, monitoring and/or recovery initiatives should be considered.

The groundwater impact assessment refers to the following in regards to recommended groundwater monitoring criteria:

- Groundwater levels (gauging of groundwater through installation of at least three monitoring wells with continuous loggers)
- Heavy metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc)
- Polychlorinated Biphenyls (PCBs)
- Total Recoverable Hydrocarbons (TRH)

- Polycyclic Aromatic Hydrocarbons (PAH)
- PFAS
- Volatile organic compounds (VOCs)
- Landfill gasses (i.e. methane and carbon dioxide).

Detailed discussion on the potential impacts around contaminated land, groundwater and surface water is provided in Section 8.4.

Surface water

Several criteria apply to the assessment of surface water quality for construction and operational phases:

- **Ecosystem protection levels:** The ANZG (2018) Guidelines for Fresh and Marine Water Quality provide ecosystem protection levels for toxicants (CoPC) for receiving waters based on its ecosystem condition or 'desired' ecosystem condition relative to the degree of human disturbance (ANZG 2018). Based on all EIS proposal areas containing mapped areas of coastal wetland, which are considered environmentally sensitive ecosystems to be preserved and protected (DPIE 2018), a 99 per cent species protection Derived Guideline Value (DGV) should be applied when assessing water quality for toxicants (ANZG 2018). The assessment of potential contaminants is provided in Section 8.4.
- **ANZG (2018) water quality guidelines**: the Guidelines for Fresh and Marine Water Quality Water Quality provide biophysical water quality guidelines for estuaries in South-east Australia.
- **NSW water quality objectives (WQO)**: The relevant water quality objectives for this reach of the Georges River and tributaries (including Milperra Drain) are based on the protection of aquatic ecosystems, visual amenity and primary contact recreation (longer term objective - 10 years or more) (DECCW 2006).
- **Blue Book discharge guidelines:** Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom 2004) and 2D (main road construction) (DECC 2008).
- State Environmental Planning Policy (Coastal Management) 2018: water quality objectives of the SEPP.
- **Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (1999)**: water quality objectives for developments and land use within the Georges River catchment.

Table 8-20 contains guideline values for the Georges River aquatic ecosystems and its tributaries (including Milperra Drain) as listed by ANZG (2018), the NSW WQO and Blue Book. A comparison is made with current water quality conditions identified through the Georges Riverkeeper data from about 1.7 kilometres upstream and the water quality monitoring results collected for this proposal (SW01 (Georges River) and SW02 (Milperra Drain)) (Appendix J).

Table 8-20 Water quality guideline values and water quality monitoring results for Georges River and Milperra Drain.

Indicator	ANZG (2018) guideline value	WQOs trigger value	Managing Urban Stormwater (V1 and V2D)	Georges Riverkeeper data	WQM Results^	
					SW01 Mean	SW02 Mean
Dissolved oxygen (DO) % saturation	80 – 110	80 – 110	-	73.46	4.5 mg/L	9.5 mg/L
Turbidity NTU (Nephelometric Turbidity Unit)	0.5 – 10	0.5 – 10	-	11.16	17.6	6.3
pH	7.0 – 8.5	7.0 – 8.5	6.5 – 8.5	7.33	7.6	7.8

Indicator	ANZG (2018) guideline value	WQOs trigger value	Managing Urban Stormwater (V1 and V2D)	Georges Riverkeeper data	WQM Results^	
					SW01 Mean	SW02 Mean
Total suspended solids (TSS) mg/L	-	-	<50	-	22	294*
Total dissolved solids mg/L				6.73	2508	605
Total Nitrogen µg/L	300	300	-	-	-	-
Total Phosphorus µg/L	30	30	-	-	-	-

^ Value rounded to nearest significant number

* Four of the five results were under 22 mg/L with one reading (4/11/2020) of 1420 mg/L.

8.7.5 Assessment of potential impacts

Groundwater

Construction

Potential construction impacts from the EIS proposal relevant to groundwater and groundwater quality may include:

- Direct impacts to aquatic and terrestrial GDEs and coastal wetlands through GDE removal during earthworks and leaching of potential ASS into GDE habitats (primarily EIS proposal area 1).
- Indirect impacts to aquatic and terrestrial GDEs and coastal wetlands through stormwater discharges, leading to sedimentation and toxicological impacts from potential contaminants mobilised by ground disturbance, accidental spills or lowering of the soil/water pH as a result of leaching of ASS.
- Indirect impacts to aquatic and terrestrial GDEs and coastal wetlands through transport of existing contaminant sources through preferential drainage paths (i.e. backfilled utilities trenches)
- Direct impacts to groundwater quality resulting from pavement seepage and stormwater leakage to groundwater.

In addition, only two registered bores used for supply or irrigation are located within 1 kilometre of the overall proposal. The extraction of groundwater for water supply or lowering of the water table is not proposed, therefore potential impacts to surrounding groundwater users are considered minimal.

Specific impacts on groundwater from the EIS proposal are detailed in Table 8-21.

Table 8-21 Construction impact assessment on groundwater

Impact	Potential impact rating	Relevance/discussion
GDEs and coastal wetlands	Very high	Excavations Shallow excavations within the topsoil and fill materials for embankments and a shared path in EIS proposal area 1; and drainage structures constructed under and from the roadway in EIS proposal area 1 and 2 are not expected to intersect groundwater due to the shallow nature of expected excavations. EIS proposal area 3 will be used as a temporary ancillary site during construction and only minor ground improvements would be undertaken to stabilise surfaces for construction vehicles entering and exiting. Excavations and drainage outlet construction in EIS proposal area 1 would intersect coastal wetlands along the riparian zone of the Georges River. Construction of drainage outlets in EIS proposal area 2 would impact on coastal wetlands along Milperra Drain. The coastal wetlands and associated vegetation communities form aquatic GDEs within the EIS boundaries. Within the EIS boundaries, the potential impacts from excavations on aquatic GDEs (covering an area of 0.25 hectares) are considered to be very high as a result of direct loss of habitat caused by excavation and disturbance.
ASS	Moderate to high	The EIS proposal areas are considered to pose a risk of encountering ASS as follows: EIS proposal area 1 is considered high risk; EIS proposal area 2 is considered low risk; and EIS proposal area 3 has both high risk and low risk ratings. If excavations expose ASS which is likely during excavation, infiltration and recharge after rain events of exposed ASS can transport acids (low pH runoff) into the groundwater and to areas of GDE habitat. Leaching of acid from soils would potentially impact the health of GDEs from low pH water or from some existing soil toxicants becoming mobilised as a result of low pH conditions. Drawdown of aquifers/seasonal variability of groundwater levels have been known to oxidise PASS which creates ASS causing impacts on groundwater quality. This level of aquifer interference is not proposed and not required for the construction of the EIS proposal or the overall proposal. Without suitable management measures, ASS are considered to present a moderate to high potential impact to groundwater water and indirectly impact on the health of GDEs.

Impact	Potential impact rating	Relevance/discussion
Salinity	Very low	Salts within the Parramatta/Georges River hydraulic grade line (HGL) are known to be highly mobile and pose a severe potential impact to buildings and structures within the EIS proposal area. There is a high risk of excavated soils being saline, which may cause impacts where spoil material is exposed to surface waters and rain. However, it is noted that in the EIS proposal areas, groundwater salinity is already high. Runoff from these exposed soils could produce a highly saline waste stream that may have minor impacts should it migrate into the groundwater through recharge or to GDEs. Given the groundwater salinity is high and due to the minor amount of soil to be excavated (0.9 m^3), these impacts are considered very low.
Contamination	Moderate	The potential for groundwater contamination mobilisation exists where excavation would occur. This is highly likely in EIS proposal areas 1 and 2. Some minor surface stabilisation would occur in EIS proposal area 3. Potential contamination sources include hydrocarbon, volatile organic compound, and heavy metal contamination to be present within groundwater within and around operational service stations from leaks, spills and stormwater leakage to groundwater. These sources are relevant to EIS proposal area 1. There is also potential for PFAS contamination from Bankstown Aerodrome for EIS proposal areas 1 and 2 that occur nearest to the aerodrome. The potential for leaching of wastes from a former landfill site is most relevant to EIS proposal area 3 which occurs north of the former landfill site. Herbicide/pesticide contamination from golf courses and historical activities are relevant to all EIS proposal areas. If dewatering of excavations is required for the EIS proposal, the removal of groundwater from excavations may pose a potential risk to construction workers and the environment without adequate management. There are also potential risks to both human health and structures arising from vapour intrusion into excavations and groundwater from potential hydrocarbon contaminated soils in EIS proposal area 1. Further risk of contamination to groundwater may occur as a result of on-site leaks, accidental spills of fuels and inappropriate storage of chemicals during construction. Key risks to groundwater quality will include contamination from oils and grease, lead, zinc, copper, cadmium from vehicles, and nitrogen and phosphorous from atmospheric deposition during construction works. The potential impacts from groundwater contamination are considered to be moderate.

Operation

Potential operational impacts from the EIS proposal relevant to groundwater may include:

- Indirect impacts to aquatic and terrestrial GDEs and coastal wetlands through stormwater discharges during operation, leading to sedimentation and toxicological impacts from potential contaminants.
- Indirect impacts to aquatic and terrestrial GDEs and coastal wetlands through transport of existing contaminant sources through preferential drainage paths (i.e. backfilled utilities trenches) during operational phases.
- Direct impacts to groundwater quality resulting from pavement seepage and stormwater leakage to groundwater during operational phases.

It is noted that operational phase impacts to groundwater quality are considered minimal due to stormwater treatment options including grass swales and bio-retention basins being proposed for the overall proposal. The location of vegetated swales are expected to occur in EIS proposal areas 1 and 3.

The impacts of the EIS proposal during operation are shown in Table 8-22.

Table 8-22 Operation impact assessment on groundwater

Impact	Potential impact rating	Relevance/discussion
Aquifer interference	Very low	Due to the nature of key features for the EIS proposal, a significant change of impermeable surfaces in the three EIS proposal areas is not anticipated. The key features mainly consist of mostly embankment with a small amount of road or shared path and EIS proposal area 3 becoming stabilised land once the road is operation. The minor increase in impermeable surfaces would only result in a very minor reduction in the overall recharge rate to the underlying unconfined aquifers. This would be unlikely to produce an effect that would constitute aquifer interference, with the aquifer interference framework, therefore the potential impacts are considered to be very low. The potential impact relative to aquifer interference has been qualitatively assessed as very low based on available information,
GDEs and coastal wetlands	Low-moderate	GDEs including the mapped coastal wetlands are not anticipated to be adversely affected long term by the operation of the EIS proposal with the potential alteration of recharge rate and change of land use. Discharge and leakage of stormwater from the surrounding road corridor has the potential to contain concentrations of suspended solids and potential contaminants and have the potential to impact all EIS proposal areas. These pollutants have the potential to impact the health of GDEs and coastal wetlands through sedimentation and toxicological effects. This includes indirect leakage of stormwater into groundwater. The potential impacts from discharges are considered to be low-moderate. Stormwater treatment infrastructure, including vegetated swales located within the EIS proposal areas, will assist in reducing impacts on groundwater quality. The impact on GDEs and coastal wetlands will subsequently also be reduced as the treatment process will result in a percentage of the treated stormwater becoming groundwater recharge. The potential impact on GDEs within the EIS proposal areas during operation has been qualitatively assessed as “low-moderate” based on available design information.
Groundwater users	Negligible	Extraction of water is not a requirement for the maintenance of the EIS proposal areas during operation of the road. The operational risk to groundwater is therefore negligible.
Groundwater quality	Low	Discharge and leakage of stormwater from the road corridor during operation has the potential to contain concentrations of suspended solids and potential contaminants. This is relevant to EIS proposal area 1 and to EIS proposal area 2 that includes transverse drainage discharging to Milperra Drain and nearby coastal wetlands. These pollutants may include concentrations of nutrients, heavy metals, and hydrocarbons, some of which would recharge to groundwater.

Impact	Potential impact rating	Relevance/discussion
		Stormwater treatment infrastructure, including vegetated swales, located within the EIS proposal areas 1 and 3 will assist in reducing impacts on groundwater quality. This is achieved by some of the stormwater being treated through the swales recharging the groundwater resource. The potential impact on groundwater quality has been qualitatively assessed as low based on available information.

Surface water

Construction

Potential impacts

Key risks to surface water quality during construction from the EIS proposal area would be increased sediment, nutrient loadings and potential mobilisation of contaminants associated with the following:

- Site disturbance resulting from vegetation clearing and exposure of soils. Disturbance activities include:
  - Topsoil stripping.
  - Excavation.
  - Construction of drainage diversions and controls.
  - Soil stockpiling and transport.
  - Trafficking of exposed work areas.
- Earthworks that could potentially disturb ASS or other contaminants within the proposal area[4].
- Accidental spills or leaks from vehicles, plant and machinery used, stored or refuelled on site of petroleum hydrocarbons, oil and grease, heavy metals or chemicals could pollute receiving waters.
- Contaminants from wash down of vehicles.
- Contaminants from surrounding land uses, exposed as a result of earthworks. Refer to Section 8.4 for detailed discussion around the potential impacts from contamination.

Construction activities within the EIS proposal areas could have potential negative impacts on surface water quality. Transportation of soils into receiving waters would lead to increased turbidity and suspended sediment loads, increased nutrient loads and increases of other potential contaminants bound to soils. Increased sedimentation rates could lead to smothering of aquatic flora and fauna. Potential impacts would be to the immediate area of coastal wetlands and could continue downstream depending on flow rates and velocities. Other potential impacts include pollution of receiving waters and downstream environments from accidental spills and leaks of petroleum hydrocarbons, oil and grease, heavy metals or chemicals.

Construction water demand

Construction water demand and indicative use is described in Section 6.4.8. The water usage during construction is considered to be a minor impact only, with the predominant use for dust suppression and for compaction. Water would be obtained from the existing piped water supply. Therefore, the EIS proposal does not propose to extract water or to apply for a licence to extract water.

Operation

Operation of the EIS proposal areas could have negative impacts on surface water quality, if left unmitigated. The pollutants from road runoff likely to impact surface water quality of Georges River and Milperra Drain (including coastal wetlands) within the EIS proposal areas include sediment, nutrients, heavy metals, hydrocarbons from oil and grease, and gross pollutants. Some of these pollutants are typically derived from adjacent land uses and activities, accidental spills/leaks, general litter and wind blown material from uncovered loads.

[4] As referred to earlier in Table 8 11, EIS proposal area 1 is within the ASS risk profile high risk 2-4 metres, EIS proposal area 2 is within the ASS risk profile high risk below four metres and EIS proposal area 2 and 3 are within the ASS risk profile low risk two to four metres.

The MUSIC rainfall runoff modelling software was used to investigate the impact of the EIS proposal in combination with the overall proposal, as a result of the Stage 1A proposal. This would increase the amount of road pavement (i.e. impervious area) and future traffic use. The modelling was undertaken to inform the development of a concept design water quality strategy (Appendix J). Two scenarios were run through the MUSIC software to compare water quality results between the 'pre-upgrade scenario' and the 'post-upgrade scenario', and the post-upgrade scenario with and without treatments.

Without treatment, the operation of the proposal would result in increases to the net annual average weight of gross pollutants, total nitrogen, total phosphorous and total suspended solids.

While the proposal is in a constrained corridor that limits possible water quality arrangements, a number of treatment measures were adopted and evaluated by the MUSIC modelling. With the adoption of vegetated swales and bioretention basins across the overall proposal, as outlined in Appendix J, the net annual average weight of pollutants for both Georges River and Milperra Drain show a reduction compared to present day conditions with the exception of total nitrogen. The net annual average weight of total nitrogen (kg) increases by 3.8 kilograms per annum in the Georges River sub catchment and increased by 7.4 kilograms per annum in the Milperra Drain sub-catchment (with treatments).

These water quality treatments for the operational phase of the overall proposal are detailed in the surface water quality controls as presented in the Concept Operational Stage 1 Strategy (Lyall & Associates 2021) and in Section 6 of this EIS. It is also noted that the surface water management measures could also provide a beneficial result in groundwater recharge and quality.

The concept stormwater quality strategy was developed to, as far as is practical, to achieve a no net increase in pollutant load attributable to the proposed Stage 1A road upgrade within the available site constraints. This water quality objective was adopted to be consistent with the Coastal Management SEPP and the Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (1999).

The strategy was developed using the results of the MUSIC modelling together with a review of the proposed road upgrade and site conditions. This information was used to identify opportunities to include suitable stormwater quality measures into the concept drainage design. The operational controls include a series of vegetated swales and bio-retention basins to treat runoff from the overall proposal. The strategy for the overall proposal includes two bio-retention basins, both of which would treat runoff discharging to Milperra Drain. These basins do not occur within the EIS proposal. Vegetated swales are proposed to treat stormwater runoff from drainage outlets that are located along Henry Lawson Drive. Vegetated swales to the north of the intersection with Milperra Road would treat runoff discharging to the Georges River (a section of the swale would occur in EIS proposal area 1), while the vegetated swales to the south would treat stormwater runoff discharging to Milperra Drain (a section of the swale would occur in EIS proposal area 3). Gross pollutant traps were considered in the analysis of potential water quality controls but were not preferred due to safety, maintenance and cost considerations.

The recommended management measures for each EIS proposal area are detailed in the following section.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

8.7.6 Environmental management measures

Safeguards and management measures for groundwater and surface water impacts are presented in Table 8-23. It is noted that due to the minor nature of the operational groundwater impacts, no management measures are proposed as part of the operational phase of the EIS proposal. The construction Erosion and Sediment Control Strategy and Concept Design Water Quality Strategy are provided in Appendix J.

Table 8-23 Environmental management measures for groundwater and surface water impacts

Impact	Environmental management measure	Responsibility	Timing
Disturbance to GDEs and coastal wetlands	Where disturbance cannot be avoided, appropriate mitigation measures will be adopted to prevent impacts outside of the required areas of disturbance. This may include use of physical barriers, boundary demarcation and signage to prevent intrusion of contractors and equipment into sensitive areas, and ongoing monitoring to ensure disturbance footprints do not extend outside of set boundaries	Contractor	Construction
Groundwater dewatering during excavation	In the event that groundwater/aquifer dewatering must occur to lower the groundwater table and reduce or prevent groundwater ingress into excavations, then potential impacts on GDEs must be quantitatively assessed prior to dewatering along with appropriate management measures and documented in a site dewatering management plan. Quantitative assessment must include assessment of the magnitude and duration of drawdown and whether impacts are likely to adversely affect the habitat conditions and ecological communities within the GDEs. Relevant approvals and permits must be obtained prior to groundwater/aquifer dewatering.	Contractor	Construction
Shallow excavations within the topsoil and fill materials for embankments	A Construction Soil and Water Management Plan, Construction Flora and Fauna Management Plan and a Clearing and Grubbing Plan will include mitigation measures and procedures to identify further opportunities to minimise direct impacts to coastal wetlands and GDEs.	Contractor	Pre-construction/ Construction
Mobilisation of acid sulfate soils	An Acid Sulfate Soil Management Plan (ASSMP) will be prepared and implemented to manage PASS or ASS exposed from excavations of soils between 2 and 4 metres, changes to groundwater levels and stockpiling. The ASSMP should be informed by the results of the Detailed Site Investigation that would include the identification of presence and extent of ASS/PASS.	Contractor	Pre-construction/ Construction
Groundwater contamination, piling and excavations	A site contamination management plan (CMP) will be prepared and implemented in the event that contaminated groundwater is encountered during construction activities, this should be completed before construction occurs.	Contractor	Pre-construction/ Construction

Impact	Environmental management measure	Responsibility	Timing
	During construction any intercepted groundwater, including piling works, will be managed under the project CEMP to mitigate risks associated with the potential mobilisation or release of contamination to the groundwater, improper storage and disposal of intercepted groundwater. Excavations should also be monitored for volatile gases that may be present as a result of hydrocarbon contamination, which may pose a risk to human health and built environment. A baseline groundwater monitoring program of the overall proposal area will be undertaken during detailed design.		
Construction surface water quality	The Concept Design Erosion and Sedimentation Strategy will be reviewed and updated during detailed design. The Strategy will be based on detailed design construction staging plans and construction methodologies. The Strategy will be revised in accordance with Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom 2004) and 2D (main road construction) (DECC 2008) and Transport's Environmental Management of Construction Dewatering (RTA 2011). A site specific Erosion and Sediment Control Plan/s (ESCP) will be prepared and implemented as part of the Construction Soil and Water Management Plan. These Plans will further develop the Construction Erosion and Sediment Control Strategy developed in detailed design and be consistent with the above guidelines (Landcom 2004, DECC 2008 and RTA 2011). The ESCP will include arrangements for managing wet weather events, including monitoring of potential high risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Transport Contractor	Detailed design Pre-construction/ Construction
Contamination of surface water	The refuelling and maintenance of plant and equipment will be undertaken in a designated sealed bunded area at ancillary facilities, where possible.	Contractor	Construction
Contamination of surface water	Vehicle wash downs and concrete washouts will be carried out within designated sealed bunded areas at construction ancillary facilities, or carried out off-site.	Contractor	Construction

Impact	Environmental management measure	Responsibility	Timing
Contamination of surface water	Regular visual water quality checks (include for turbid plumes and hydrocarbon spills or slicks) will be carried out when working in or near waterways. Construction water quality monitoring will be undertaken upstream and downstream of the EIS proposal to ensure that controls and site practices are effective at maintaining current environmental values. Monitoring will be undertaken in accordance with the Guideline for Construction Water Quality Monitoring (RTA, undated).	Contractor	Construction
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 would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport and EPA).	Contractor	Pre-construction/ Construction
	Emergency spill kit will be kept on site at all times. Spill kits will be located at all ancillary facilities and main construction work areas. All staff would be made aware of the location of the spill kit and trained in its use.	Contractor	During construction
Stormwater runoff and water quality of the Georges River and Milperra Drain	The Concept Design Operational Water Quality Strategy will be reviewed and updated during detailed design to achieve the operational water quality objective, identify additional opportunities to reduce total nitrogen loads to Georges River and Milperra Drain, and reduce impacts from potential contaminants that may be mobilised from the soil and/or groundwater. This will be undertaken in consultation with Canterbury Bankstown City Council. The Operational Water Quality Strategy will consider Transport's Water Sensitive Urban Design Guidelines (RMS 2017) and potential impacts of proposed water quality controls to coastal wetlands.	Transport	Detailed design

8.8 Visual

Secretary's requirements	Where addressed in EIS
Visual – including: • an impact assessment at private receptors and public vantage points.	Section 8.8

The potential visual impacts during construction and operation of the overall proposal have been assessed as part of the Henry Lawson Drive Upgrade – Stage 1A: Urban Design Landscape Character and Visual Impact Assessment (Tract, 2021), provided in Appendix K.

8.8.1 Assessment methodology

The methodology adopted for the assessment is consistent with *Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment – EIA NO4* (Transport, 2020).

The assessment differentiates between:

- Landscape character assessment – the overall impact of a proposal on an area's character and sense of place; and
- Visual assessment – the proposal's impacts on views.

Landscape character assessment

To assess landscape character, the local context of the site was divided into several unique units to assist in understanding the local context and the impacts of the proposal. These include defining landscape character zones (LCZ) which are zones of similar spatial or character properties, and the analysis of changes to these LCZ's as a result of the proposal.

Landscape character is defined as "*The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place"* (Roads and Maritime 2018). The purpose of dividing the proposal area into LCZs is to ensure the impacts assessed are representative for each zone. Impacts of the proposal to landscape character were assessed in terms of impacts to LCZs and the impact ranked in terms of sensitivity to change.

Visual impact assessment

The visual impact assessment involved identifying an estimated visual catchment through desktop analysis and ground truthing to ascertain the theoretical area from where the proposal would be visible. This assessment considered factors such as landform, direction of travel or direction of the view, built structures and vegetation. This area is known as the visual catchment or visual envelope.

Viewpoints were chosen to represent a range of views, including views from residential properties, public buildings and spaces, heritage items, businesses and the existing road corridor. The visual impact of the proposal was assessed by considering the sensitivity of the view and the magnitude of change to the view as a result of the proposal.

Landscape character and visual assessment matrix

To quantify impacts on landscape character and the visual amenity, the qualities of sensitivity and magnitude were assessed.

Sensitivity refers to the qualities of the area, the number and type of receivers, and how sensitive the existing character of the setting is to the proposed change. For example, a pristine natural environment would be more sensitive to change than a built up industrial area.

Magnitude refers to the nature of the proposal. For example, a large interchange would have a very different impact on landscape character than a localised road widening in the same area" (Roads and Maritime 2018).

Table 8-24 summarises the ranking of the assessment of the two criteria and how they are combined to provide an overall impact assessment.

Table 8-24 Landscape character and visual impact assessment matrix

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

8.8.2 Existing environment

A review of the physical and social context of the overall proposal was undertaken to understand the present context and attributes of place to be able to determine the potential impact of the overall proposal and a subset of this, being the EIS proposal over three separate areas.

Regional context

The overall proposal is located within the Canterbury Bankstown LGA, located around 20 kilometres southwest of Sydney CBD.

Henry Lawson Drive and Milperra Road are the main roads which form the major intersection and location of the overall proposal area. Henry Lawson Drive provides a link north to the Hume Highway and residential employment communities in and around Parramatta, while providing a southern link to the M5 Motorway. Milperra Road forms a link to the eastern suburbs of Sydney and west to Liverpool while connecting communities and employment centres.

Henry Lawson Drive presents a unique road corridor as its corridor responds to the general alignment of the Georges River. This natural asset has influenced and shaped the character of the corridor.

Project area context

The character of Henry Lawson Drive varies as its relationship to the river varies. However generally, the road has a strong landscape settling which is evident at the proposal site.

South of the Milperra Road intersection beyond the overall proposal area, the Henry Lawson Drive corridor is further away from the river's edge and responds to the urban context. The corridor is well vegetated, consisting of avenues of trees that have been structured and planted. The planted trees flank the road corridor to create a separation between the residential development located adjacent to the road.

North of the Milperra Road intersection, the character changes as the road is closely aligned with the Georges River. In this location, a more naturalistic character is provided, creating a strong sense of enclosure and connection to the natural environment. This character is reinforced by the adjoining land uses which include open space and parkland.

Similar to Henry Lawson Drive, the connecting section of Milperra Road also presents with this landscape frontage.

Other key elements within or near the proposal area include:

- Commercial/Industrial Infrastructure
  - Two industrial/commercial precincts exist to the north and south of the intersection, both on the eastern side.
  - North of the intersection comprises a range of uses, including a petrol station, fast food outlets and ALDI Supermarket. The built form is single storey and independent structures.
  - South of the intersection is a commercial complex that includes the Flower Power nursery development. It is elevated above Henry Lawson Drive and has multiple commercial outlets within the single large-scale warehouse type development
- Residential development
  - A localised section of residential development is located west of Henry Lawson Drive and south of Milperra Road, presenting a varied composition of forms and materials.
  - Dwellings are free standing of one or two storeys height.
- Utility services
  - Electricity supply and street lighting
  - Telecommunications
  - Gas
  - Water and sewer services and infrastructure.

Topography, drainage and vegetation

The landform and hydrology are interconnected with the area, comprising an alluvial plain of Georges River.

The general elevation along the overall proposal alignment ranges between 0 – 5 metres above sea level, reflecting its position on the floodplain of the Georges River. The floodplain lies between ridges to the east and west of the alignment and define the shallow river valley of the Georges River at this point. The proposal area is defined by two distinct precincts divided by a small rise which passes through the intersection. This rise covers much of the airport lands and crosses the intersection and extends through into the residential precinct to the south. To either side of this, land is less than five metres above sea level. The EIS proposal areas are all located on land less than five metres above sea level.

The Georges River at this location is tidal and comprises brackish waters where fresh and saltwater mix. Mangroves can be seen extending along the foreshore. The low lying and flood prone landscape has influenced both the land uses and vegetation that occurs within the precinct and is a key determinate of the overall character of the precinct.

The overall proposal is situated mostly within alluvial woodland, a vegetation community which forms part of the river-flat eucalypt forest. In addition, the EIS proposal areas are characterised by the freshwater wetlands, a listed endangered community.

Landscape character zones

The purpose for identifying different landscape character types or zones was to assess levels of sensitivity and to provide a description of each zone, giving the overall proposal its context and interface.

Figure 8-8 illustrates the distribution of the different character zones in relation to the proposal. A total of five landscape character zones were identified within the overall proposal area.

The EIS proposal areas are located within the following character zones:

- LCZ1 – River frontage (EIS proposal area 1)
- LCZ2 – Swampland (EIS proposal area 2 and 3)
- LCZ5 – Road Corridor (EIS proposal area 1).

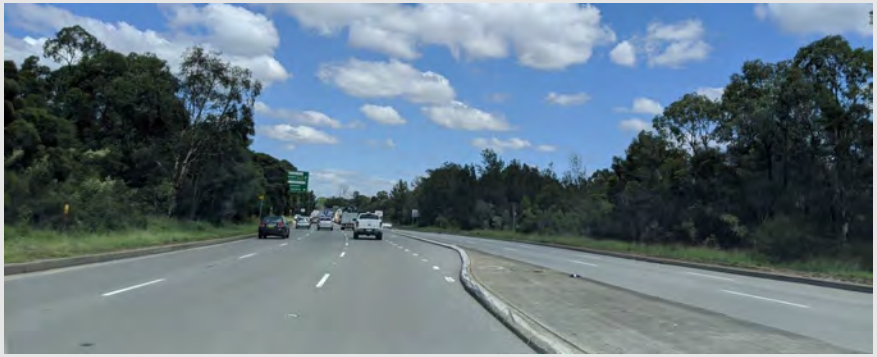
Table 8-25 provides descriptions of the landscape character zones.

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

Projection: GDA 1994 MGA Zone 56

FIGURE 8-8: Landscape character zones

Table 8-25 Landscape character zones

LCZ	Location	Description
 LCZ1 – River Frontage	Located just south of the northern leg of Henry Lawson Drive/Milperra Road intersection and extends to the approach to Georges Hall. Located predominately west of Henry Lawson Drive it straddles the alignment north of Tower Road. EIS proposal area 1 is mapped within LCZ1.	This location is characterised by well-established vegetation along the Georges River, including areas of protected coastal wetlands.
 LCZ2 – Swampland	Located along Milperra Road, to the east of Henry Lawson Drive and wraps around into Henry Lawson Drive on its eastern side, extending to Auld Avenue Bridge EIS proposal area 2 is mapped within LCZ2.	In Milperra Road, this zone marks a transition from the Milperra industrial area and the beginning of a precinct linked to the Georges River. Both sides of the alignment are well vegetated and present a natural corridor experience that provides a screen to development beyond the road alignment, particularly the Bankstown Aerodrome approximately 100 metres beyond the corridor. Within Henry Lawson Drive, the planting dominates the eastern edge of the corridor and screens the Bankstown Golf Course.

LCZ	Location	Description
 LCZ5 – Road corridor	The intersection of Milperra Road and Henry Lawson Drive provides a gateway to the Hume Highway, M5 Motorway, Liverpool and the eastern suburbs and introduces the Georges River to the road alignment in this area.	The present character is defined by the pavement of the corridor and the character of the precincts which adjoin it. The scale of the pavement varies from 7 to 8 lanes heading east west and 5 to 6 lanes heading north south respectively at the intersection of Milperra Road and Henry Lawson Drive. This transitions to 2 lanes (1 lane each way) north and south at the respective limits of the study and 6 lanes (3 each way) in Milperra Road.

Visual receptors and viewpoints

The experience of viewers varies according to the duration, field of view and nature of exposure to the proposal. In assessing the visual impact, the visual range has been considered to be the most effective distance where a viewer can be influenced by changes in traffic movement and discern individual details such as signage and planting elements. This distance varies in relation to the topography and effectiveness of screening vegetation, however the quality of detail in the landscape typically deteriorates rapidly for distances greater than 200 metres.

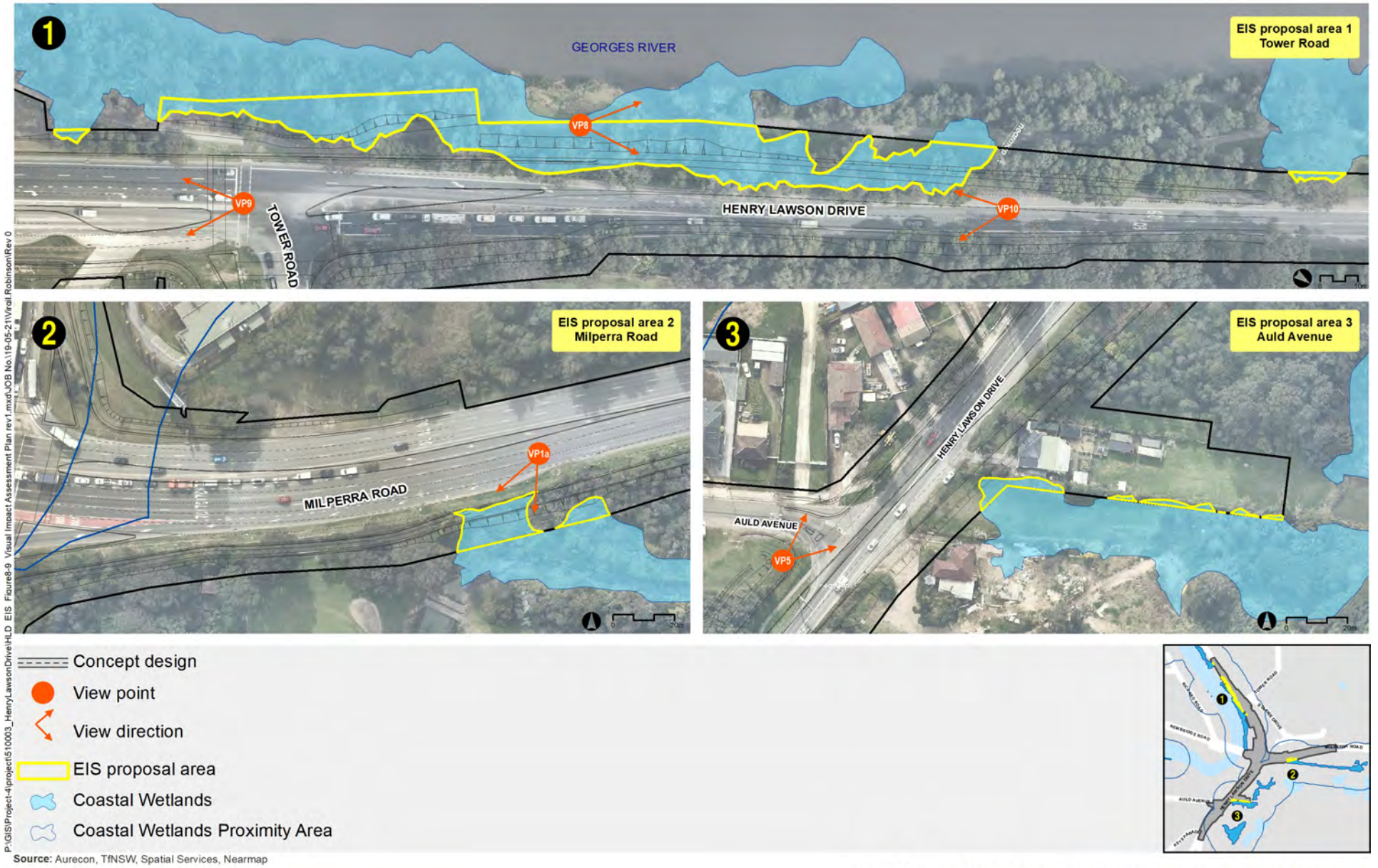
Typically, the viewpoints have considered the impact of those looking over the proposal. Of the adjoining observers, it is the residential users who would be the most sensitive to change. These are generally the primary viewpoint assessed. In some instances, other viewpoints, other viewers (including the road user) have been considered.

The visual catchment of the proposal is well defined due to the topography of the site and clear barriers to sightlines including vegetation and built form.

A total of eleven individual viewpoints were identified within the overall proposal area (refer to Figure 8-9) to understand the visibility within the site. The following viewpoints are relevant to the EIS proposal areas:

- VP1a – Milperra Road (EIS proposal area 2)
- VP5 – Auld Avenue (EIS proposal area 3)
- VP8 – Georges River (EIS proposal area 1)
- VP10 – Henry Lawson Drive (river edge) (EIS proposal area 1).

The location and physical attributes of each of the viewpoints are defined within Table 8-26.



Source: Aurecon, TfNSW, Spatial Services, Nearmap

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 8-9: Visual impact assessment plan

Table 8-26 Viewpoints

Viewpoints	Description
 VP1a – Milperra Road (EIS proposal area 2)	VP1a is located about 100 metres from the intersection of Henry Lawson Drive and Milperra Road and provides a view looking south from Milperra Road to the adjoining Bankstown Golf Course and bushland. The established swampland vegetation adjoining the corridor defines its character.
 VP5 – Auld Avenue	VP5 is from Auld Avenue looking north along Henry Lawson Drive and to the swampland vegetation located east and beyond the Bankstown Golf Course where EIS proposal area 3 is located.
 VP8 – Georges River	VP8 is from shared path adjacent to the Georges River looking north along Henry Lawson Drive. The view is dominated by riverside vegetation, including coastal wetlands within EIS proposal area 1. The vegetation provides a park-like setting to the shared path as well as screening to Henry Lawson Drive.

Viewpoints	Description
 VP10 Henry Lawson Drive (river edge)	VP10 is from Henry Lawson Drive heading south between Georges River Golf Course and Georges River. It is taken approximately 100 metres north of the Tower Road intersection and illustrates the extent of vegetation screening, and the visual buffer along both the Georges River Golf Course and the Georges River.

8.8.3 Policy and planning setting

The following policies and plans have been referred to in the landscape character and visual impact assessment:

- State government plans and policies:
  - NSW State Infrastructure Strategy 2018-2038
  - Future Transport Strategy 2056
  - NSW Freight and Ports Plan 2018-2023
  - Draft Road Safety Plan 2021
  - Road Network Plan Summary Report – Henry Lawson Drive Woodville Road
- Local Plans:
  - Local Strategic Planning Statement (LSPS) – Connective City 2036 (Canterbury Bankstown 2020)
  - Bankstown Local Environmental Plan 2015
- Standards and guidelines:
  - Beyond the Pavement 2020 Urban Design Approach and Procedures for Road and Maritime Infrastructure Planning, Design and Construction (Transport 2020)
  - NSW Sustainable Design Guidelines Version 3.0 (Sustainable Design Guidelines) (Transport, 2013)
  - Crime Prevention through Environmental Design (Queensland Government 2007)
  - Urban Green Cover in NSW. Technical Guidelines (Urban Tree Cover) (Office of Environment and Heritage 2015).

8.8.4 Assessment of potential impacts

Construction

General construction activities would result in temporary visual impacts on views nearby. These include the movement and operation of various machinery, light and heavy vehicles, and the erection of temporary structures such as fencing, lighting and construction compound sites. Visual impacts would be experienced due to clearance of vegetation, excavations and earthworks and the presence of construction areas including ancillary facilities and plant and equipment. The greatest impact would be to residential properties that overlook the construction site due to their prolonged exposure.

The potential impacts would be temporary as construction would take about 20 months to complete. The magnitude of impact would depend on the stage of construction and the location of the work along the alignment. It is expected that the greatest visual amenity impacts would occur when works are being undertaken south of the Milperra Road, the use of the Henry Lawson Drive ancillary construction site and the Auld Avenue site. There are no anticipated residual landscape or visual impacts resulting from the construction phase of the proposal. Contractors would be required to rehabilitate all work sites prior to and at the end of the construction period. Landscape and visual impacts may arise from these rehabilitation works and would be most evident during the first year of operation. Visual impacts may vary depending on final construction methods and staging identified in later design stages.

Operation

Landscape character assessment

Three landscape character zones (LCZ1, LCZ2 and LCZ5) are located within the EIS proposal areas. These are the landscape character zones which are the focus of the landscape character assessment.

For LCZ1, the impacts have been assessed as high based on the extent of vegetation that is impacted and identified as coastal wetlands north of Tower Road.

Although both LCZ1 and LCZ2 are vegetated, the extent of vegetation loss in LCZ2 for the EIS proposal area 2 is less than LCZ1, although both locations of protected vegetation are impacted by either permanent or temporary works and are considered to have a high impact. The impacts on EIS area 3 have been assessed as moderate based on the quantity of works proposed within the EIS area with most of the proposals works occurring outside of the EIS area.

The impact on LCZ5 is classed as moderate.

The summary of the landscape character assessment is presented in Table 8-27.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

Table 8-27 Landscape character assessment summary

Character definition	Sensitivity	Magnitude	Summary
LCZ1 – River frontage	**High** The existing landscape is well vegetated along the river's edge, providing filtered views to the Georges River for users of the shared path and respite from the hustle and bustle of the adjoining major road and urban development. It is a scenic backdrop to the corridor which is highly sensitive to change.	**High** The proposal is anticipated to impact this character zone along the immediate edges of Henry Lawson Drive in this location. EIS proposal area 1 is impacted by expansion of the footprint. As a protected community it is considered highly sensitive to change and so magnitude of change is assessed as high.	**High** The upgrade would affect the existing vegetation, including areas of coastal wetlands, north of Tower Road. The overall impact is considered high based on the sensitivity of the space and quantity of vegetation likely to be impacted by the works.

Character definition	Sensitivity	Magnitude	Summary
	EIS proposal area 1s occurs within this zone north of Tower Road. As a protected zone they are considered highly sensitive to change.		The EIS assessment reflects this with impacts to coastal wetland impacted by widening and resulting in a high sensitivity and magnitude of change.
LCZ2 – Swampland	**High** The landscape is densely vegetated, providing screening to the elements beyond the corridor and a scenic outlook along Milperra Road, contrasting with the industrial/commercial character experienced on the approach to this section of the corridor. The close proximity of this zone with Bankstown Aerodrome makes the established vegetation significant in helping the road user feel safe whilst driving along Milperra Road. As a narrow underdeveloped section of vegetation adjoining the corridor, it has a high sensitivity to change. A small section of land occurs in relation to a watercourse crossing Milperra Road (EIS proposal area 2) and another perpendicular to Henry Lawson Drive within a lot to be acquired as part of the proposal (EIS proposal area 3). EIS proposal area 2 is within a heavily altered landscape defined predominately by exotic grass and weed species. Its condition has been assessed as being in moderate condition in the biodiversity report and so sensitivity is considered high. EIS proposal area 3 is located within an urban lot surrounded by turfed area and narrow in widths, and its resilience and condition is assessed as low. Sensitivity is consequently assessed as moderate.	**Low** The proposal sees an expansion in the footprint of the intersection of Milperra Road with Henry Lawson Drive. Vegetation is to be removed and the formation widened to accommodate additional turning lanes. This would see the impact of a small portion of this character zone on the south eastern corner of the intersection with much of the remaining area not being impacted. The impact has been assessed as low. The two sections of coastal wetland are impacted by the proposal. EIS proposal area 2 at Milperra Road sees the lengthening of the culvert and channel works. Its impact is considered high. EIS proposal area 3 falls within acquired lands, although the extent of footprint impacts only the western most limits of the community its impact is considered moderate.	**Moderate to High** The upgrade is expected to have a material impact on the landscape character as the proposal impacts the south eastern corner of the intersection resulting in the clearance of much of the vegetation, resulting in an increase in pavement area and reduction in vegetation area as a result of vegetation clearance. Despite clearance extent a body of vegetation is maintained preserving the sense of a vegetation backdrop. The overall impact has been assessed as moderate to high. Two EIS areas occur within this zone, EIS proposal area 2 experiences a high impact on character and EIS proposal area 3 experiences a moderate impact.

Character definition	Sensitivity	Magnitude	Summary
LCZ5 – Road corridor	**Moderate** The corridor is heavily congested and dominated by the road itself. The proposal would enhance the operation of the intersection which would be evident to the key users of the space, the road user, and will impact the overall character of the space. The sensitivity to this change is considered moderate.	**Moderate** The corridor sees an expansion in overall footprint by doubling the width in certain locations. This sees a large intersection expanded to a larger intersection. The magnitude of this change is considered moderate as the viewers perspective is still of a large scale intersection.	**Moderate** The overall impact of the intersection is considered moderate based upon the impact of the expansion on the road users experience and overall retention of the corridor as a major road intersection.

Visual impact assessment

Four viewpoints were identified within or near to the EIS proposal areas:

- VP1a – Milperra Road (EIS proposal area 2)
- VP5 – Auld Avenue (EIS proposal area 3)
- VP8 – Georges River (EIS proposal area 1)
- VP10 – Henry Lawson Drive (river edge) (EIS proposal area 1).

Table 8-28 provides a summary of the viewpoint assessment.

Table 8-28 Viewpoint assessment summary

Viewpoint	Sensitivity	Magnitude	Summary
VP1a – Milperra Road (EIS proposal area 2)	**Moderate** The view depicted is largely that of the motorist, a transitory user of the space whose sensitivity would be limited due to their focus on the road corridor and the operation of the intersection. The view is strongly defined by the vegetation cover and so is considered to have a moderate level of sensitivity reflecting its natural interface and oversight by commuters.	**High** The scale of change within the verge would see an expansion of the road pavement, extension to culvert, and the formation itself. The impacts would see both clearance of coastal wetland beyond the built structures plus the widening of drainage channel into the EIS proposal area. Magnitude of the impact is considered high	**Moderate to High** The overall impact of the proposal at VP1a is considered moderate to high, due to the scale of change caused by the expansion of the road and the sensitivity of the motorists passing through the corridor.
VP5 – Auld Avenue (near EIS proposal area 3)	**Moderate** This view is based on the sensitivity of a transitory user of the shared path. The sensitivity is considered moderate based on the reconfiguring of the traffic lanes and widened footprint, which has the potential to change the overall	**High** The magnitude is considered high due to the extent of pavement proposed. The magnitude of change to the EIS proposal area 3 is assessed as moderate with footprint impacting a small section of the coastal wetland community.	**Moderate to High** VP5 is considered moderate based on the extent of change expected along the corridor, the widened footprint and addition of a concrete median all increasing the hardscape of the corridor. The impact on EIS Proposal area 3 has been assessed

Viewpoint	Sensitivity	Magnitude	Summary
	character due to the scale of the change. EIS proposal area 3 –is identified as having coastal wetland community so sensitivity to change is high.		as moderate to high reflecting the expanded footprint and presence of coastal wetland community.
VP8 – Georges River (EIS proposal area 1)	**High** This view is from a user on the shared path, overlooking vegetation that provides separation and screening to Henry Lawson Drive. The sensitivity of this view is considered high based on the existing context and susceptibility to notice change caused by the changing of the landscape.	**High** The scale of works anticipated, including fill batters which expand the footprint of the formation, is likely to cause the removal of vegetation (identified as coastal wetland) immediately aligning Henry Lawson Drive. Due to the extent of works proposed and the affect this would have on the users' experience, the magnitude is considered high.	**High** VP8 is considered to have a high rating based on the scale of change proposed, most evident in the loss of vegetation and screening of the road alignment, and the affect this would have on the users' experience in this location.
VP10 – Henry Lawson Drive (River edge) (near EIS proposal area 1)	**High** The view is from Henry Lawson Drive and is from the perspective of a transitory vehicle travelling south. This view is unique as it features a strong vegetated edge along both sides of the corridor, with vegetation up to the edge of the road. This provides a scenic corridor where the tree canopy arches over the road. The sensitivity is considered high based on the expected impacts on existing character. The presence of the coastal wetland community west of the alignment and its contribution to the corridor sees the EIS proposal area 1 as a high sensitivity.	**High** Any works immediately beyond the existing corridor would impact the vegetation, affecting the character of the view. Batters extend several metres into both verges which would impact the existing canopy and park-like setting of the rivers' edge. Consequently, the magnitude of impact is considered high. The expansion of the road footprint west of the existing would see an immediate impact to the coastal wetland and so impact is assessed for EIS proposal area 1 as being high.	**High** VP10 is considered to have a high rating as the scale of the works would see existing vegetation removed, and road width expanded, affecting the existing character of the view and creating a new experience for road users. Impacts on EIS proposal area 1 are considered high due to impacts on existing canopy and its impact on overall character.

8.8.5 Environmental management measures

Safeguards and management measures for landscape character and visual impacts are presented in Table 8-29.

Table 8-29 Environmental management measures for landscape character and visual impacts

Impact	Environmental management measure	Responsibility	Timing
Visual amenity and urban design	Urban design development of the proposal will continue through to detailed design for the overall proposal, of which a portion includes the EIS Proposal. Urban design will be integrated into project development processes. The following policy/guidelines will guide future design development of the proposal: • Transport Urban Design Policy (Beyond the Pavement) • Transport Urban Design Guidelines. The urban design objectives, principles and concept design strategy presented in the urban design report for the REF and EIS proposals will form the basis for future design development and consultation with stakeholders.	Transport	Detailed design
Earthworks and landscape character	Integrate earthworks with adjoining landform to avoid sharp transition in profile through the adoption of appropriate grades, where possible.	Transport	Detailed design
	Stabilise and progressively revegetate exposed ground as works progress to limit erosion and visual impacts through early integration with surrounding vegetation.	Contractor	During construction
Retention of existing vegetation and coastal wetlands	Design the EIS proposal to avoid impact to prominent trees and vegetation communities where possible. Existing threatened species in the EIS proposal areas will be retained and protected where possible.	Transport	Detailed design
	Define and demarcate clearing boundary limits and exclusion zones in the EIS proposal areas to protect neighbouring vegetation cover and coastal wetlands.	Contractor	During construction
Revegetation	Plants used in revegetation will be consistent with existing communities, including riparian vegetation, and support the existing landscape character. Revegetation will use local provenance material and proposed tree species which provide canopy cover and minimise urban heat effects.	Transport	Detailed design
Tree management and removal	Any tree removal or pruning will be undertaken by a qualified specialist and in accordance with AS4970: 2009: Protection of Trees on Development Sites (Standards Australia, 2009) and AS4373:2007: Pruning of Amenity Trees and WorkCover Amenity Tree Industry Code of Practice 1998.	Contractor	Pre-construction/ Construction
Minimise road furniture and signage	Provide minimum signage requirements and limit structural elements to provide an open and permeable setting	Transport	Detailed design

Impact	Environmental management measure	Responsibility	Timing
Lighting	Minimise lighting and potential for light spill	Transport	Detailed design
	Minimise night works and provide lighting which minimises light spill	Contractor	During construction
View management	Provide and implement visual screening in accordance with urban design and Landscaping Plans to minimise the visual impact in areas identified as moderate or high impact	Transport/ Contractor	Detailed design/ During Construction
Visual amenity and ancillary facilities	The layout of the ancillary facility site in EIS proposal areas 1 and 3 will be designed to minimise visual amenity impacts. The design will consider: • Screening of boundaries facing sensitive receivers or views • Careful placement of structures and buildings to maintain viewpoints or provide additional screening of site activities	Contractor	Pre-construction/ Construction
	The ancillary facilities in EIS proposal areas 1 and 3 will be maintained, kept tidy and well-presented including sorting regular removal of excess materials to reduce visual impact.	Contractor	During construction
	Ancillary facility sites and temporary construction areas will be progressively restored to at least their pre-construction conditions or in accordance with Landscaping Plans, when no longer required.	Contractor	During construction

9 Assessment of other issues

This chapter provides an assessment of the proposal's potential impacts that were not identified as key issues by the SEARs.

The issues discussed in this chapter have either been directly identified by the proposal team or have emerged through the consultation process (see Chapter 7). The level of assessment reflects the fact that these are issues commonly associated with transport infrastructure projects and are appropriately addressed through the design process or by implementing best practice management and mitigation measures. The proposed management and mitigation measures in this chapter are collated in Chapter 10.

Assessments are, where possible, focussed on impacts which occur within the EIS proposal area. However, for some assessments, this was not possible (eg traffic modelling and noise modelling) due to the nature of some assessment methods needing to be undertaken over a broader geographic and catchment scale. As such, this chapter should be read in conjunction with the REF prepared for the REF proposal.

9.1 Traffic and transport

While the traffic and transport issue was not specifically identified as a key issue by the SEARs, there are two requirements that are considered relevant as they are either inputs or outcomes of this assessment.

Secretary's Requirement	Where addressed in EIS
Land use and development including: • the assessment for impacts of construction and operation on and from surrounding land uses • an assessment of safety and access to intersections and properties during construction	Section 8.6.4 and 9.1.3
Project justification – including: • The need for the proposal, the suitability of the site for the development, a demonstration that the proposal is consistent with relevant strategic planning documents, a consideration of impacts of 'no action' and a consideration of alternative options and operation technologies.	Chapter 4, Chapter 5, Chapter 9

A Traffic and Transport Assessment (Transport, 2021) was prepared for the overall proposal. Due to the integrated nature of the proposal, the traffic and transport assessment cannot provide a separate impact assessment of the EIS proposal. Instead, this section details the traffic and transport assessment for the overall proposal, focusing on features near the EIS proposal area, where appropriate to do so. The assessment is provided in Appendix L.

9.1.1 Assessment methodology

The methodology for the traffic and transport assessment consisted of:

- Reviewing the existing and future conditions of the transport network within and surrounding the overall proposal using publicly available information as well as data that had been previously collected for the proposal
- SIDRA traffic modelling to assess construction impacts based on a future year of 2023
- Preparing a microsimulation traffic model for the concept design of the overall proposal
- Modelling the traffic performance for the operation of the overall proposal for several scenarios (see Future development approach section)

- Assessing the impacts of the overall proposal on traffic and transport performance during construction and operational stages
- Recommending mitigation measures to minimise potential traffic or transport impacts from the overall proposal.

The investigation of the existing environment and impacts for the traffic and transport assessment were developed in consideration of the overall proposal area.

The study area for the traffic model considered a broader road network than just the overall proposal area. The purpose of this was to:
- Incorporate future projects in the area that would result in increased traffic volumes or changed traffic movements through the overall proposal area
- Assess the impacts of the overall proposal on the broader road network.

The study area captured existing transport routes (Figure 9-4) within and around the overall proposal area extending out to Georges Hall, Chipping Norton and Milperra (Figure 9-4).

Future Development Approach

Future year models were developed for the overall proposal for the following assessment scenarios:
- 2026 AM/PM peak period without works (Do-Minimum).
- 2036 AM/PM peak period with the proposal.

The future year models for 2026 (opening year) and 2036 (ten years after opening) were developed for the future AM and PM peaks by adding the predicted traffic growth to the base case 2019 calibrated demand volumes. The traffic growth was derived using traffic volumes from the Sydney Strategic Traffic Forecasting Model (STFM).

It is noted that at the time of modelling, there were several key developments not included within the future land use assumptions within Land Use 2016. These developments include Bankstown Airport and Riverlands Golf Course Subdivision. Traffic volumes generated by these developments have been based on Bankstown Airport Masterplan (Bankstown Airport, 2019) and the Riverland's Golf Course Residential Subdivision Traffic Impact Assessment (TTPP, 2020) and included in future year traffic assessment scenarios.

In addition, the Georges Hall Pinch Point upgrade to be constructed north of the Stage 1A proposal on Henry Lawson Drive between Beale Street and Rabaul Road has also been considered in all future year assessment scenarios. The changed traffic movements and improvements to the traffic on Henry Lawson Drive from that project has been modelled in these scenarios.

9.1.2 Existing environment

The study area is located predominantly within the City of Canterbury Bankstown LGA, though it is noted that a minor part of the area encompassing Newbridge Road extends into the Liverpool City LGA. Local development within the City of Canterbury Bankstown LGA is largely governed by the *Bankstown Local Environmental Plan 2015* (Bankstown LEP), which establishes land zonings that control the types of land uses that are permitted.

Road network

Key roads

The study area includes several key roads, which are described in the sections below, including:
- State roads – Milperra Road, Henry Lawson Drive, Newbridge Road
- Regional roads – Haig Avenue, Ashford Avenue
- Local roads – Tower Road, Rabaul Road, Auld Avenue.

Further discussions on roads that are within and surrounding the EIS proposal areas are discussed in Table 9-1.

Table 9-1 Description of key roads within and surrounding the EIS proposal areas

Road	Construction
Henry Lawson Drive	Henry Lawson Drive is a 20 kilometre- long State road that runs predominantly north-south from Hume Highway in Villawood to Forest Road in Peakhurst. Within the study area, Henry Lawson Drive intersects with Newbridge Road and Milperra Road at an at-grade signalised intersection. South of this intersection, Henry Lawson Drive has one-lane in each direction, with additional auxiliary turning lanes. North of this intersection, it has two lanes in each direction until Tower Road, where it reduces to one-lane in each direction. Both sections are sign posted at 60 kilometres per hour.
Milperra Road	Milperra Road is a State road that runs predominantly east-west from Newbridge Road in Milperra to Canterbury Road in Revesby. It is part of the A34 arterial route which connects Newtown and Liverpool. Within the study area, Milperra Road intersects with Newbridge Road and Henry Lawson Drive at an at-grade signalised intersection. This section of Milperra Road has three lanes in each direction, with additional auxiliary turning lanes. It is signposted at 70 kilometres per hour.
Tower Road	Tower Road is a north-south local road that connects Henry Lawson Drive to Link Road and Bankstown Airport. It is generally a two-lane undivided road with aeronautical industry/golf course on both sides.
Auld Avenue	Auld Avenue is an east-west dead-end local road that connects Henry Lawson Drive to cricket pitches to the west. It is generally a two-lane undivided road with on-street parking on both sides.

Key intersections

The intersections that are within or surrounding the EIS proposal areas are detailed in Table 9-2.

Table 9-2 Summary of key intersections within the study area

Intersection	Layout
Henry Lawson Drive/Tower Road	• Signalised T-Intersection. Roundabout at Tower Road located within 30m east of intersection. • Access to Tower Road from Henry Lawson Drive northbound carriageway via right turn short lane. Access from southbound carriageway via a through-left full-length lane. • Access from Tower Road to Henry Lawson Drive via full length (30m) dedicated left and right turn lanes.
Henry Lawson Drive/Newbridge Road/Milperra Road	• Signalised 4-way intersection with all turning movements permitted. • Left turns on all approaches are single slip lanes protected by median islands. Two left turn slip lanes are provided on the south approach of Henry Lawson Drive. • Right turns on all approaches are on single dedicated right turn short lanes. Two right turn lanes are provided on Henry Lawson Drive north approach.

Intersection	Layout
Henry Lawson Drive/Auld Avenue	• Priority T-intersection with one lane approach/exit on all legs, except for Henry Lawson Drive northbound exit lane expanding to two lanes after the intersection. • All turning movements permitted. Auld Avenue eastbound onto Henry Lawson Drive controlled by Give Way sign.
Henry Lawson Drive/Keys Parade	• Signalised T-intersection for access to/from Flower Power and Henry Lawson Drive • Access to Flower Power from Henry Lawson Drive northbound carriageway via a right turn short lane. Access from southbound carriageway via a protected short left turn slip lane, with left turn permitted on red signal. • Access from Flower Power to Henry Lawson Drive northbound via dedicated right tun lane. Access to southbound carriageway via a protected left turn slip lane
Henry Lawson Drive/Haig Avenue	• Signalised T-Intersection • Access to Haig Avenue from Henry Lawson Drive northbound and southbound via right and left turn short lanes respectively. • Access from Haig Avenue to Henry Lawson Drive southbound carriageway via left-turn short lane. Access to northbound carriageway via right turn full length lane.
Henry Lawson Drive/Rabaul Road	• Priority 4-way intersection with one lane approach/exit on all legs • all turning movements permitted. Rabaul Road westbound controlled by Stop sign, and eastbound controlled by Give Way sign.
Henry Lawson Drive/Murray Jones Drive	• Signalised T-intersection • Access to Murray Jones Drive from Milperra Road westbound carriageway via a right turn short lane, and from eastbound carriageway via a through-left full-length lane. • Access from Murray Jones Drive to Milperra Road eastbound carriageway via left-turn lane with left turn on red permitted after stopping. Access to westbound carriageway via right turn with seagull treatment
Henry Lawson Drive/Ashford Avenue	• Signalised T-Intersection • Access to Ashford Avenue from Milperra Road eastbound carriageway via a right turn short lane, and from westbound carriageway via a through-left full-length lane. • Access from Ashford Avenue to Milperra Road via dedicated left and right turn lanes for access onto eastbound and westbound carriageways respectively.

Other key intersections within the study area include:

- Henry Lawson Drive/Keys Parade
- Henry Lawson Drive/Haig Avenue
- Henry Lawson Drive/Rabaul Road
- Henry Lawson Drive/Murray Jones Drive
- Henry Lawson Drive/Ashford Avenue.

Road traffic volumes and intersection performance

The existing (2019) traffic and intersection performance of intersections within and surrounding the EIS proposal areas has been modelled to provide the existing scenario.

Intersection operational performance is evaluated by assessing the intersection turning volumes, vehicle delays and level of service (LoS). LoS is a measure used to determine the effectiveness of intersection operation and is commonly used to analyse intersections by categorising traffic flow conditions. Table 9-3 below shows the standard LoS criteria for intersection operation.

Table 9-4 details the modelling results of the existing intersections within and surrounding the EIS proposal area.

Table 9-3 Level of Service criteria for intersections

Level of Service	Average delay per vehicle (s/veh)	Traffic signals, roundabout
A	<14	Good operation
B	15 to 28	Good with acceptable delays & spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts requires other control mode
F	>70	Unsatisfactory with excessive queuing

Table 9-4: Existing (2019) traffic volumes and intersection performance

Intersection	AM peak 7-8			AM peak 8-9			PM peak 4-5			PM peak 5-6		
	Volume (Vol)	Delay	LoS	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/ Milperra Road	6052	112	F	6296	112	F	6615	152	F	6819	199	F
Henry Lawson Drive/ Tower Road	2935	18	B	3046	26	B	2984	70	E	3142	49	D
Henry Lawson Drive/ Auld Avenue	1880	11	A	2056	13	A	2119	25	B	2192	29	C

Henry Lawson Drive/Tower Road performs at an overall good level of service (LoS) B during both AM peak hours and LoS E and D during the PM peak hours. The poor performance in the PM peak can be attributed to a pinch point along the north approach exit which results in vehicles merging from two lanes to one. This extends into queues stretching beyond the Tower Road intersection. Additionally, Tower Road approach provides access to retail shops, which generates more traffic during the PM peaks.

Henry Lawson Drive/Milperra Road/Newbridge Road performs at an overall LoS F for both AM and PM peak periods, though has noticeably worse delay during the PM peak period.

Poor performance of the intersections can be partly attributed to:

- Right turn bay along the east approach is typically full during both peaks, with heavy vehicles filling up the bay space readily.

- During the PM peak, dual right turn along the north approach is typically full and queues back upstream along Henry Lawson Drive
- The left turn slip from Newbridge Road is heavily utilised during the AM peak and is constrained by the short storage length, which measures 60 metres from the stop line.

Henry Lawson Drive/Auld Avenue performs at an overall LoS A during the AM Peak, and slightly worse during the PM peak at LoS B and C. The performance of this intersection is good overall due to the low demand from Auld Avenue during the peak period.

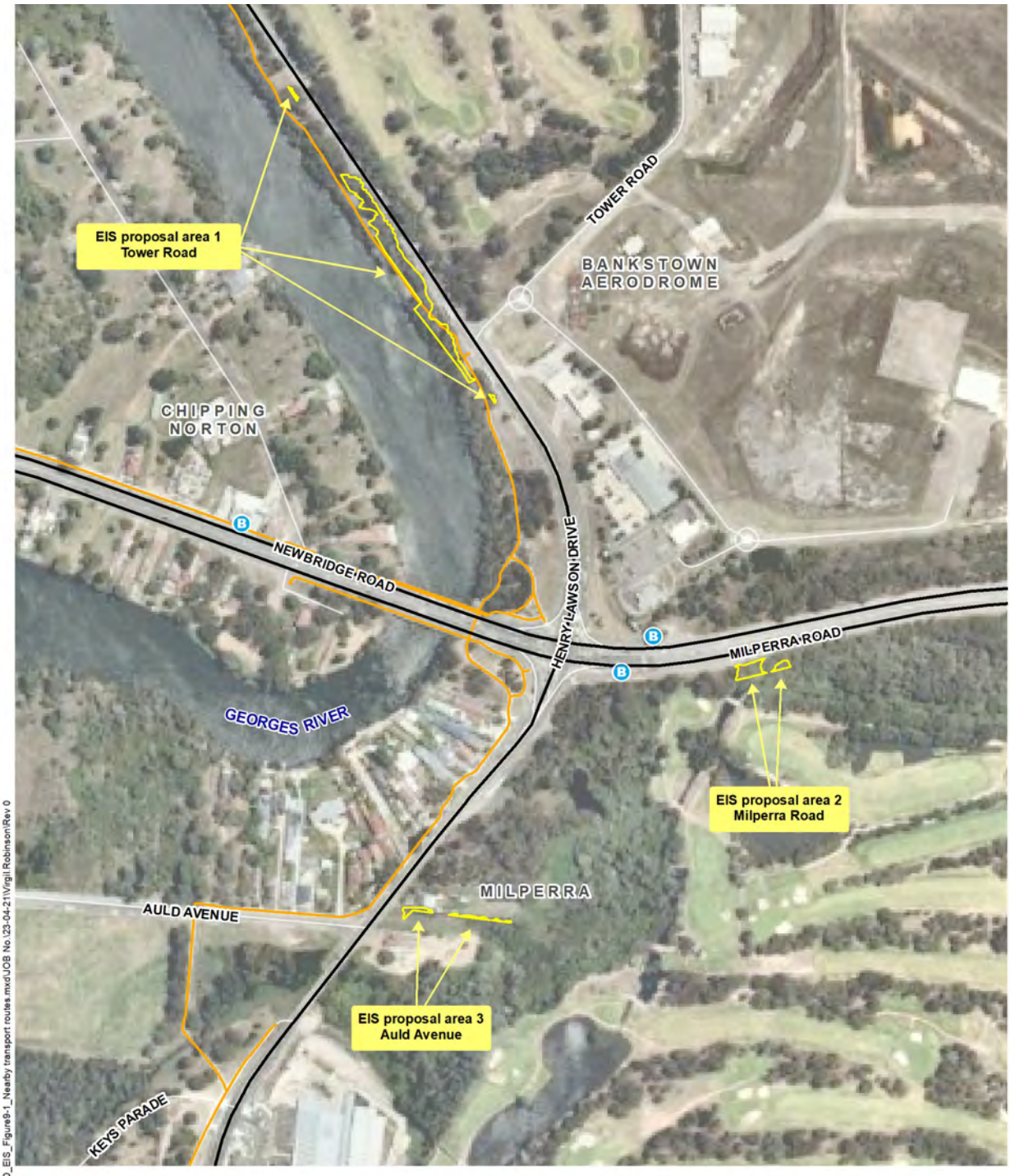
Freight

Heavy vehicle numbers

A majority of Sydney's freight task is undertaken by road. Henry Lawson Drive is an important route for freight and industrial type business operations that connects surrounding large industrial areas of Milperra, Revesby, Chipping Norton and Moorebank, which are made up of warehouses, manufacturing, storage and logistics businesses. As such, there are many approved B-Double routes through the area (shown in Figure 9-1). As a result, a range of vehicles including heavy vehicles travel throughout the local road network. The proportion of heavy vehicles during the peak periods along Henry Lawson Drive is high compared to the average of four per cent across the Sydney urban road network (refer to Table 9-5).

Table 9-5 Existing (2019) average weekday heavy vehicle volumes

Midblock	7-9 AM		4-6 PM	
	Volumes	%	Volumes	%
Henry Lawson Drive north of Newbridge Road/Milperra Road intersection	587	12	412	8
Henry Lawson Drive south of Newbridge Road/Milperra Road intersection	422	11	303	8



Henry Lawson Drive Stage 1A Environmental Impact Assessment

FIGURE 9-1: Nearby transport routes

Crash data analysis

Crash data was extracted from the past 10 years from the Transport Crash Link database for Henry Lawson Drive, Milperra Road and Newbridge Road across an area similar to the study area.

The crash history along with the crash types is shown in Figure 9-2 and Figure 9-3**.** Note that casualties include accidents involving fatalities and injuries.

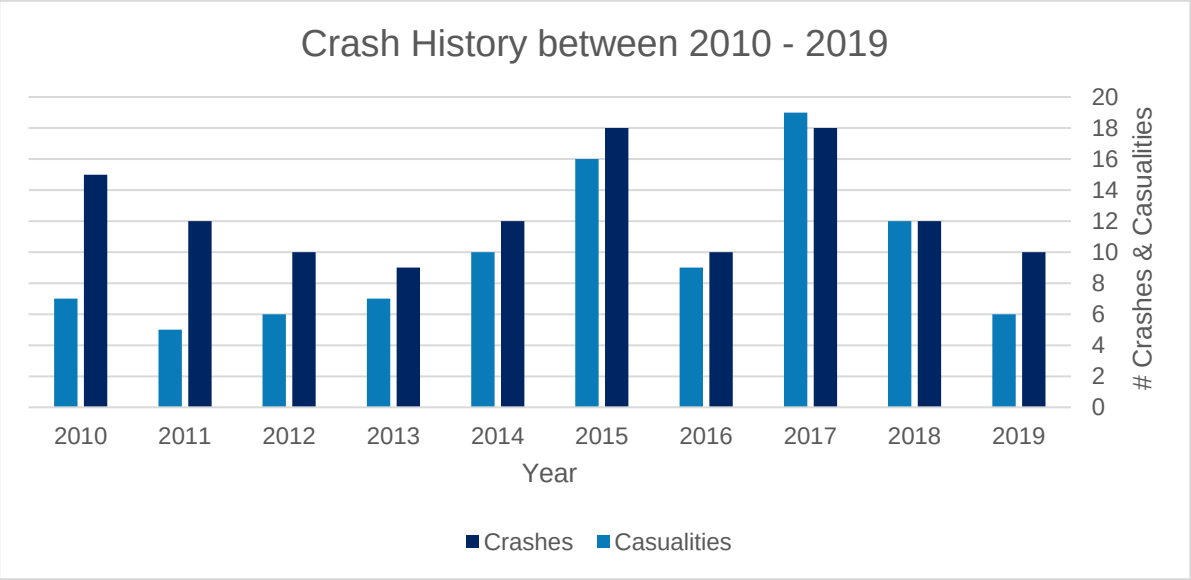


Figure 9-2 Crash history along Henry Lawson Drive and Milperra Road (2010 – 2019)

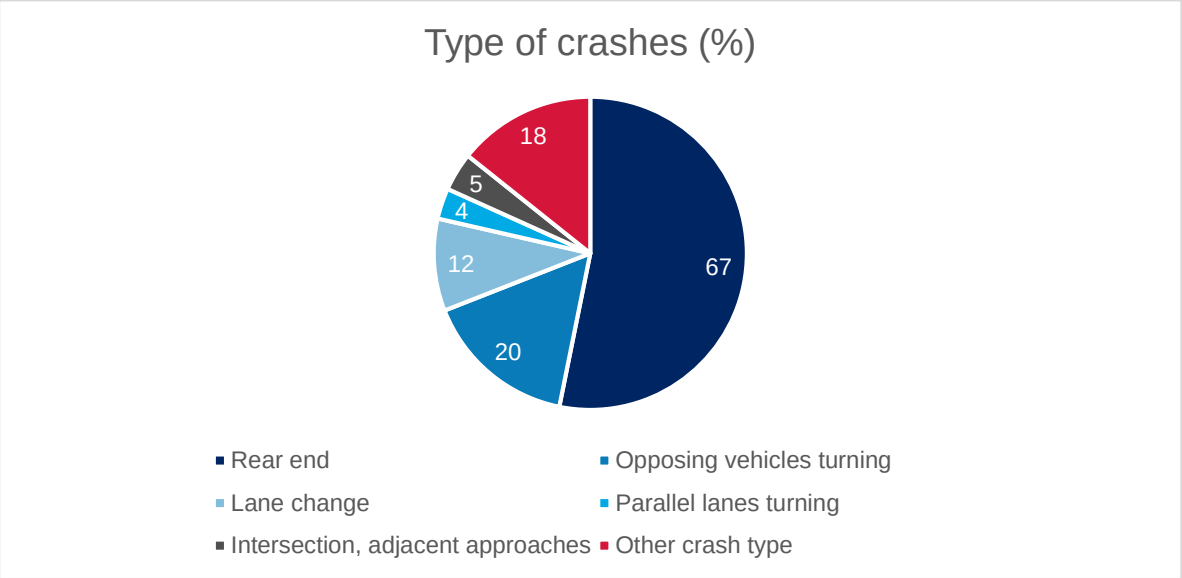


Figure 9-3 Crash by type along Henry Lawson Drive and Milperra Road (2010 – 2019)

The crash history data shows an average of 12.6 crashes and 9.7 casualties per year within the study area. Rear end crashes make up the majority of crashes (53.2 per cent) followed by lane changing (9.5 per cent) and opposing vehicles turning (15.9 per cent). The data also shows most crashes occur within 10 metres of the intersection (65.9 per cent). Most of the crashes occurred during the AM and PM peak periods during the weekdays.

Public transport

Rail network

There is no rail network within the study area. The nearest train stations are East Hills station, about four kilometres to the south, and Liverpool Station, about five kilometres to the west.

Bus network

The study area is serviced by a single bus route, the M90 which runs from Liverpool to Burwood. Bus stops are located along Milperra Road and Newbridge Road. There is one bus stop (westbound along Milperra Road) to the west of the EIS proposal area 2.

Active transport

Pedestrian and cyclist infrastructure

Existing pedestrian footpaths and shared (pedestrian and cyclist) paths across the study area is substantial, including existing pathways for pedestrians along:

- To the west of Henry Lawson Drive, south of its intersection with Newbridge Road.
- Either side of Newbridge Road, crossing the Georges River bridge
- Pedestrian pathway on the east bank of the Georges River to the north of Newbridge Road (EIS proposal area 1)
- Bridge crossing along Henry Lawson Drive south of Auld Avenue has a footpath along the northern carriageway that is of substandard width.
- Local roads within the residential streets.

There are no pedestrian or shared pathways that pass near or within EIS proposal areas 2 and 3.

9.1.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the traffic and transport assessment are:

- Bankstown Airport Master Plan 2019
- Transport for NSW Road network plan – Henry Lawson Drive and Woodville Road 2018
- Future Transport Strategy 2056
- Greater Sydney Region Plan: A Metropolis of Three Cities 2018NSW Freight and Ports Plan 2018-2023
- NSW Road Safety Plan 2021
- Transport for NSW draft walking and cycling policy (internal draft).

9.1.4 Assessment of potential impacts

The following section details the impacts of the proposal on traffic and transport during both construction and operation.

Construction

Impact on network performance

The proposal would generate light and heavy vehicle movements on the road network surrounding the proposal associated with delivery or removal of construction materials and equipment and construction worker movements to and from the construction footprint. Construction could result in up to an additional 60 heavy vehicles and 70 light vehicles on the surrounding road network per day during peak construction. The construction traffic for delivery or removal of construction materials and equipment would generally be staged throughout the day. The construction workers would arrive and leave site at the start and end of each shift.

The construction footprint is well serviced by roads suitable for heavy vehicles. Therefore, impacts on local roads surrounding the proposal are expected to be limited to short sections of local roads required to access the construction zones. In particular the use of the roundabouts at Nancy Ellis Leebold Drive and the intersection of Ashford Avenue and Bullecourt Avenue, for construction vehicles to turn around.

A SIDRA assessment was performed, comparing road performance in 2023 with and without construction vehicles. The assessment showed that due to their low overall volumes compared to existing traffic volumes on the roads, construction vehicles had no material impact on the performance of intersections within the surrounding road network.

The construction haulage routes are shown in Figure 9-4.

Impact on road access

The majority of construction works are being undertaken in the road reserve and on/adjacent to the roads of Henry Lawson Drive, Milperra Road and Newbridge Road. Side roads such as Tower Road and Auld Avenue would also be affected by construction works. These roads would remain operational during construction. However, there may be a need for temporary lane closures at times during the construction period.

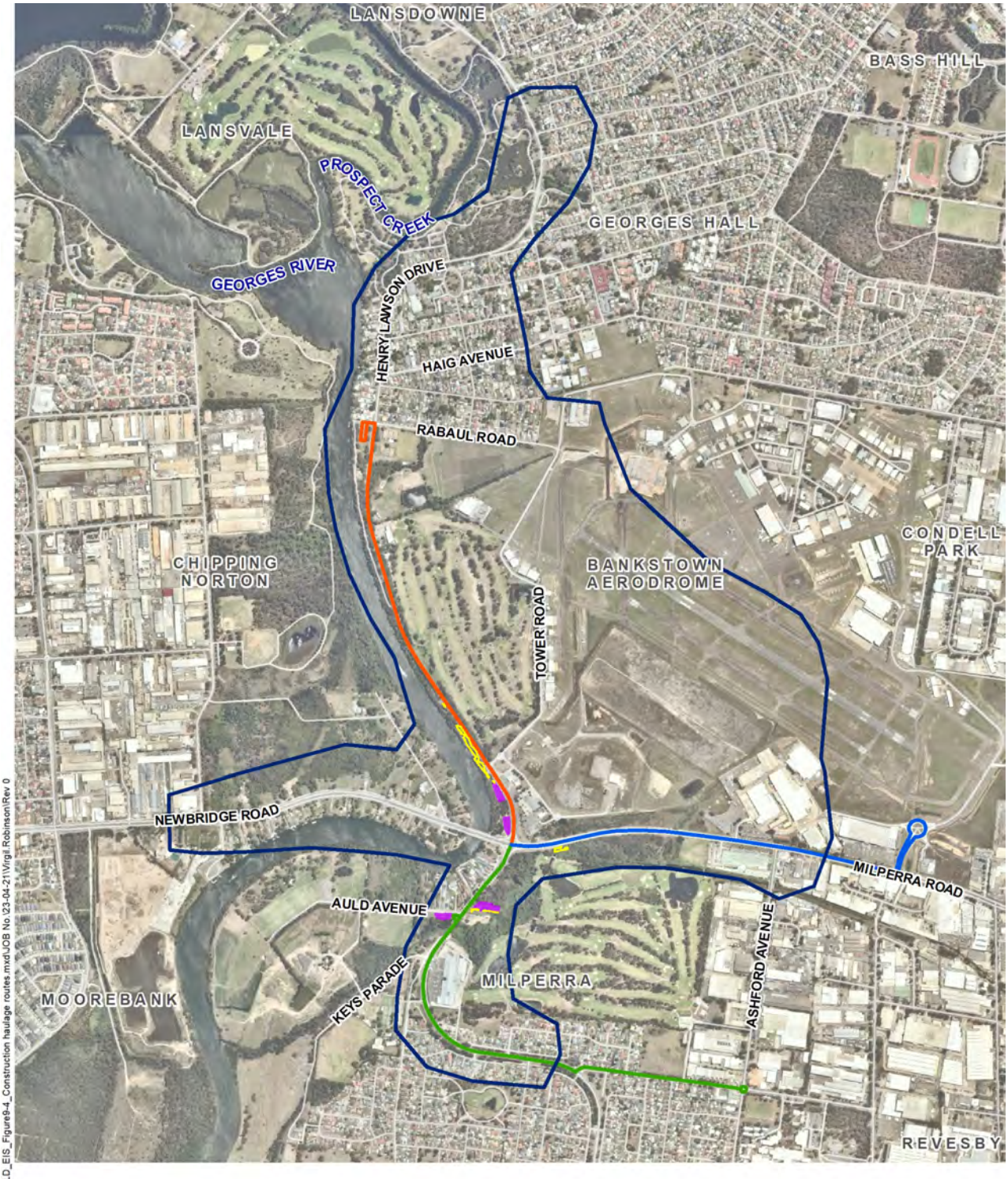
In addition, as sections of the upgrade are completed, traffic switches would be put in place to shift traffic onto new sections of the road to enable works on existing pavement to be completed. Traffic management controls such as speed limit reduction would also be enforced near worksites. All impacts to the road network would be undertaken in accordance with a Road Occupancy Licence (ROL) to be obtained from the Traffic Management Centre. Access for emergency vehicles would be maintained along these roads.

Impact on property access

Access to properties would be maintained during construction. However, access may need to be disturbed on a short-term basis. It is expected that the following property accesses may be affected by construction works:

- Access to commercial properties along southbound carriageway of Henry Lawson Drive between Tower Road and Milperra Road (ALDI, BP Truckstop) maybe be temporarily affected as widening works encroaches on existing access points. Alternate access routes are available along Starkie Drive.
- Access to residential properties to the west of Henry Lawson Drive between Newbridge Road and Auld Avenue may be temporarily affected as widening works encroaches on existing access points. Access to these properties would be maintained by the contractor, though it may involve detours and increase in travel times.
- Access to the Flower Power complex from Henry Lawson Drive southbound may be minimally affected by widening works. Northbound access to the Flower Power complex is not expected to be directly affected as it is outside of scope of works.

Landowners and occupiers would be consulted by the construction contractor about any potential access impacts prior to the commencement of construction and methods to minimise impacts.



Henry Lawson Drive Stage 1A **Environmental Impact Assessment**

FIGURE 9-4: Traffic model study area and construction haulage routes

Impact on public transport

Bus routes M90 operate along Newbridge Road/Milperra Road in both directions (shown in Figure 9-4). Access for pedestrians and to public transport would be maintained around the construction site during construction. There are two bus stops within the construction area that would be temporarily relocated to allow for safe access.

Impact on active transport

Detours for pedestrian/cyclist access would be implemented within the proposal area and alternative arrangements managed through signage and wayfinding. In particular, the following routes may be affected, as they lie within the zone of construction works:

- Existing shared path along northbound Henry Lawson Drive north of Keys Parade
- Existing shared path along northbound Henry Lawson Drive between Auld Avenue and Milperra Road
- Existing shared path along Georges River near Tower Road.

The bicycle network is shown in Figure 9-4. Pedestrian and cyclist access across the Henry Lawson Drive/Milperra Road/Newbridge Road intersection would be maintained during the construction period. However, some detours may be required at times.

Operation

Impact on network performance

A microsimulation model of the study area was created to identify the operational impact of the proposed upgrades on intersections, travel times, and network statistics in the study area for the years 2026 and 2036, compared to a do-minimum scenario.

Modelling showed that at intersections within the study area all showed significant improvements in delay and volume throughput due to capacity improvements, even though the operating level of service sometimes remained the same.

Level of service results for the Do Minimum 2026 and 2036 scenarios are shown in Table 9-6 and Table 9-7. Level of service results for the Proposal 2026 and 2036 scenarios are shown in Table 9-8 and Table 9-9.

Table 9-6 Level of service results for Do Minimum 2026 scenarios

Intersection	AM Peak 7-8			AM Peak 8-9			PM Peak 4-5			PM Peak 5-6		
	Volume (Vol)	Delay	Level of service (LoS)	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/Milperra Road	6341	237	F	6104	509	F	6789	246	F	6997	255	F
Henry Lawson Drive/Tower Road	2784	26	C	2408	52	D	2995	105	F	3126	78	F
Henry Lawson Drive/Auld Avenue	2105	66	E	1957	82	F	2201	80	F	2145	99	F

Table 9-7: Level of service results for Do Minimum 2036 scenarios

Intersection	AM Peak 7-8			AM Peak 8-9			PM Peak 4-5			PM Peak 5-6		
	Volume (Vol)	Delay	Level of service (LoS)	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/Milperra Road	6361	297	F	6195	572	F	6580	265	F	6429	314	F
Henry Lawson Drive/Tower Rd	2892	56	E	2544	105	F	3019	121	F	2890	134	F
Henry Lawson Drive/Auld Avenue	2146	54	D	1941	76	F	2201	80	F	2145	99	F

Table 9-8: Level of service results for Proposal 2026 scenarios

Intersection	AM Peak 7-8			AM Peak 8-9			PM Peak 4-5			PM Peak 5-6		
	Volume (Vol)	Delay	Level of service (LoS)	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/Milperra Road	6949	77	F	7261	131	F	7247	163	F	7478	1919	F
Henry Lawson Drive/Tower Road	3204	26	B	3452	39	C	3530	81	F	3514	88	F
Henry Lawson Drive/Auld Avenue	2219	17	B	2415	32	C	2421	47	D	2515	30	C

Table 9-9: Level of service results for Proposal 2036 scenarios

Intersection	AM Peak 7-8			AM Peak 8-9			PM Peak 4-5			PM Peak 5-6		
	Volume (Vol)	Delay	Level of service (LoS)	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/Milperra Road	7217	98	F	7413	201	F	7273	201	F	7339	225	F
Henry Lawson Drive/Tower Road	3235	26	B	3392	54	D	3591	87	F	3586	81	F

Intersection	AM Peak 7-8			AM Peak 8-9			PM Peak 4-5			PM Peak 5-6		
	Volume (Vol)	Delay	Level of service (LoS)	Vol	Delay	LOS	Vol	Delay	LOS	Vol	Delay	LOS
Henry Lawson Drive/Auld Avenue	2341	26	B	2499	65	E	2567	66	E	2498	70	F

Henry Lawson Drive/Milperra Road

The modelling shows:

- The intersection would still operate at LoS F under the operation scenario for both 2026 and 2036 during both peak periods.
- There is a reduction in delay and the volume capacity of the intersection. The 2026 7-8 AM peak, delay has reduced from 240 seconds down to 77 seconds(s). Volume throughput has also increased from 6341 to 6949 vehicles which shows the intersection is able to accommodate more traffic.
- The 2026 8-9AM shows delays improving from 509s to 131s and also volume throughput increases.
- In 2036, delays have improved from 297s to 98s in the 7-8AM and from 572s to 201s in the 8-9AM. Likewise, improvements in delay can also be seen during the PM peak periods.

The delay improvement of the intersection can be factored by the addition of a dual right turn along from Milperra Road into Henry Lawson Drive.

Henry Lawson Drive/Tower Road

The modelling shows:

- The intersection remains at LoS B during the 7-8AM and improves from LoS D to LoS C during 8-9AM in 2026.
- In 2036, the 7-8AM improves from LoS E to LoS B and the 8-9AM improves from LoS F to LoS D. The PM peak shows the intersection performing at LoS F however with improvements in overall delay.
- In 2026, delay is reduced from 105s to 81s (4-5PM) and remains at 88s during the 5-6PM.
- In 2036, delay is further reduced from 121s to 87s (4-5PM) and 134s to 81s (5-6PM). Volume throughput of the intersection has also increased across all peak periods.

The improvements in delay and volume throughput of the intersection can be seen coming from the capacity improvements of the Tower Road leg with the addition of a dual right turn bay and a dedicated left turn slip which helps during the PM peak periods as more traffic exits from the development.

Henry Lawson Drive/Auld Avenue

The modelling shows:

- The do minimum modelling shows by 2026, Henry Lawson Drive/Auld Avenue would operate at LoS E/F in the AM peak and LoS F during the PM peak.
- Similar LoS can be seen in 2036 do minimum.
- Under the proposal scenario, the 2026 modelling shows the intersection performing at LoS B/C during the AM peak and LoS D/C during the PM peak.
- By 2036, the intersection performs at LoS B/E during the AM peak and LoS E/F during the PM peaks.

The poor performance under the do minimum is attributed to the high delays from traffic turning in and out of Auld Avenue as a result of congestion along Henry Lawson Drive.

The improvement in performance is a result of the intersection layout changes from a T-intersection with all movements to a left in left out arrangement.

Impact on property access

Working on the EIS proposal areas would not result in any impacts to property access.

Potential construction impacts on property access for the overall proposal is discussed within the REF.

Refer to the REF for a broader discussion on the property access impacts, both during construction and operation.

Impact on public transport

The bus stop located on the Milperra Road westbound carriageway would be relocated out of the left turn lane about 20 metres from where it is currently located (to an area within EIS proposal area 2). This would require the bus to merge out of the left turn lane into the Milperra Road. The operation of the EIS proposal would not result in any changes to public bus services.

As part of the overall proposal, a new shared path would also be constructed to the relocated bus stop.

Impact on active transport

As a part of the overall proposal, pedestrian accessibility and safety would be improved through new and upgraded infrastructure. In EIS proposal area 2, a new pedestrian pathway would be constructed to connect the bus stop to the Henry Lawson Drive/Milperra Road intersection. This pathway would improve access to bus services for bus customers.

Pedestrian and cyclist movements along the Georges River would be maintained. The existing pedestrian pathway along the Georges River north of Newbridge Road bridge would be slightly realigned to accommodate the larger footprint of the upgraded Henry Lawson Drive/Tower Road intersection. This pathway would still connect to the existing pedestrian crossing at Tower Road. This would pass through EIS proposal area 1. Impacted pathways would be re-instated to concrete in accordance with the proposal's urban design plan.

Impact on road safety

Whilst no dedicated road safety upgrades form part of the overall proposal, the increased intersection capacity and smoother operation of the network in general is expected to significantly improve road safety. The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

9.1.5 Environmental management measures

Table 9-10 provides a summary of the mitigation measures and environmental safeguards that are recommended for the proposal based on the assessment of potential traffic and transport impacts.

Table 9-10 Traffic impact mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport for NSW Traffic Control at Work Sites Manual (RMS, 2020) and QA Specification G10 Control of Traffic (Transport, 2020). The TMP will include: • Confirmation of haulage routes	Contractor	Pre-construction/ during Construction

Impact	Environmental safeguard	Responsibility	Timing
	• Measures to maintain access to local roads and properties • Construction traffic control plans outlining site-specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access (with the implementation of a Vehicle Movement Plan) • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion from cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms. The TMP will ensure the following: • Alternative routes for active transport users will be clearly identified by signage and the use of traffic controllers where required. • Public transport providers and users will be notified in advance of any changes to bus stop locations through signage at the existing bus stops on Milperra Road. • Canterbury Bankstown City Council will be consulted of any detours in accordance with the Traffic Management Plan and the Community Liaison Plan (CLP).		
Traffic impacts	Further traffic modelling will be carried out during detailed design based on detailed construction methods and traffic staging. Traffic modelling will assess the potential traffic impacts from detailed design and identify whether any additional mitigation measures or traffic control measures will be required.	Transport	Detailed design
Impact on bus stops or routes	Temporary and permanent bus stop relocation will be discussed with the relevant bus operator.	Transport/ Contractor	Detailed design/ during Construction
Construction traffic	Heavy vehicle movements to be minimised during peak traffic periods (i.e. not between 7.15 and 8.15 am or 4.45 and 5.45 pm), where practical.	Contractor	During Construction
Traffic management measures	Any temporary traffic diversions, clearways and lane closures for work carried out in the EIS proposal areas will be implemented in accordance with Transport Management Centre (TMC) and Canterbury Bankstown City Council requirements.	Contractor	During Construction
Parking	Off-road parking for construction vehicles will be provided within the ancillary facility and construction areas.	Contractor	During Construction

Impact	Environmental safeguard	Responsibility	Timing
Damage to local roads	Any damage to the local road network identified to be caused by construction vehicles will be remediated to pre-existing road conditions.	Contractor	During Construction

9.2 Noise and vibration

A Noise and Vibration Impact Assessment (Aurecon Australasia, 2021) was prepared for the overall proposal. Due to the integrated nature of the proposal, the noise and vibration assessment cannot provide a separate impact assessment of the EIS proposal. Instead, this section details the traffic and transport assessment for the overall proposal, focusing on features near the EIS proposal area, where appropriate to do so. The assessment is provided in Appendix M.

9.2.1 Assessment methodology

Construction

The methodology for assessing construction noise involved:

- Assessment of potential construction noise impacts to sensitive receivers within around 600 metres of the proposal, based on the construction methodology identified in the EIS and REF.
- Predicted noise levels were compared against applicable assessment criteria (including evaluation of exceedances), in line with the requirements of the Transport's Construction Noise and Vibration Guideline (RMS 2016) and NSW EPA ICNG. Appropriate control measures have also been considered in accordance with Transport's Noise Mitigation Guidelines (RMS 2015).
- A qualitative discussion of potential noise impacts from construction traffic on haulage routes.
- A vibration impact assessment based on typical safe working distances for vibration-intensive equipment and identification of locations where receivers may be within the safe working distance for structural and human comfort impacts. Identification of consideration for any vibration management measures have been identified.

Operational

The methodology for assessing operational noise involved:

- Noise monitoring and concurrent traffic counts at two locations across the proposal area. Baseline noise levels were recorded over a minimum of seven consecutive days. The concurrent automatic traffic counts established existing traffic volumes and characteristics over this period. The traffic data would also be used to validate the predictive noise model.
- Following the noise survey, proposal noise catchment areas, representing groups of sensitive receivers of similar background noise and similar level of impact from the proposal, were established to then determine the most appropriate noise assessment criteria.
- Computational noise modelling was done using SoundPlan v8.1, with reference to Transport's Noise Criteria Guideline (RMS 2015) requirements. This model incorporated terrain, receiver locations, proposal geometry (existing and proposed design) and traffic data for the operational assessments. The computational acoustic model has been validated with noise monitoring with concurrent traffic counts. Details of the modelling parameters and inputs are provided in the Noise and Vibration Impact Assessment in Appendix M.
- The noise impact assessment for operational traffic noise was undertaken in accordance with the Transport guidelines for noise impact assessments. An assessment of operational noise impacts included the assessment of the following scenarios:
  - Year of opening: 2026, without upgrade
  - Year of opening: 2026, with upgrade
  - 10 years after opening: 2036, without upgrade
  - 10 years after opening: 2036, with upgrade.

- Noise predictions for each scenario for all sensitive receivers within 600 metres of the proposal and assessment of level of impact. This included maximum noise level predictions and predictions of sleep disturbance impacts, where relevant.
- Identification of the need and type of noise management measures considered feasible.

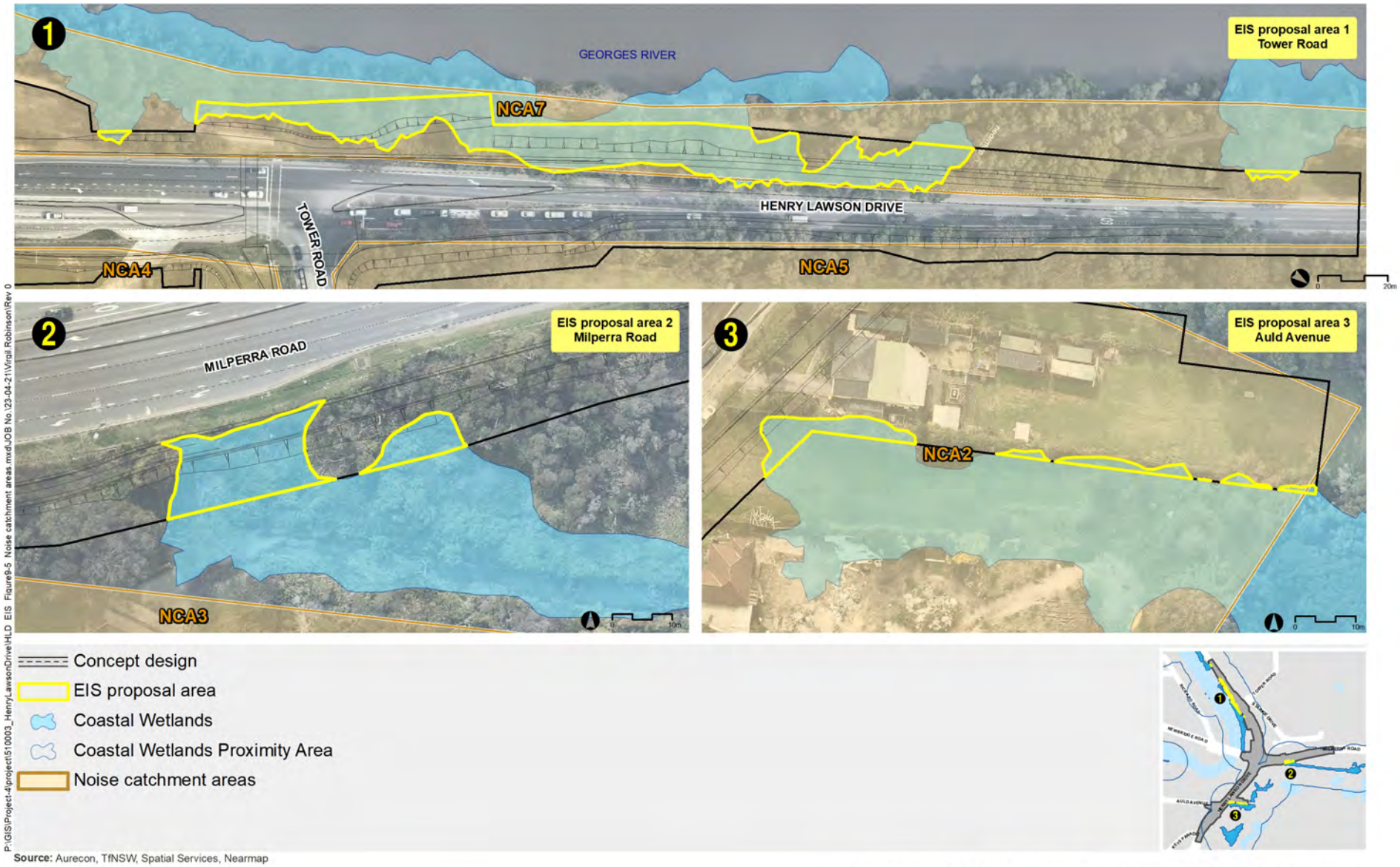
The future operational traffic volumes for the road traffic noise assessment were obtained from Transport traffic modelling. These volumes were calibrated against the Matrix traffic monitoring data undertaken in 2020.

9.2.2 Existing environment

The area surrounding the overall proposal has been divided up into Noise Catchment Areas (NCAs) as shown in Figure 9-5. These NCAs are based on similar land use and similar location. Each of the NCAs has been described in Table 9-11.

Table 9-11 Noise Catchment Area Descriptions

NCA	Description
NCA 1	The noise catchment area contains residential receivers. The NCA is not directly adjacent the construction footprint or Henry Lawson Drive, however the sensitive receivers are directly adjacent to Newbridge Road. Receivers are also exposed to noise from Henry Lawson Drive, particularly due to the presence of the Georges River. Traffic along Newbridge Road would be affected by the overall proposal and is required to be assessed relative to the receivers within the NCA. EIS proposal area 1 is located across the river from this NCA.
NCA 2	The noise catchment area contains residential receivers directly adjacent to the construction footprint as well as adjacent to the widening of the Henry Lawson Drive. Sensitive receivers within the NCA would be affected by the change in operational road traffic noise and the construction noise and vibration of the overall proposal. EIS proposal area 3 is located within this NCA.
NCA 3	The noise catchment area contains recreational open space, which would be affected by construction and operational noise and vibration induced by the overall proposal. EIS proposal area 2 is located near to this NCA.
NCA 4	The noise catchment area contains commercial receivers. EIS proposal areas 1 and 2 are located near to this NCA.
NCA 5	The noise catchment area contains recreational open space, which would be affected by construction and operational noise and vibration induced by the proposal.
NCA 6	The noise catchment area contains recreational open space, which would be affected by construction and operational noise and vibration induced by the overall proposal.
NCA 7	The noise catchment area contains recreational open space, which would be affected by construction and operational noise and vibration induced by the overall proposal. EIS proposal area 1 is located within this NCA.



Source: Aurecon, TfNSW, Spatial Services, Nearmap

Projection: GDA 1994 MGA Zone 56

Henry Lawson Drive Stage 1A **Environmental Impact Statement**

FIGURE 9-5: Noise catchment areas

The EIS proposal areas do not contain any sensitive receivers. While there is currently a residence on EIS proposal area 3, this would be acquired for the proposal and used as a construction compound, being returned to Council at the completion of construction as part of their floodplain voluntary purchase scheme. This property has therefore not been considered during the construction and operation of the proposal.

Long term unattended noise monitoring was conducted at two residential receivers: one in NCA 1 and one in NCA 2. Long term unattended noise monitoring was conducted between the 16 September 2020 and 28 September 2020. The results of the noise monitoring at the locations are detailed in Table 9-12.

Table 9-12 Measured existing ambient (dBLAeq) and background noise levels (dB_{LA90})

Location	Ambient noise level, dBL_{Aeq}			Background noise level, dBL_{A90}		
	Day	Evening	Night	Day	Evening	Night
40 Rickard Rd, Chipping Norton	60.3	57.0	54.7	53.1	51.5	40.7
392 Henry Lawson Drive, Milperra	64.5	60.8	59.0	51.9	47.4	40.7

9.2.3 Criteria

Construction

Recommended standard hours

The ICNG (NSW DECC 2009) generally applies to the management of construction noise in NSW. This guideline provides recommendations on standard construction hours and construction noise management levels (NMLs).

Construction noise management levels

The construction noise criteria are defined as Noise Management Levels (NMLs). The NMLs represent a noise level that, if exceeded, would require management measures including the following:

- Reasonable and feasible work practices
- Contact with residences to inform them of the nature of works to be carried out, the expected noise levels and durations and contact details.

The ICNG sets the NMLs for residential receivers as well as other receivers. Table 9-13 and Table 9-14 are extracted from the ICNG, and derive the NMLs for residential receivers as well as other land uses applicable for the overall proposal.

Table 9-13 Noise Management Levels at residential receivers

Time of Day	Noise Management Level, $dBL_{Aeq\ (15\ min)}$[1]
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)
	Highly noise affected 75dB(A)
Outside recommended standard hours (OOHW)5	Noise affected RBL + 5dB(A)

[5] OOHW Period 1 (Day) – Saturdays 7am to 8am and 1pm to 6pm; Sundays and public holidays 8am to 6pm.
OOHW Period 1 (Evening) – Monday to Saturday 6pm to 10pm.
OOHW Period 2 – Monday to Saturday 10pm to 7am; Sundays and public holidays 6pm to 8am.

Table 9-14 Noise Management Levels at other land uses

Land use	Noise Management Level, $dBL_{Aeq\ (15\ min)}$[1]
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Commercial premises	External noise level 70 dB(A)

Construction traffic noise criteria

The ICNG does not outline specific guidelines surrounding construction traffic noise requirements. Construction related traffic noise objectives are sorted through the CNVG. The CNVG states that if a quantitative assessment is required then the objectives should be based upon the RNP.

With respect to the RNP, an initial screening of the additional construction traffic is required to evaluate whether the noise levels would increase more than 2dBA.

This initial screening would involve the comparison of the construction induced traffic and the current traffic volumes on Henry Lawson Drive, Milperra Road and Newbridge Road.

Construction sleep disturbance

Construction noise during the night-time period (10pm to 7am), has the potential to disturb people's sleep patterns. Guidance in the ICNG references further information in the NSW EPA Road Noise Policy (RNP), that discusses criteria for the assessment of sleep disturbance.

The RNP suggests a screening level of L1(1min) dB(A), equivalent to the RBL + 15 dB. Where this level is exceeded, further analysis is required, as detailed in Section 5.4 of the RNP:

- Maximum internal noise levels below 50 – 55 dB(A) would be unlikely to result in people's sleep being disturbed
- If the noise exceeds 65 – 70 dB(A) once or twice each night, the disturbance would be unlikely to have any notable health or wellbeing effects.

A sleep disturbance screening criterion of RBL+15 dB was adopted for this assessment. Where this level is predicted to be exceeded, assessment against the maximum external noise limit of 65 dB_{LAmax} was considered to determine all feasible and reasonable safeguards.

Proposal construction noise criteria

Based on the noise management levels for residential receivers and other sensitive receivers, the specific noise management levels for the proposal are detailed in Table 9-15.

Table 9-15 NCA specific Noise Management Levels

NCA	Assessment Period	Noise Management Level, $dBLAeq_{(15\ min)}$
NCA 1	Day (Standard Hours)	63
	OOHW Period 1 (Day)	58
	OOHW Period 1 (Evening)	57
	OOHW Period 2 (Night)	46

NCA	Assessment Period	Noise Management Level, dBLAeq (15 min)
NCA 2	Day (Standard Hours)	62
	OOHW Period 1 (Day)	57
	OOHW Period 1 (Evening)	52
	OOHW Period 2 (Night)	46
NCA 3	Day (Standard Hours) – Golf Course	External noise level - 65 dB(A)
NCA 4	When in use – Commercial	External noise level – 70 dB(A)
NCA 5	Day (Standard Hours) – Golf Course	External noise level - 65 dB(A)
NCA 6	Day (Standard Hours) – Recreation	External noise level - 65 dB(A)
NCA	Day (Standard Hours) – Recreation	External noise level - 65 dB(A)

Construction vibration criteria

Human comfort criterion is detailed in Section A.3.1 of the CNVG, which references Assessing Vibration - a technical guideline (DECC, 2006) provides guidance on disturbance to human occupants of buildings as a result of vibration. This document provides criteria which have been based on the British Standard BS 6472-1992, Evaluation of human exposure to vibration in buildings (1-80Hz).

British Standard BS 7385 recommends vibration limits for transient vibration judged to give a minimal risk of vibration induced damage to affected buildings.

Operation

Operational traffic noise criteria

The NSW Road Noise Policy (RNP) is used to assess and manage potential noise impact from new and redeveloped road proposals. The RNP identifies the potential noise impacts for new roads (i.e. new road infrastructure where there is no road) or redeveloped road (widening or upgrade of existing road infrastructure).

Should the criteria be exceeded, then feasible and reasonable management measures should be considered in accordance with the Noise Mitigation Guidelines.

The proposal is deemed to be a redevelopment of the existing arterial roads of Henry Lawson Drive and Milperra Road. Noise criteria for redeveloped road is extracted from the RNP for sensitive receivers is applicable (for this proposal, residential and open space). No other sensitive receivers are present in the surrounding proposal area.

Relevant criteria are detailed in Table 9-16 and Table 9-17.

Table 9-16 RNP Criteria for redevelopments of existing arterial roads for residential and non-residential land uses

Road Category	Type of project/land use	Assessment Criteria (dBA)	
		Day (7am – 10 pm)	Night (10 pm – 7 am)
Freeway/Arterial/Sub-Arterial Roads	Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	$L_{Aeq\ (15hr)}$ 60 (External)	$L_{Aeq\ (9hr)}$ 55 (External)
Freeway/Arterial/Sub-Arterial Roads	Open Space (Active Use) These spaces include, • Bankstown Golf Course • Georges River Golf Course • Georges River Trail walk • Vale of Ah Reserve • Vale of Ah Dog Park	$L_{Aeq\ (15hr)}$ 60 (External)	-

Table 9-17 RNP Relative increase criteria for residential land uses

Road Category	Type of project/land use	Assessment Criteria (dBA)	
		Day (7am – 10 pm)	Night (10 pm – 7 am)
Freeway/Arterial/Sub-Arterial Roads	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic $L_{Aeq\ (15hr)}$ + 12 (External)	Existing traffic $L_{Aeq\ (9hr)}$ + 12 (External)

Of the two relevant criteria for residential lands uses, the controlling criterion is the criterion with the greatest exceedances. In terms of the EIS proposal, there are no close receivers to EIS proposal areas 1 and 2, so the relative increase criteria does not apply. For the EIS proposal area 3, the relative increase criteria is the controlling criteria due to the closeness of sensitive receivers already subject to Henry Lawson Drive traffic noise.

As the proposal area may be already exposed to road traffic noise exceeding the applicable road traffic noise criteria, a comparison of the No Build and Build scenarios must be undertaken to determine the difference in noise levels. Should the difference be less than 2 dB, then noise mitigation is not required to be considered.

9.2.4 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the EIS proposal are:

- Interim Construction Noise Guideline (ICNG) (DECC, 2009)
- Road Noise Policy (RNP) (DECCW, 2011)
- BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2, BSI, 1993
- DIN 4150:Part 3-2016 Structural vibration – Effects of vibration on structures, Deutsches Institute fur Normung, 1999
- Assessing Vibration: a technical guideline (DEC, 2006)
- Model Validation Guideline (Roads and Maritime, 2018)
- Construction Noise and Vibration Guideline (CNVG) (Transport, 2016)

9.2.5 Assessment of potential impacts

The following sections assess the potential noise impacts from the EIS proposal.

Construction

Construction period and duration

Construction is expected to commence in early 2023 and is forecast to extend over a 24-month period.

Construction works are proposed to be undertaken during both standard recommended hours and OOHW for the proposal.

OOHW would be required to minimise disruptions to the road network. The main works that would be required to occur out of hours would include:

- Intersection works at the Milperra Road/Henry Lawson Drive and Tower Road/Henry Lawson Drive intersections
- Auld Avenue bridge upgrade works.

Widening and Pavement works would also occur at night and hence it has been assessed for sleep disturbance in this assessment.

Construction activities and construction noise sources

The construction scenarios required for the EIS proposal have been detailed in Table 9-18.

Table 9-18 EIS proposal construction scenarios and associated sound power levels

Scenarios	Indicative equipment/machinery	Scenario total sound power levels[6]	
		L_{Aeq}	L_{AMax}
Preliminary works	Vacuum truck, light vehicles, bogie tipper truck	112	118
Utility works	Vacuum truck, light vehicles, backhoe/excavator, concrete saw, daymaker, generator, crane, whacker plate, compactor, bogie tipper truck, jumping jack	119	125
Building and fencing removal	Light vehicle, vacuum truck, excavator, rigid truck, handheld tools, hammer drill, crane, bogie tipper truck	118	123
Earthworks	Excavator, grader, light vehicles, bogie tipper truck, rigid truck, backhoe/excavator, loader, profiler, truck and dog, vacuum truck, water cart, road sweeper, daymaker, generator	120	124
Widening and pavement works	Trencher, trucks, hand held tools, angle grinder, backhoe/excavator, vacuum truck, paver and asphalt finisher, compactor, vibratory roller, concrete saw, concrete pump, concrete agitators, line marking machine, road sweeper, water cart, daymaker, generator, vibratory roller, jumping jack, grader, crane	123	128

[6] **Sound Power Levels of equipment were sourced from the following documents:*
EPA NSW, (2009) Interim Construction Noise Guideline
Construction Noise and Vibration Guidelines (CNVG) (Transport, 2016)
British Standard 5228: Part 1 (2009 including amendment 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise

Scenarios	Indicative equipment/machinery	Scenario total sound power levels[6]	
		L_{Aeq}	L_{AMax}
Pedestrian pathway, intersection crossings and shared path works	Handheld tools, angle grinder, vacuum truck, rigid truck, excavator, road sweeper, water cart, concrete saw, concrete pump, concrete agitators, water truck, whacker plate, crane, daymaker, generator	121	126
Landscaping and finishing works	Grader, bobcat, trucks, handheld tools, compactor, trencher, light vehicle, bogie tipper truck, crane, whacker plate, front loader	120	125
Removal of ancillary facilities and site rehabilitation	Light vehicle, excavator, trucks, bobcat, handheld tools, crane, bogie tipper truck	114	121

Construction noise assessment

There are no sensitive receivers located within the EIS proposal areas and therefore there would not be any noise impacts on sensitive receivers within these areas. EIS proposal area 3 forms part of a residential property, however this would be acquired by Transport prior to works.

However, it is noted that the works to be undertaken in the EIS proposal areas, would contribute to the noise created by the construction of the overall proposal, albeit a small amount.

Specific details of the overall proposal construction noise impacts, when unmitigated, on each of the NCA's which are relevant for consideration of the EIS proposal include:

- NCA 1 (which is located across the river from EIS proposal area 1): Construction noise impacts from the overall proposal to the receivers within NCA 1 are expected to exceed the proposal NMLs during both the recommended standard hours and out-of-hours work periods. During standard hours, exceedances of the NMLs are found along Rickard Road for all construction scenarios, with receivers along Newbridge Road experiencing exceedances of the NMLs during the standard hours of work for Widening and Pavement Works and Bridge and Drainage Works.
- NCA 2 (which EIS proposal area 3 is located within): The receivers within NCA 2 generally exceeded all NMLs for both standard working hours as well as OOWH when considering the overall proposal. To add to that the highly affected noise management levels was exceeded for the majority of the receivers for the most of the proposed construction activity due to the majority of receivers within NCA 2 being next to or within 100 m of the construction footprint.
- Open Space (NCA 3, which EIS proposal area 2 is located near to) and NCA 7 (which EIS proposal area 1 is located within)): The open space receivers within NCA 3,5,6,7 generally exceeded all NMLs for both standard working hours as well as for OOWH for the overall proposal.

Sleep disturbance assessment

A sleep disturbance assessment has been undertaken considering the construction scenario that would be undertaken during OOHW, with the greatest maximum noise reading (LAmax). This is Widening and Pavement works. Widening and pavement works would occur in EIS proposal area 1. The sensitive receivers for EIS proposal area 1 are located across the river. Whilst widening and pavement works also occur in EIS proposal area 2, the closest sensitive receiver for EIS proposal area 2 would be the Bankstown Golf Course and they would only be exposed to the disturbance for short time periods (and non-residential).

Widening and pavement works may take up to 2-3 months, and would be done progressively along the alignment, so that the sensitive receivers in one area would not be exposed to such noise levels for that whole period. The EIS proposal is captured within the area which may experience sleep disturbance, however, as stated earlier, there are no sensitive receivers located within the EIS proposal areas.

Whilst there are widening and pavement works that would occur within EIS proposal area 1, the EIS proposal is relatively small in comparison to the overall proposal and is not considered to substantially contribute to the sleep disturbance impacts of the overall proposal.

Construction traffic noise assessment

Construction related traffic has the potential to temporarily increase road traffic noise levels at receivers which are adjacent to construction haulage routes. The overall proposal is estimated to induce the following vehicle movements per day at peak construction period:

- Construction personnel (cars and private vehicles): 30
- Light construction vehicles and ute: 40
- Heavy vehicles and trucks: 60.

Given the amount of road traffic on Henry Lawson Drive, Newbridge Road and Milperra Road, the additional construction traffic induced by the EIS proposal are not expected to increase the overall road traffic noise by more than 2dB.

Construction vibration assessment

The key vibration intensive equipment/machinery proposed for the construction of the overall proposal, is a vibratory roller. As the size of the vibratory roller has not been specified, a worse case 18T vibratory roller has been assumed for this assessment. EIS proposal area 1 and EIS proposal area 2 would require the use of the vibratory roller. The use of the vibratory roller at these locations are outside the minimum distances required, thereby minimising the potential for building effects and adverse effects on human comfort.

As the EIS proposal has no sensitive receivers, it is considered that the EIS proposal would not require mitigation measures in regard to construction vibration.

Operation

Operational noise impacts, including maximum noise levels, have been predicted to all sensitive receivers within 600 metres of the outer most lanes of the overall proposal.

As mentioned previously, there are no sensitive receivers located within the EIS proposal areas, for there to be any noise impacts.

However, some of the works in the EIS proposal areas would make a minor contribution to the noise created by the operation of the overall proposal. In particular, these include small areas of road pavement in EIS proposal areas 1 and 2.

Upon construction completion, EIS proposal area 3 (which forms part of a larger property) would be handed back to Canterbury Bankstown City Council for recreational purposes.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

9.2.6 Environmental management measures

Safeguards and management measures provided below would be implemented to minimise potential construction noise impacts (Table 9-19).

Table 9-19 Environmental management measures for construction noise impacts

Impact	Environmental management measure	Responsibility	Timing
Construction noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will be prepared in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016) NSW EPA Interim Construction Noise Guideline and identify: • All potential significant noise and vibration generating activities associated with the activity • A monitoring program to assess performance against the noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Pre-construction/ during Construction
Out of hours work	Out of hours works will be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016). This includes: • Offer respite and/or restricted construction hours where noise intensive works are planned over extended periods, especially where they occur outside of standard hours. This may include moving the construction work front to different areas so that sensitive receivers are not impacted for longer than two consecutive days • No more than two consecutive nights of noise with special audible characteristics and/or vibration generating work may be undertaken in the same NCA over any 7-day period, unless otherwise negotiated with affected receivers.	Contractor	During Construction
Out of hours work	Noisiest activities should be limited to standard construction hours, where practicable	Contractor	During Construction
Noise and vibration	All sensitive receivers (eg local residents) likely to be affected will be notified at least 5 working days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • The proposal • The construction period and construction hours • Contact information for project management staff • Complaint and incident reporting • How to obtain further information.	Contractor	During Construction

Impact	Environmental management measure	Responsibility	Timing
Noise and vibration	A register of most affected noise and vibration sensitive receivers (NVSRs) will be kept on site and maintained. The register will include the following details for each NVSR: • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number. The register is to be included as part of the Proposal's CLP or similar document and maintained in accordance with the requirements of this plan.	Contactor	During Construction
Noise and vibration	Source controls will be employed to minimise noise impacts, such as using noise screens and mufflers, maximising offset distance, and orienting plant away from sensitive receivers.	Contractor	During Construction
Noise and vibration	The selection of plant and machinery will consider noise emissions, operated to reduce maximum noise levels, maintained regularly and turned off when not in use	Contractor	During Construction

9.3 Socio-economic

9.3.1 Assessment methodology

The socio-economic impact assessment has been prepared for a 'moderate' level assessment (as per Transport's *EIA-N05 Environmental Impact Assessment Practice Note – Socio-economic Assessment* (Transport, 2020)). The moderate level of assessment is used as it reflects the scale and magnitude of potential impacts to the socio-economic environment. The assessment includes:

- Review of statutory planning and legislative requirements, including a review of existing State and local government strategies relevant to the social and economic environment of the study area such as the Local Strategic Planning Statements (LSPS), Community Strategic Plans and Local Environment Plans (LEPs). This includes a review of the NSW South District Plan (Greater Sydney Commission).
- A site visit was undertaken on 15 July 2020 between 10am to 2pm to understand the existing environment
- Description of the existing socio-economic environment of the study area to establish the baseline, including:
  - Analysis of key population and demographic indicators, including data from the *2016 ABS Census of Population and Housing*.
  - Analysis of existing data and information on local business and industry, employment and income, and dwelling characteristics.
  - Review of existing social infrastructure and community features near to the proposal including recreation uses, educational facilities, places of worship, public transport and walking and cycling facilities.
  - Analysis of existing consultation feedback gathered by Transport to date for this proposal (such as the Henry Lawson Drive Early Concept Design Consultation Report, July 2020) and other nearby proposals.

- Identification and assessment of the potential socio-economic impacts of the proposal's construction and operation on local amenity and community values, social infrastructure, business, land use and property impacts (such as temporary and permanent property access impacts and perceived economic impacts associated with property acquisition), access and connectivity.
- The impact assessment was prepared in accordance with the methodology of assessing impacts based on sensitivity and magnitude to determine potential significance of impacts prescribed in the Transport *EIA-N05 Environmental Impact Assessment Practice Note – Socio-economic assessment (2020).*
- Measures to avoid, minimise and manage potential construction and operation impacts on the socio-economic environment and maximise potential benefits of the proposal.

In the socio-economic assessment, the direct study area focused on residents, stakeholders and facilities closest to the overall proposal. The EIS proposal areas are located in the direct study area, which includes the road corridor and the areas surrounding the road corridor, including residences on the western side of the Georges River.

The socio-economic study area is the area within 400 metres of the overall proposal and considers those within general walking distance and access to the overall proposal.
The broader study area includes the following Statistical Area:
- Panania - Milperra - Picnic Point
- Condell Park
- Bass Hill - Georges Hall
- Chipping Norton – Moorebank.

The broader study area used in this assessment contributes to developing the context of the existing environment and has been compared against the Liverpool CityLGA, City of Canterbury Bankstown LGA and Greater Sydney. The investigation of these areas outside of the direct and indirect impact areas is important to understand the range of services, facilities and lifestyle of the community.

9.3.2 Existing environment

The socio-economic characteristics of the broader study area can be summarised as follows:
- There were 77,671 people living in the broader study area in 2016, which accounts for 1.6 per cent of the Greater Sydney population. There was a higher proportion of people aged 14 years or younger in the broader study area, City of Canterbury Bankstown LGA and Liverpool City LGA, compared to Greater Sydney. The broader study area also had the highest proportion of people aged 65 years or older
- The Aboriginal and Torres Strait Islander population within the broader study area was 1.1 per cent in 2016, this was above the City of Canterbury Bankstown LGA (0.7 per cent) but below the Liverpool City LGA and Greater Sydney (1.5 per cent)
- The broader study area had the lowest proportion of overseas born residents at 31 per cent, compared to the City of Canterbury Bankstown LGA (44 per cent), Liverpool City LGA (41 per cent) and Greater Sydney (37 per cent). This may reflect less cultural diversity in the broader study area or historic migration patterns (Profile id, 2016) with varying clusters of overseas born people living across the City of Canterbury Bankstown and Liverpool City LGAs.
- The population of City of Canterbury Bankstown LGA is expected to increase by up to 41.2 per cent between 2016 and 2040. This is relatively consistent with the growth expected in the Greater Sydney Region which is expected to grow by around 51.5 per cent. The Liverpool City LGA is expected to increase significantly (108.2 per cent), which may be attributed to anticipated high rates of development, including the rezoning of 25 hectares in the Liverpool centre for the creation of Sydney's "third CBD".

- Employment in health care and social assistance; construction; and retail trade comprised the highest proportion of the work force in the broader study area, City of Canterbury Bankstown and Liverpool City LGAs. The high number of construction workers may be attributed to current growth and development within Western Sydney, providing more opportunities and a higher demand for construction related jobs. Similarly, the higher levels of employment in health care and social assistance and retail trade, may be attributed to the proximity to the hospitals located just outside of the broader study area (Bankstown-Lidcombe Hospital and Liverpool Hospital) and the urban centres located throughout, which are comprised of small to large commercial areas.
- In 2016, vehicle ownership in the broader study area ranged between 1.8 – 2 vehicles per dwelling, with 6.5 per cent of dwellings having no motor vehicles. In comparison, 11.1 per cent of dwellings within the Greater Sydney Region did not have any motor vehicles. The high vehicle ownership in the broader study area may be reflective of the needs of the residents within the area, the reliance on private motor vehicles and lack of public transport choice for residents.

Social infrastructure

There are a number of social infrastructure facilities located within the broader study area, including the Gordon Parker Reserve, Vale of Ah Reserve, Bankstown Golf Course, Georges River Golf Course and the Crosscurrents – Georges River Art Walk. It is likely that the local community use Henry Lawson Drive and connecting streets to access these social infrastructure facilities.

Areas of community interest

Within communities, there are areas that hold value and are appreciated by the community. This includes local spaces, gathering areas, roadside memorials and other places that are visited by the community. There are two primary areas of community value that are located within the direct study area: Georges River and Crosscurrents - Georges River Art Walk' Camoufleur' artwork and Trail Markers.

Access and connectivity

The following travel patterns were identified from the review of ABS data:

- City of Canterbury Bankstown LGA had relatively high proportions of people commuting to work by train and the bus compared to the broader study area and Liverpool City LGA.
- The preferred method of travel to work in the broader study area, Liverpool City LGA, City of Canterbury Bankstown LGA and Greater Sydney was travel to work by car (as driver). The broader study area and Liverpool City LGA had the highest portion of residents overall.
- Travel to work by train was the second most used method of travel to work in the broader study area, Liverpool City LGA, City of Canterbury Bankstown LGA and Greater Sydney. This is likely to be due to the additional public transport facilities located throughout both LGAs including train and bus services.

Other key transport features of relevance include:

- The main roads within the direct study area include Henry Lawson Drive, Milperra Road, Newbridge Road, Auld Avenue, and Tower Road.
- Public transport through the socio-economic study area is primarily through buses. The M90 – Burwood to Liverpool bus route traverses Milperra Road/Newbridge Road, directly through the direct impact area.
- The direct study area consists of a mix of shared use paths (used by both pedestrians and cyclists) and on-road cycling facilities.
- Henry Lawson Drive is an important route for freight and industrial type business operations.

Community values

Understanding the values of a community is fundamental to identify what is most important for residents for quality of life and wellbeing and provides context and insight into how the community may perceive impacts of the overall proposal.

The Liverpool City Council's CSP and the Canterbury Bankstown City Council's CSP are used to inform the community values for this assessment as they have been developed recently and informed by extensive community consultation. Both the Liverpool City Council and the Canterbury Bankstown City Council's CPS highlight the importance of investing in active transport and good infrastructure to increase connectivity and accessibility.

9.3.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the socio-economic assessment are:

- NSW Premier's Priorities (2019)
- NSW Road Safety Strategy 2012-2021
- Greater Sydney Region Plan: A Metropolis of three cities – connecting people 2018
- Future Transport Strategy 2056
- Building Momentum - State Infrastructure Strategy 2018 – 2038
- Road Safety Plan 2021 – Towards Zero
- Community Strategic Plans
- Local Strategic Planning Statements
- other Canterbury Bankstown City Council Plans.

9.3.4 Assessment of potential impacts

The potential socio-economic impacts of the EIS proposal are expected to be minor. The proposal is expected to have some adverse impacts during the construction phase, including:

- Changes in access and connectivity for all road users as a result of construction traffic impacts, delays around construction areas and temporary alternate traffic arrangements
- The temporary relocation of bus stops and temporary adjustment of footpaths may affect accessibility, and some resident and visitor enjoyment of public spaces
- The community values natural areas and protecting the environment, as well as movement and connectivity.

During the operation, socio-economic impacts include:

- Some changes in land use in the road corridor, including areas that were previously vacant or vegetated land alongside Henry Lawson Drive, Milperra Road and Newbridge Road would now form part of the road footprint.
- Potential amenity impacts as a result of increased road infrastructure footprint and road traffic noise levels closer to receivers.
- Revegetation throughout the direct study area to improve the visual aesthetic of the upgrade.
- The potential impacts to residential receivers on the western side of the Georges River and recreational users of the Georges River, particularly as a result of vegetation removal including vegetation that forms part of the SEPP coastal wetlands in EIS proposal area 1.
- Impacts to people who use the bus stop on Milperra Road in EIS proposal area 2 due to the installation of the new bus stop from its existing position on Milperra Road and new section of a new footpath to the bus stop, resulting in some impacts to access and connectivity.

Table 9-20 outlines the socio-economic factors and potential impacts of the activities to be undertaken in the EIS proposal areas. The socio-economic factors and potential impacts of the EIS proposal relating to land use and development have been discussed in Section 8.6.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

Table 9-20 EIS impact assessment

Aspect	Construction impact assessment	Significance of impact			Operation impact assessment	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
Social infrastructure	EIS proposal area 1 is located within the vegetated corridor between the Georges River and Henry Lawson Drive. This area is comprised of coastal wetlands and dense vegetation, used for active transport connectivity and passive recreation by the community. During construction, this area would be impacted by earthwork, widening and utilities work. This would impact the use of this area by the community, including those accessing this area as part of the Crosscurrents – Georges River Art Walk. In addition, recreational users of the Georges River may also experience amenity impacts in this area during construction and avoid using this section of the river for boating and recreational uses. During construction, earthworks and widening required within EIS proposal area 2 are not expected to impact the use and operation of Bankstown Golf Club. There is no social infrastructure within EIS proposal area 3.	Low	Moderate	Moderate-low	There are no impacts to social infrastructure anticipated during the operation of the EIS proposal.	Negligible	Negligible	Negligible

Aspect	Construction impact assessment	Significance of impact			Operation impact assessment	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
Business and commercial	There are no businesses or commercial premises within or near the EIS proposal areas.	Negligible	Negligible	Negligible	There are no anticipated impacts to businesses and commercial operations during the operation of the EIS proposal.	Negligible	Negligible	Negligible
Amenity and community values	Impacts during construction would be similar to those experienced as a result of the overall proposal however on a smaller scale. In EIS proposal area 1, amenity impacts to residential receivers on the Georges River, active transport users using the shared user path and recreational users of the Georges River would occur in the form of noise and visual impacts. Visual impacts associated with the presence of construction plant and machinery and vegetation removal would also impact the community. This includes the removal of vegetation that is identified as SEPP coastal wetlands which have biodiversity value that is appreciated and valued by the community. More information about this is discussed in the BDAR prepared for the EIS.	Moderate	Moderate	Moderate	Landscaping undertaken as part of the EIS proposal would take time to mitigate visual impacts from construction. It is assumed that landscaping would take around five years to fully establish and achieve the urban design and landscaping principles for the overall proposal. This is particularly relevant to EIS proposal areas 1 and 2 where SEPP coastal wetland areas holds amenity and recreational value to the community.	Moderate	low	Moderate -low

Aspect	Construction impact assessment	Significance of impact			Operation impact assessment	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	Construction plant and machinery and vegetation removal can also result in air quality impacts by surrounding receivers. For works closest to the foreshore of the Georges River, lighting glare from construction areas is likely to be experienced by residents on the Georges River. This would impact the natural landscape character of the EIS proposal area. Construction within this area may deter the use of the shared user pathway and vegetated space between the Georges River and Henry Lawson Drive. Noise impacts are expected to be experienced as a result of construction activities in all three EIS proposal areas. The most impacts to receivers is expected to occur opposite EIS proposal area 1 at the residences on the western side of Georges River and opposite EIS proposal area 3 at the residences on Henry Lawson Drive northbound. Noise impacts would occur as a result of the use of ancillary facilities and road widening in EIS proposal areas 1 and 3 and also as a result of bridge construction in EIS proposal area 3. Noise impacts				The road footprint would also be closer to the residential properties on the Georges River which may result in minor noise increases during the operation of Henry Lawson Drive. EIS proposal area 2 would require acquisition of land subject to an Aboriginal land claim, which could result in a perceived reduction of cultural value of this area.			

Aspect	Construction impact assessment	Significance of impact			Operation impact assessment	Significance of impact		
	Construction	Sensitivity	Magnitude	Ranking		Sensitivity	Magnitude	Ranking
	would occur on a smaller scale to those that would be experienced as a result of the overall proposal. Construction is likely to have some indirect impacts on the Bankstown Golf Course, through construction noise and visual impacts associated with the embankment work and widening of Milperra Road. As mentioned previously, this section of the golf course would not be frequented by patrons of the facility often as it is densely vegetated and relatively close to the border of the course, away from the main playing area. EIS proposal area 3 forms a small component of the ancillary facility. In addition, a small part of EIS proposal area 3 also forms part of the road footprint and embankment to be widened on the southbound side of Henry Lawson Drive. There would be visual amenity impacts during construction in this area, which would be used as a construction area, rather than a residential area.							

9.3.5 Environmental management measures

Table 9-21 provides a summary of the mitigation measures and environmental safeguards that are recommended for the proposal based on the assessment of potential socio-economic impacts.

Table 9-21 Environmental management measures for socio-economic impacts

Impact	Environmental management measure	Responsibility	Timing
Community impacts during construction including noise, visual and access impacts	A CLP will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CLP 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 CLP will be prepared in accordance with: • Transport's stakeholder engagement tool kit • Transport's Stakeholder and Community Engagement Policy 2019	Contractor	Pre-construction/ during construction
Community consultation during detailed design and construction, property impacts as a result of temporary access changes and property acquisition	Transport will continue to consult with the community, recreational groups, businesses and other stakeholders until the completion of the overall proposal. Discussions will include: • Changes to the overall proposal as a result of detailed design, the nature and timing of construction works • Mitigation measures for residents, stakeholders and people using the overall proposal • Mitigation measures for noise, traffic, access and visual impacts.	Transport and Contractor	Detailed design/ pre-construction/ during construction
Potential impacts on Aboriginal Heritage and areas of significance	Transport will continue to consult with Local Aboriginal Land Councils during detailed design phase to minimise impacts to both the acquired land and adjacent Aboriginal claim land.	Transport	Detailed design/ pre-construction
Social infrastructure impacts including access and amenity impacts	Operators of the Georges River Golf Course and Bankstown Golf Course, public transport providers as well as Council in reference to Gordon Parker Reserve, Vale of Ah Reserve and the vegetated corridor between the Georges River and Henry Lawson Drive will be consulted and informed regarding construction activities to mitigate any impacts during busy periods and events at these facilities.	Contractor	Pre-construction/ construction

9.4 Air quality

9.4.1 Assessment methodology

Air quality criteria used to access the potential for ambient air quality to give rise to adverse health or nuisance effects. Emissions from construction equipment and vehicles using the highway have the potential to impact on local air quality. The most significant emissions produced from motor vehicles are:

- Oxides of nitrogen (NOx)
- Carbon monoxide (CO)
- Particular matter (PM_{10}).

Construction activities would also generate dust and other particulate matter. There are various classifications of particulate matter, with NSW Environment, Energy and Science (EES) providing assessment criteria for:

- Total suspended particulates
- Particulate matter (PM_{10} and PM_{25})
- Deposited dust.

9.4.2 Existing environment

There are no EES air quality monitoring stations in the overall proposal area. The overall proposal is located in the middle of two EES air quality monitoring stations including Liverpool (about eight kilometres away) and Chullora (about 11 kilometres away).

Air quality data from Liverpool from the NSW Annual Compliance Report 2019[7] showed:

- Nitrogen dioxide: the site met performance standards and goals
- Carbon monoxide: the site met performance standards and goals
- Particulate matter: the site did not meet performance standards and goals, with 28 exceedance days and an annual mean of 27.7 $\mu g/m^3$.

Air quality data from Chullora from the NSW Annual Compliance Report 2019 showed:

- Nitrogen dioxide: the site met performance standards and goals
- Carbon monoxide: the site met performance standards and goals
- Particulate matter: the site met performance standards and goals.

A search of National Pollutant Inventory for the City of Canterbury Bankstown LGA identified Bankstown Airport as the nearest source of air pollution (with the ANZSIC Class of Mineral, Metal and Chemical Wholesaling [332]).

As the EIS proposal is near an existing high volume roads and airport, the air quality would be currently impacted, however, the air quality data from the surrounding air quality monitoring stations shows that performance standards and goals are generally being met. This is with the exception of particulate matter at the Liverpool monitoring station.

Motor vehicles on Henry Lawson Drive and the surrounding road network are a significant local source of air pollutant emissions. Higher emissions would be experienced during periods of traffic congestion.

Rainfall data for the study area was obtained from the closest Bureau of Meteorology station located at the Milperra Bridge (station number 66168). This rain gauge indicates that the annual average rainfall is 638.32 millimetres, with March receiving the highest average monthly rainfall.

[7] NSW Annual Compliance Report 2019

As the Milperra Bridge station does not have data on temperature, temperature data was obtained from the next nearest station at Bankstown Airport (station number 66137). This station indicates that the annual mean maximum temperature is 23.4 degrees. The warmest months are December to February, with mean maximum temperatures during these months ranging from 23.8 to 32.3 degrees. The coolest month is July with a mean temperature of 17.4 degrees.

9.4.3 Policy and planning setting

Relevant pieces of legislation and planning setting that are relevant to the air quality assessment are:

- 2016 National Environment Protection (Ambient Air Quality) Measure.

9.4.4 Assessment of potential impacts

The EIS proposal is relatively small in comparison to the overall proposal and is not considered to substantially contribute to the air quality impacts of the overall proposal.

Construction

Construction of the EIS proposal may have short-term localised impacts on air quality from:

- Clearing of vegetation (as recognised in Section 8.1.4, the EIS proposal would directly impact on 0.25 hectares of native vegetation and 0.02 hectares of non-native vegetation)
- Stripping, stockpiling and managing of topsoil
- Earthworks and excavation leading to the creation of airborne dust, especially in dry and windy conditions
- Road sub-grade preparation and road pavement work
- Transport and handling of soil and materials to and from the EIS proposal area
- Use of construction vehicles and their associated exhaust fumes
- Spray painting of the road for line marking
- Demolition activities.

Potential air quality impacts during construction would be predominantly associated with the generation of dust. The settlement of dust may impact upon properties located near the overall proposal. Substantial dust generation could result in health impacts to nearby receivers. Air quality impacts from dust generation are considered to be minor as they would be limited to the construction phase only and would be minimised through the implementation of the safeguards and management measures outlined below. In addition, as noted in the noise in Section 9.2, the EIS proposal areas do not contain any sensitive receivers. While there is currently a residence on EIS proposal area 3, this would be acquired for the proposal and used as a construction compound.

Machinery and other construction vehicles emit exhaust fumes. The impact of these emissions would be limited to the duration of the construction phase. Odours may be generated during the application of asphalt and line marking. However, the construction period be would temporary and there would be no long-term odour impacts for nearby receivers. Operation of machinery and other construction vehicles would be undertaken to meet the relevant criteria. Overall, potential air quality impacts during construction would be short-term and minor, provided appropriate safeguards and management measures are implemented.

Operation

During operation, air quality impacts are not expected to differ from the existing situation. The upgrade of Henry Lawson Drive would have a higher capacity than the existing road, potentially resulting in increased traffic use and emissions. However, the road upgrade would assist in reducing traffic congestion due to its higher capacity. Travel speeds across the network improve and greater traffic movement through the network would result from a reduction in congestion and queuing. Higher emissions generally occur during periods of traffic congestion – so a reduction in congestion should also result in reduced vehicles emissions.

In addition, the impacts on air quality in relation to the clearance of vegetation would be partially offset through revegetation works to be delivered via a landscape plan.

Recent commitments and strategies made by the NSW Government and Transport for NSW would also result in long-term improvements in air quality around highly trafficked areas. Transport for NSW's Future Transport 2056 Strategy and Future Energy Action Plan 2020-2025 contributes to NSW Government Climate Change Policy Framework's goal of net zero emissions by 2050. The successful implementation of the Action Plan and achieving the objectives and targets of the overarching Policy and Strategy would likely improve air quality in and around the proposal area in the long-term.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

9.4.5 Environmental management measures

Safeguards and management measures provided below would be implemented to minimise potential air quality impacts (shown in Table 9-22).

Table 9-22 Environmental management measures for air quality impacts

Impact	Environmental safeguards	Responsibility	Timing
General air quality impacts	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include: • Identification of potential risks/impacts due to the work/activities as dust generation activities • Management measures to minimise risk of dust generation • A process for monitoring dust on-site • A process for altering management measures as required and reprogramming construction activities if the safeguards and management measures do not adequately restrict dust generation.	Contractor	Pre-construction Construction
Dust emissions	Work will cease when levels of visible airborne dust become excessive.	Contractor	Construction
Dust emissions	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads; dust and debris near recreational areas residences and commercial premises).	Contractor	Construction
Dust emissions	Stockpiled materials will be covered stabilised or stored in areas not subject to high wind.	Contractor	Construction
Dust emissions	All trucks will be covered when transporting material to and from the site.	Contractor	Construction

9.5 Risk/hazard

General environmental hazards and risks associated with the construction and operation of the proposal have largely been addressed and mitigated in other sections or are relatively minor and do not require special consideration in this chapter. This includes the consideration of hazards and risks such as flooding or contamination that have been addressed in earlier chapters. The number of environmental management measures relating to minimising environmental hazards and risks is largely covered by the proposed preparation and implementation of various plans such as:

- CEMP
- Acid Sulfate Soil Management Plan
- Construction Soil and Water Management Plan
- Contaminated Land Management Sub-Plan
- Unexpected Finds Protocol (UFP)
- Construction Flood Management Sub-Plan
- Construction Work Health and Safety (WHS) Plan
- Site specific emergency spill plan.

This section identifies those risks and hazards that have not been captured elsewhere. This includes bushfire risk and airport operations hazard and risks during construction and operation phases of the EIS proposal.

9.5.1 Assessment methodology

Bushfire hazard

The following tasks were undertaken to understand the exiting environment and to identify potential impacts associated with bushfire hazard:

- A review of bushfire prone land mapping
- A review of existing land uses in the study area based on desktop review of spatial data and aerial photography
- A review of potential impacts on access for emergency services during construction and operation of the proposal
- Consultation with NSW Rural Fire Service.

Airport operation hazard

The following tasks were undertaken to understand the existing environment and to identify potential hazards and risks associated with the nearness of the proposal area to Bankstown Airport:

- A review of the Bankstown Airport Master Plan
- A review of Obstacle Limitation Surface (OLS) mapping
- Consultation with Sydney Metro Airports.

9.5.2 Existing environment

Bushfire hazard

Within and to the south of the Henry Lawson Drive and Milperra Road/Newbridge Road intersection, the overall proposal area is largely mapped as being within a vegetation buffer on the bushfire prone area land mapping. The buffer area illustrates land that directly adjoins bushland prone to bushfires and are the areas in which developments and people would most likely be affected by a bushfire burning in the adjacent land. EIS proposal area 2 and EIS proposal area 3 are located within the council mapped 'Bushfire Prone Land'[8].

[8] https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

With reference to the NSW Rural Fire Service online search tool to 'check if you're in bushfire prone land', all EIS proposal areas are within parcels of land identified as within a designated bushfire prone area[9]. It is noted that the online tool does not recognise the road corridor as a 'property'.

Land to the north of the Henry Lawson Drive and Milperra Road/Newbridge Road intersection is not included on the bushfire prone area land mapping. EIS proposal area 1 is therefore not captured within any mapped areas.

Areas of vegetation within the Bankstown Golf Course located to the south of Milperra Road and to the east of Henry Lawson Drive is mapped as Vegetation Category 1 land. Vegetation Category 1 is considered to be the highest risk for bushfire. There is a 100 metres buffer. EIS proposal area 2 is within this mapped area.

Land within the proposal area to the south of the Henry Lawson Drive road bridge south of Auld Avenue is mapped as Vegetation Category 2. Vegetation Category 2 is considered to be a lower bushfire risk than Category 1. This vegetation category is given a 30 metre buffer. EIS proposal area 3 is within this mapped area.

Airport operations hazard

The overall proposal is located close to Bankstown Airport.

Bankstown Airport is situated on 313 hectares of land and has three parallel runways, several apron areas, a small passenger terminal and a business park, home to more than 160 businesses. The airport has numerous fixed-wing and helicopter flying schools and also caters to charter and private business flights, freight, aeromedical services, recreational flights, aircraft maintenance businesses, private aircraft and emergency services.

Bankstown Airport is not under curfew, operating 24/7 (with some circuit training restricted to certain hours).

On reviewing the existing Bankstown Airport Obstacle Limitation Surface (OLS) mapping, the overall proposal area (including EIS proposal areas) is not located within the OLS. The OLS is located NW to SE along the runways. The OLS (edge of the transition surface) is around 400 metres away from the EIS proposal area 1 and EIS proposal area 2. EIS proposal area 3 is furthest away, being about 1 kilometre from the edge of the transitional surface.

The Planning for Bush Fire Protection (PBP) 2006 identifies development standards for designing and building on bushfire prone land in NSW. A road upgrade is not a class of development that requires a bushfire assessment under the PBP. However, through consultation with Rural Fire Service NSW, they have requested that the overall proposal considers the bushfire risk.

9.5.3 Assessment of potential impacts

Bushfire hazard

Construction

As the overall proposal (including two of the EIS proposal areas) would be partially located within and near bushfire prone land, the EIS proposal has the potential to increase bushfire risk in the study area from accidental ignition from the use of mobile equipment, fuels and chemicals during construction. The removal of vegetation in the construction area would also reduce the risk of bushfire occurring.

[9] Check if you're in bush fire prone land - NSW Rural Fire Service

Measures to mitigate and manage bushfire would be developed and included as part of a site-specific bushfire risk management plan within the CEMP for EIS proposal area 1 and EIS proposal area 2. Temporary ancillary facilities and construction infrastructure would generally be less sensitive to bushfire than permanent facilities, given the temporary nature of the construction compounds and the absence of critical infrastructure within the compounds.

Temporary ancillary facilities and construction infrastructure would generally be less sensitive to bushfire than operational facilities, given the temporary nature of the construction compounds and the absence of critical infrastructure within the compounds.

Temporary construction compounds would be maintained in a tidy and orderly manner to minimise potential fuel loads should they be affected by fire.

Construction activities involving flammable materials and ignition sources would be managed to ensure that the potential for fire is minimised. High risk construction activities such as welding and metal work would be subject to a risk assessment on total fire ban days and restricted or ceased as appropriate.
Construction personnel would be inducted into the requirement to operate safely to minimise risk of fire. During construction, there would be impacts on roads in and adjacent to the construction footprint including reduced speed limits and modified arrangements. This may delay response times and/or access for emergency services including fire crews, in the event of a bushfire. It is recommended that a bushfire management plan is prepared for the compound on EIS proposal area 3.

Road reserves are extremely important in bushfire management. They provide access for firefighting operations, can provide a containment line or firebreak, and are a route of escape in the event of an evacuation. The EIS proposal would not obstruct the road reserves during construction. It would therefore continue to be able to perform as an evacuation route.

Operation

The EIS proposal is not expected to be a significant bushfire hazard during operation as ongoing vegetation management activities by Transport along the road corridor.

The EIS proposal would result in the removal of vegetation, providing additional buffer area between bushfire risk areas and the adjoining areas. This would reduce the risk of bushfire, allowing for better containment.

Access for emergency services would be improved by the operation of the proposal.

Airport operation hazards

Construction

The overall proposal (including EIS proposal areas) is located outside the OLS and would not intrude into the OLS. It is considered that construction equipment for the proposal would not infringe or impact the OLS. No crane over 50 metres would be required.

Given to the close proximity to the airport, the proposal may have the following potential impacts during construction:

- Construction lighting producing light spill in the direction of incoming aircraft
- Dust production causing visibility issues in the airspace surrounding the airport
- Risk of wildlife strikes due to attraction of wildlife to areas near airport operations.

The CEMP will include measures that will mitigate potential impacts to the operations of the airport. As Bankstown Airport operates 24/7, the CEMP will also include measures to mitigate potential impacts of lighting used during construction. Lighting will be angled downwards to ensure no glare is exposed towards incoming aircraft, causing a distraction to pilots.

Operation

The EIS proposal is unlikely to impact on aviation risks during operation.

The potential cumulative impacts that would result from the EIS proposal and the overall proposal in combination with other proposals nearby is also described in Section 9.6.

9.5.4 Environmental management measures

Safeguards and management measures for hazard and risk are presented in Table 9-23.

Table 9-23 Environmental management measures for risk/hazard impacts

Impact	Environmental safeguards	Responsibility	Timing
Bushfire risk	The CEMP will include a bushfire management plan prepared in accordance with the *Planning for Bush Fire Protection 2019 (Rural Fire Service 2006)*. Measures to be implemented to manage bushfire risk include: • Monitoring of weather and local bushfire ratings • Consultation requirements for community notifications in the event of a bushfire • Maintaining equipment in good working order • Ensuring plant and equipment are fitted with appropriate spark arrestors, where practicable • Ensuring site workers are informed of the site rules including designated smoking areas and putting rubbish in designated bins. • Obtaining hot work permits and implementing total fire bans as required • Implementing adequate storage and handling requirements for potentially flammable substances in accordance with the relevant guidelines.	Contractor	Pre-construction/ during Construction
Consultation with emergency services	Consultation with emergency services will be undertaken, including the Rural Fire Service and Fire and Rescue NSW to: • Ensure emergency access is maintained during construction • Co-ordinate any bushfire emergency actions as outlined in the proposal's Bushfire Management Plan.	Contractor	During Construction

9.6 Cumulative impacts

9.6.1 Study area

The EIS proposal forms part of the overall proposal, as shown in Figure 1-3. The EIS proposal located within areas mapped as coastal wetlands under the Coastal Management SEPP is subject to this EIS. The REF proposal is subject to approval under Division 5.1 of the EP&A Act and has been assessed in an REF. The REF proposal occurs in areas identified as the proximity areas to coastal wetlands. The impacts of the REF proposal on proximity areas are assessed in the REF. The EIS proposal does not occur within proximity areas but is adjacent to these areas.

Other developments and projects that are located near the overall proposal have been included when considering cumulative impacts (Section 9.6.3). Developments and projects have been considered where either the construction or operation phases of the projects would overlap with the EIS proposal and result in cumulative impacts.

9.6.2 Other projects and developments

The other projects and developments which have been identified as relevant when considering the cumulative impacts are:

- The REF proposal of the Henry Lawson Drive Stage 1A project (in planning stage)
- Henry Lawson Drive and Rabaul Road intersection upgrade (in construction readiness stage)
- Flower Power development: at Keys Parade intersection immediately south of the overall proposal area (now operational), but incorporated into traffic modelling 'future' scenarios
- Widening of Milperra Drain within Bankstown Golf Course (in construction)
- Bankstown Airport redevelopment (in construction).
- Milperra Road and Murray Jones Drive intersection upgrade (as part of the Bankstown Airport redevelopment) (in planning).
- Tower Road and Henry Lawson Drive upgrade by Bankstown Airport Ltd (in planning).
- Riverlands subdivision (in planning).

9.6.3 Potential impacts

Cumulative impacts from projects

Biodiversity

The incremental effect of multiple sources of impact (past, present and future) are referred to as cumulative impacts (Contant and Wiggins, 1991, Council on Environmental Quality, 1978). Cumulative impact assessment considers a Project within the context of other past, present and likely future sources of impact. This is necessary to identify any impacts associated with the Project that may have an additive effect or interaction with impacts from other activities within the locality to the extent that the overall (cumulative) impact becomes significant when it would not otherwise have been significant.

The potential cumulative biodiversity impacts as a consequence of the construction and operation of the EIS proposal are discussed here within the context of the existing environment, present and likely future impacts.

Residential and infrastructure development in the locality in historic and recent times has led to extensive vegetation clearing in the locality and at the catchment scale. Remaining remnant vegetation/habitat has also been affected by a variety of disturbance mechanisms, including clearing of undergrowth, altered fire regimes, feral animals and weed invasion. This habitat loss and disturbance has resulted in the local extinction of a number of species which are less tolerant of habitat loss and disturbance (e.g. woodland birds and small mammals) and an increased risk of extinction to a number of vegetation communities.

Isolated remnant populations of disturbance-sensitive threatened species in such a landscape may be susceptible to local extinction due to seemingly small reductions in habitat area or quality, if the habitat is near the lower limit in size or quality necessary to support a viable population and a critical threshold is reached.

In assessing the cumulative impact of an EIS proposal, it is important to consider whether the additive effects of multiple projects may cause such a critical threshold to be reached for any threatened biodiversity affected. The EIS proposal's removal of 0.25 hectares of native vegetation and habitats would represent an incremental increase to impacts on biodiversity associated with past, present and future projects within the locality. This incremental increase is considered unlikely to significantly exacerbate impacts on biodiversity such that the critical threshold would be reached.

A number of developments are underway or planned in the locality, that also impact on biodiversity values that are likely to be impacted by the current EIS proposal:

- Bankstown Airport Redevelopment South West Precinct (in construction)
  - Clearing of 3.5 ha of native vegetation
  - Habitat for Grey-headed Flying Fox, Green and Golden Bell Frog, seven Microchiropteran Bats, Swamp Harrier, Little Eagle, Square-tailed Kite, Eastern Osprey, Varied Sittella, Dusky Woodswallow, Scarlet Robin and Flame Robin
- SIMTA Intermodal Facility (in construction):
  - Clearing of 1.23 hectares of native vegetation
- Glenfield Waste Services Materials Recycling Facility (in planning):
  - 9.5 hectares of critically endangered Cumberland Plain Shale Woodland and Shale Gravel Transition Forest
  - five threatened bat species recorded
- Riverlands subdivision – Milperra (in planning):
  - 0.54 hectares River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions
  - 0.48 hectares Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
  - Southern Myotis
  - Green and Golden Bell Frog
- Milperra Drain Widening (in construction)
  - 0.83 hectares of River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions
  - 0.15 hectares of Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Henry Lawson Drive – REF proposal for Stage 1A (in planning)
  - 0.21 hectares of Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion
  - 0.07 hectares of Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions
  - 0.96 hectares River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-east Corner bioregions
  - 0.45 hectares Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
  - Threatened species including Southern Myotis, *Acacia pubescens* and *Callistemon linearifolius*

Cumulative impacts to Freshwater Wetlands on Coastal Floodplains TEC from the EIS proposal and the REF proposal would have direct impacts on the Freshwater Wetlands on Coastal Floodplains listed as Vulnerable under the BC Act. The combined impact of the proposal would be the direct removal of 0.09 hectares of PCT 781: Coastal Freshwater Lagoons of the Sydney Basin and South East Corner to coastal wetlands.

Cumulative impacts to Freshwater Wetlands on Coastal Floodplains are discussed below under *Hydrology, flooding and coastal processes*.

Removal of threatened biodiversity in coastal wetland proximity areas would occur as a result of the REF proposal. This is assessed in the REF in Section 6.1. About 7.10 ha of proximity area would be directly impacted by the REF proposal. The EIS proposal does not occur in the proximity area and would only have the potential to contribute to indirect impacts to these areas. Due to the nature and scale of activities of the EIS proposal, the indirect impacts would be comparatively minor and overshadowed by the larger and more direct impacts caused by the REF proposal.

Indirect impacts such as noise, dust, light and contaminant pollution are likely to result from activities associated with the EIS proposal, which are also likely to have cumulative effects. The environmental safeguards and mitigation measures will minimise the potential for cumulative effects.

Aboriginal cultural heritage

Cumulative impacts to Aboriginal cultural heritage can result in substantial or total loss of any remaining cultural heritage in an area. This is through the loss of artefacts, sites or knowledge.

There would be no impacts from the EIS proposal to any known Aboriginal heritage site. As such, it is not considered that there would be cumulative impacts relating to Aboriginal cultural heritage.

However, the overall proposal would impact on one Aboriginal heritage site. Another seven sites would be subject to total and direct harm from potential future upgrade of sections of the Henry Lawson Drive corridor. Most of these sites are considered to have low significance while two sites have moderate significance.

Archaeological mitigation would be required for these two of the eight sites should future transport planning and development occur for other potential stages of upgrading he Henry Lawson Drive corridor. The timing of this is uncertain.

Non-Aboriginal heritage

As the impacts of the EIS proposal are anticipated to only occur if unexpected finds are encountered, it is not considered that there would be cumulative impacts relating to Non-Aboriginal heritage.

The cumulative impact from the overall proposal includes minor encroachment upon the heritage curtilage of the LEP listed Bankstown Aerodrome on the northern side of the Newbridge Road and Milperra Road intersection. However, the impact would only have a neutral impact to the heritage item. There is also would impact on an area that may have archaeological heritage fabric.

Contamination and soil quality

The contamination and soil quality impacts relating to the EIS proposal have been considered with an understanding of the existing site constraints through the desktop review which highlighted potential issues from nearby sites. It is considered that there is an overall beneficial impact when considering the REF proposal in addition to the surrounding major projects as all projects would manage and/or rehabilitate any known contamination issue.

For example,

- The Flower Power complex had historical indications of elevated contaminants of potential concern (COPC) including methane and Landfill Gas (LFG) concentrates. As it has been constructed, the site is assumed to be remediated.
- As part of the Bankstown Airport Redevelopment numerous contaminated soil investigations were undertaken and identified potential contaminants including benzo pyrene, PFAs and asbestos. However, no remediation was required, but ongoing monitoring and investigation would take place.

The cumulative impact from the overall proposal includes greater impacts than the EIS proposal, due to the greater scale of construction activities.

Hydrology, flooding and coastal processes

The flood modelling assessment included the local terrain changes from the recently completed Flower Power complex and additional survey of Milperra Drain near Henry Lawson Drive and the proposed Henry Lawson Drive/Tower Road intersection upgrade by Bankstown Airport Ltd. These terrain changes formed part of the pre-proposal conditions. The Milperra Drain Widening project and Bankstown Airport redevelopment did not form part of pre-proposal conditions and were considered as part of future cumulative impacts. These impacts include:

- According to the *Milperra Drain Widening Review of Environmental Factors* (Cardno, 2018), the widening of Milperra Drain would result in a reduction in the depth of flooding at a number of properties along Ashford Avenue and Milperra Road. No increases in flood levels attributable to the widening works are identified. With safeguards, the proposal would have only a minor impact on flood behaviour in Milperra Drain. The proposal would not adversely affect the benefits of the Milperra Drain widening (ie. reductions in flood levels).
- The Bankstown Airport Masterplan 2019 includes a Flooding and Stormwater Management Strategy that was developed by Bankstown Airport Limited (BAL) in consultation with Canterbury Bankstown City Council. This was to manage the flooding impacts from the Bankstown Airport redevelopment. The Strategy includes the provision of detention basins to mitigation impacts on flood behaviour in the receiving drainage lines. With these safeguards, the proposal would have only a minor impact on flood behaviour. As such, the cumulative impacts of the proposal together with the Bankstown Airport development would also be minor.

The combination of the overall proposal, the Bankstown Airport redevelopment, Flower Power development, Milperra Drain widening and the intersection upgrade of Tower Road and Henry Lawson Drive would only have a minor drainage and flooding impact on Milperra Drain. Ongoing consultation with Canterbury Bankstown City Council would occur during detailed design to assess potential impacts of the EIS proposal and to consider emerging hydrology and flooding issues as neighbouring projects are constructed and become operational.

It is therefore expected that the overall proposal would not adversely affect the reductions in flood levels in Milperra Drain that are attributable to the widening works within the Bankstown Golf Course.

Given the minor nature of the impacts that are attributable to the overall proposal near Tower Road and Murray Jones Drive, it is expected that the cumulative impacts of these projects in combination with the Tower Road upgrade and the Milperra Road and Murray Jones Drive intersection upgrade would also be minor in nature.

No cumulative impacts on flood behaviour are expected to occur from the Henry Lawson Drive and Rabaul Road intersection upgrade and the Riverlands subdivision as it is located in an area of the Georges River floodplain that is remote from the overall proposal.

Regarding coastal processes, both the EIS proposal and the REF proposal would have direct impacts on the Freshwater Wetlands on Coastal Floodplains TEC listed as Vulnerable under the BC Act as detailed in the biodiversity section. The key potential operational impacts associated with the proposal on Freshwater Wetlands on Coastal Floodplains relate to changes to hydrology and geomorphology due to increases in impermeable surfaces. The flood assessment also considered aspects that could occur in combination of one another leading to cumulative effects. However, the BDAR concludes that environmental safeguards and mitigation measures implemented as part of the EIS proposal would minimise impacts. A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the Construction Soil and Water Management Plan.

Land use and development

The overall proposal would have a minimal change to land use in the area. While most of the proposal would be constructed within the existing road corridor, there would be some strip acquisition and change of land use along the Henry Lawson Drive and Milperra Road corridors, such as in the EIS proposal area. Impacts would be related to the mostly partial property acquisition. There are three full property acquisitions being one residential property which would result in a land use change as well as two properties currently partially being used as road corridor and recreation land. As such, these properties would only have a partial change in land use.

Other major projects in the area would have a greater impact on surrounding land use. The Bankstown Airport redevelopment would result in the land use change from airport operational land to commercial development. The RIverlands development would result in a land use change in a large swathe of land along the Georges River from recreational to residential development.

As such, cumulatively, the EIS proposal would only contribute a minor impact to land use change in the area.

Groundwater

Potential cumulative impacts may include reduced recharge as a result of increased area of impervious surfaces. Increased groundwater and soil salinity may also be a result of stormwater to groundwater interactions.

Contamination of groundwater source that passes under the projects near the EIS proposal is the key potential cumulative impacts including:

- Interception of ASS or PASS: Infiltration through PASS or ASS would potentially leach acids into the groundwater resource which is shared by the EIS proposal. However, these are to be managed by following Guidelines for the Management of Acid Sulfate Materials 2005 (RMS, 2005) and the CEMP of this proposal.
- Accidental spills or leaks of chemicals, oils and greases that, if not managed appropriately, could contaminate the groundwater.

For the surrounding projects, they would either have no impact on groundwater or would not have substantial impacts to the aquifer or groundwater quality. Particularly due to the implementation of environmental safeguards and management measures.

The cumulative impact from the overall proposal includes similar impacts to the EIS proposal with the additional impacts on groundwater from the piling works at the Auld Avenue bridge duplication, and the impacts from a greater scale of construction activities. Piling is considered to present a minimal risk to GDEs and coastal wetlands within the REF extents based on the proposed methodology. Despite the low risk, piling activities will be closely monitored. In additional, although aquifer drawdown is not proposed, if groundwater dewatering must occur for the overall proposal, then further information and approvals will be required.

When considering the EIS proposal in addition to the surrounding major projects, this EIS proposal is not of a nature that would draw upon the groundwater aquifer as a water supply. Impacts on groundwater would therefore be via interactions during excavations. The contribution of the EIS proposal to cumulative impacts is expected to be minor and short term during the construction period.

Surface water

During construction, potential negative impacts to water quality of the sensitive receiving environments could arise if construction of future developments were to occur concurrently with the proposal.

Given the current status of surrounding projects, it is expected that the main civil earthworks and surface infrastructure for the Bankstown Airport redevelopment, the Milperra Drain widening and the Tower Road/Henry Lawson Drive intersection would be completed before the EIS Proposal commences construction in early 2023. If occurring concurrently, in a worst case scenario, the potential impacts would likely include increases in water quality parameters such as TSS, TDS and turbidity due to the disturbance or removal of groundcover and bulk earthworks. However, the safeguards and mitigation measures would be sufficient to avoid and manage potential negative impacts to water quality. As such, no cumulative impacts on coastal wetlands as a result of construction of the proposal are expected.

During operation, potential negative impacts to water quality of the sensitive receiving environments could arise during construction and operation of future developments occurring concurrently with the proposal. Potential impacts would likely include increases in stormwater quality pollutants such as TSS, gross pollutants, total nitrogen, and total phosphorus. The safeguards and mitigation measures would be sufficient to avoid and manage potential negative impacts to water quality for all pollutants except total nitrogen. Cumulative total nitrogen impacts on coastal wetlands could result of operation of the proposal. Further investigations for stormwater quality controls in the broader sub-catchments would be explored to address this potential cumulative impact.

The cumulative impact from the overall proposal includes similar impacts to the EIS proposal with the additional impacts from a greater scale of construction activities.

Traffic and transport

The traffic modelling for the overall proposal used a broader road network as the study area. Forecasted traffic volumes therefore also considered the traffic generation of surrounding future development and was modelled as part of the EIS proposal. Traffic modelling results are detailed in Section 9.1.4.

Noise and vibration

As the noise and vibration impacts of the EIS proposal are limited as there are no sensitive receivers within the EIS proposal areas, it is not considered that there would be cumulative impacts relating to noise and vibration.

The cumulative impact from the overall proposal includes similar impacts to the EIS proposal with the additional impacts from a greater scale of construction activities, and additional impacts due to sensitive receivers being located near the overall proposal. A summary of noise impacts from the overall proposal is included in Section 9.2.5.

Socio-economic

Cumulative impacts could occur during construction if other projects are constructed concurrently or in close timing with the overall proposal. This includes other stages of the Henry Lawson Drive Upgrade Project, the Bankstown Airport Redevelopment and the Riverland's Residential Development.

The Bankstown Airport Redevelopment, Riverlands Residential Development and other projects that form part of the Henry Lawson Drive Upgrade Program of works, including the EIS proposal, could result in cumulative impacts in the form of amenity and traffic impacts. Potential consultation and construction fatigue for local communities and stakeholders as a result of the proximity and timing of these projects may also occur. The magnitude of the cumulative impacts due to concurrent construction projects are moderate, resulting in the level of significance being moderate.

There are not expected to be any substantial negative cumulative impacts associated with the overall proposal during operation. Design development of the REF proposal has included expected demand and growth from surrounding developments and land uses. The overall proposal is needed to support these other projects and proposals once they are constructed and in operation. The sensitivity of the community to cumulative socio-economic impacts is negligible. The magnitude of the cumulative impacts (amenity, access, land use changes, social infrastructure and businesses) during operation is negligible, resulting in the level of significance being negligible. As the EIS proposal is relatively small in comparison to the overall proposal, it is considered that a similar conclusion would be made for the EIS proposal during operation.

The cumulative impact from the overall proposal would be similar to those experienced as a result of the EIS proposal however on a larger scale, and additional impacts due to sensitive receivers being located near the overall proposal that would have their amenity impacted in the form of noise, visual and air quality impacts.

Air quality

As the EIS proposal is relatively small in comparison to the overall proposal and is not considered to substantially contribute to the air quality impacts of the overall proposal, it is not considered that there would be cumulative impacts relating to air quality.

There is potential for cumulative impacts relating to dust generation, during construction of the EIS proposal along with the construction of the surrounding development. With incorporation of safeguards, the proposal would have only a minor impact in terms of cumulative dust generation.

The overall proposal would have the larger cumulative contribution to air emissions from transport, once operational. In the long-term this is expected to reduce if the implementation of Transport for NSW's Future Transport 2056 Strategy, Future Energy Action Plan 2020-2025 and NSW Government Climate Change Policy is successful. It is also noted that the overall proposal would be catering for future demand that would be driven by surrounding development, not by the road in itself.

Risk/hazard

As the EIS proposal impacts relating to risk/hazard (bushfire risk and Airport operations) are adequately managed, it is not considered that there would be cumulative impacts in conjunction with nearby projects.

The cumulative impact from the overall proposal would be similar to those experienced as a result of the EIS proposal however the bushfire risk would be larger due to the greater land area of bushfire risk requiring consideration and management. There is limited bushfire risk from the other major developments and therefore there would not be a cumulative risk. The increased capacity from the REF proposal, however, could assist the traffic generating developing development evacuate.

The surrounding developments also would not have impacts on the airport operations.
With the incorporation of safeguards, the proposal would only have a minor impact in terms of cumulative impacts relating to risk/hazards.

9.6.4 Safeguards and management measures

Safeguards and management measures for cumulative impacts are presented in Table 9-24.

Table 9-24 Safeguards and management measures for cumulative impacts

Impact	Environmental safeguards	Responsibility	Timing
Cumulative impacts	Ongoing coordination and consultation will be undertaken between the proposal contractors and other developments in the area to ensure cumulative traffic impacts are appropriately assessed and managed particularly during peak holiday periods.	Contractor	Pre-construction/ During Construction

10 Summary of environmental management measures

This chapter collates the environmental management measures for the proposal that were identified through the impact assessment process. All measures listed in Table 10.1 would be incorporated into the CEMP and/or the operational framework for the proposal.

This chapter also shows how Transport has addressed the following SEARs.

Secretary's requirements	Where addressed in EIS
Environmental Monitoring and Management – including: • a detailed description of what measures would be implemented to manage, mitigate or offset the potential impacts (including cumulative impacts) of the proposal (as identified above) during construction and operation as relevant, and where required, and • describe how the environmental performance of the proposal would be monitored and managed over time. Where possible, reasonable and feasible mitigation measures should be developed in consultation with surrounding affected landowners and relevant public authorities.	Chapter 10

10.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in the EIS in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the EIS proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the EIS proposal.

A CEMP will be prepared to describe the safeguards and management measures identified for the overall proposal, inclusive of the EIS proposal. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Transport Environment Manager, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with Transport's construction contract specifications set out in the QA Specification *G36 – Environmental Protection (Management System)*, QA Specification *G38 – Soil and Water Management (Soil and Water Plan)*, QA Specification *G40 – Clearing and Grubbing*, QA Specification *G10 – Traffic Management.*

In regard to the second bullet point in the SEARs above, the Contractor's CEMP as required under QA Specification G36 will identify the monitoring requirements during construction of the overall proposal which will include but not be limited to: monitoring of water quality upstream and downstream of construction works, noise monitoring, vibration monitoring, and other required monitoring to respond to community complaints. The following Transport environmental inspection and incident reporting procedures will be followed during construction:

- Transport for NSW's Environmental Inspection Procedure
- Transport for NSW's Environmental Incident Procedure.

In the long term, the asset will be put into the Transport asset and maintenance system and would be subject to periodic maintenance inspections, including inspections of operational water quality controls and undertaking any required maintenance.

10.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this EIS will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures identified in Chapters 8 and 9 have been consolidated to form a single set of measures and these are summarised in Table 10-1 below.

Table 10-1 Summary of environmental management measures

Environmental issue	ID	Environmental management measures	Responsibility	Timing
General - minimise environmental impacts during construction	GEN1	A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. It is also the responsibility of the Contractor to provide a copy of the CEMP to Canterbury Bankstown City Council for review. As a minimum, the CEMP will address the following: • Any requirements associated with statutory approvals • Details of how the proposal will implement the identified safeguards outlined in the EIS • Issue-specific environmental management plans • Roles and responsibilities • Communication requirements • Induction and training requirements • Procedures for monitoring and evaluating environmental performance, and for corrective action • Reporting requirements and record-keeping • Procedures for emergency and incident management • Procedures for audit and review. The endorsed CEMP will be implemented during construction.	Contractor/ Transport	Pre-construction/ during construction
General - notification	GEN2	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five working days prior to commencement of the activity.	Contractor/ Transport	Pre-construction
General – environmental awareness	GEN3	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include: • Threatened species habitat • Unexpected finds procedure	Contractor	Pre-construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		• Adjoining residential areas requiring noise awareness, behavioural practices and mitigation measures.		
Biodiversity - Removal of native vegetation and habitat features/ Removal of threatened species habitat	B1	Native vegetation and habitat removal will be minimised through detailed design processes in particular, to minimise impacts on Hollow-bearing trees and Threatened Ecological Communities, where possible, with consideration to: • Placement of embankments and adopting alternative options such as retaining walls to minimise the construction footprint.	Transport	Detailed design
Biodiversity - Removal of native vegetation and habitat/Removal of threatened plants	B2	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 (Roads and Traffic Authority, 2011).	Contractor	Prior to construction
Biodiversity - Removal of native and non-native vegetation and habitat/ Injury and mortality of fauna	B3	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 (Roads and Traffic Authority, 2011).	Contractor	During construction
Biodiversity - Removal of native vegetation and habitat	B4	Native vegetation will be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011) and the landscaping plans for the proposal.	Contractor	During construction
Biodiversity - Removal of native vegetation and habitat/Wildlife corridors and connectivity	B5	The unexpected species find procedure under Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (RTA 2011) will be implemented if TECs or threatened fauna, not assessed in the biodiversity assessment, are identified in the EIS proposal area.	Contractor	During construction
Biodiversity - Removal of native vegetation and habitat/Impacts to habitat in human made structures	B6	Fauna will be managed in accordance with Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Biodiversity - Impacts to habitat in human made structures	B7	Develop options for providing microbat roosting habitat during detailed design processes for culvert structures particularly for the Southern Myotis (*Myotis macropus*).	Transport	Detailed design
Biodiversity – Microbat survey and habitat	B8	A targeted microbat survey of structures within the footprint and proposed for removal or modification would be undertaken in accordance with 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH, 2018b), prior to construction or as soon as feasible prior to disturbance. If threatened microbats are detected, a Microbat Management Plan will be developed as part of the Construction Environment Management Plan and implemented by a suitably qualified bat specialist. A copy of the Microbat Management Plan would be submitted to Canterbury Bankstown City Council for review.	Contractor	Pre-construction
Biodiversity - Indirect impacts on native vegetation and habitat	B9	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 (Roads and Traffic Authority, 2011). This will include: • Demarcating riparian exclusions zones to protect aquatic habitats and riparian zones where works are not required. • Excluding portions of the mapped coastal wetlands along sections of the property boundary of EIS Proposal Area 3 to avoid any unnecessary disturbance, except for property site restoration works that may be needed at the end of construction in consultation with Council.	Contractor	During construction
Biodiversity - Indirect impacts on native vegetation and habitat	B10	Weed species will be managed in accordance with Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction
Biodiversity - Indirect impacts on native vegetation and habitat	B11	The Landscaping Plan and the Construction Flora and Fauna Management Plan, the latter comprising a Weed Management Sub-Plan will be prepared in accordance with the DPI Office of Water Guidelines for Vegetation Management Plans on Waterfront Land (2012).	Contractor	Pre-construction
Biodiversity - Indirect impacts on native vegetation and habitat	B12	Pathogens will be managed in accordance with Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011).	Contractor	During construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Biodiversity - Indirect impacts on native vegetation and habitat	B13	Shading and artificial light impacts will be minimised where practicable taking into account minimum luminescence requirements for: • Safety when constructing during the night-time period • An urban road as outlined in the Australian Standards through detailed design.	Transport/ Contractor	Detailed design/ during construction
Biodiversity - Impacts to habitat in non-native vegetation	B14	Habitat will be replaced or re-instated in accordance with: • Urban design landscaping plans which will include revegetation with local native vegetation species, suitable for the riparian zone considering vegetation species that adopts existing communities and landscape character, and uses local provenance • Guide 5: Re-use of woody debris and bushrock • Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011). Canterbury Bankstown City Council will be consulted with at the detailed design stage in regard to the selection of vegetation species in the landscaping plans.	Transport/ Contractor	Detailed design/ during construction
Biodiversity – Injury and mortality to fauna - vehicle strike	B15	Opportunities to minimise road-kill will be identified in the design process with consideration to: • Available space. • Avoid creating features too close to the roadside that would attract fauna to the roadside. • Using landscaping techniques to create suitable buffers and to separate any potential attracting features from the roadside. • A roadside planting palette that does not intentionally attract fauna to the roadside.	Transport	Detailed design
Biodiversity - Aquatic impacts	B16	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 (Roads and Traffic Authority, 2011) • Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (Department of Primary Industries, 2013) • Acid Sulfate Soil Management Plan • Construction Soil and Water Management Plan.	Contractor	During construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		Consultation with NSW DPI Fisheries Regional Conservation Manager will be undertaken to discuss the best approach to construction works within aquatic habitats and riparian zones. This will also help identify whether any trees to be removed for the proposal can be used to re-snag waterways.		
Biodiversity - Coastal wetlands and proximity areas for coastal wetlands, and impacts to GDEs	B17	Consider detailed design refinements and constructability options that minimise removal of riparian vegetation and disturbance of coastal wetlands and proximity areas for coastal wetlands along the western boundary of the existing Henry Lawson Drive for EIS proposal area 1 wherever possible. This includes ensuring any access to the waterway, if required, minimises the removal of riparian vegetation and is restricted to the minimum amount of bank length required for the construction activity. Further consideration of minimising direct impacts to coastal wetlands and GDEs will be undertaken during detailed design and construction.	Transport	Detailed design
Aboriginal and Non-Aboriginal heritage – unexpected finds	A1	*The Standard Management Procedure - Unexpected Heritage Items* (Transport for NSW, 2015) will be followed in the event that an unknown or potential Aboriginal and/or Non Aboriginal object/s, including skeletal remains, is found during construction. The construction workforce will be inducted and trained in the procedure. The procedure applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	During construction
Additional Aboriginal heritage impacts	A2	Any further impacts proposed beyond the proposal area must be subject to further assessment and consultation with Aboriginal stakeholders, consistent with the process in this report.	Transport/ Contractor	Detailed design/during Construction
Contamination and soil quality - Risk of contamination from APECs	C1	A Detailed Site Investigation will be undertaken near the APECs showing a moderate risk of COPCs at concentrations above the Tier I screening values. The scope of the DSI will be detailed in a Sampling Analysis and Quality Plan (SAQP) which is to include collection of soil, groundwater and landfill gas samples near moderate risk APECS. The scope of the DSI will be in accordance with the NEPM 2013 and analytical results will be compared to the applicable Tier I screening values in Schedule B2 of the NEPM 2013.	Transport	Detailed design

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Contamination and soil quality - Contamination from onsite filling	C2	Any spoil requiring off-site disposal will be sorted in accordance with: • the NSW EPA Waste Classification Guidelines Parts 1 to 4 and Addendum 1. If natural soil is disturbed, it may meet the definition of Excavated Natural Material and the analytical data will be compared to the concentrations and requirements with: • ENM Resource Recovery Order and Exemption under the *Protection of Environmental Operations (Waste) Act 2000*.	Contractor	During construction
Contamination and soil quality - Risk of potentially impacted soil migrating	C3	A Contaminated Land Management Sub-Plan will be prepared and implemented as part of the CEMP. This will address the risk of potentially impacted soil migrating from site during construction and include standard practices for dust suppression, and erosion and sedimentation control. Other controls in the Contaminated Land Management Sub-Plan will include: • An Unexpected Finds Protocol (UFP) and the Construction Work Health and Safety (WHS) Plan will include a UXO risk assessment and any management measures. • Mitigation of the risk that contaminated groundwater is encountered during construction activities. During construction any intercepted groundwater will be managed under the CEMP to mitigate risks associated with the potential mobilisation or release of contamination to the groundwater, improper storage and disposal of intercepted groundwater. • Monitoring of excavations for volatile gases that may be present as a result of hydrocarbon contamination, which may pose a risk to human health and built environment. • Proper use of work health and safety (WHS) equipment and monitoring of works where asbestos or other contamination is identified. • Response plan if accidental major spills and leaks occur detailing remediation steps necessary to reduce impact to nearby coastal wetlands and GDEs.	Contractor	Pre-construction
Contamination and soil quality - UXO	C4	Prior to any ground disturbance directly west of the Bankstown Aerodrome property boundary a risk assessment will be undertaken to determine the likelihood of UXOs being present and the required management measures to mitigate the risk.	Transport/Contractor	Detailed design/ Pre-construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Hydrology, flooding and coastal processes – Construction and management of ingress, changes to surface water flows and scour	H1	A Construction Soil and Water Management Plan will be prepared to guide construction methods in implementing the following measures in accordance with Blue Book (Managing Urban Stormwater, Soils and Construction Volume 2D Main Road construction): • Intercepting clean water flows from areas upslope of the EIS proposal areas and diverting it in a controlled manner whether through or around the construction work areas to avoid or minimise mixing of 'clean' water flows with 'dirty' sediment-laden runoff from work areas. • Minimise the potential for scour by implementing surface stabilisation, scour protection measures and energy dissipation measures • Implement a 'wet weather' Erosion and Sediment Control Plan that includes stabilisation of exposed earthworks prior to the onset of heavy rainfall or predicted flooding. In addition, changes to surface water flows (volume and velocity) will be minimised by: • Detailed design of drainage infrastructure that provides sufficient capacity and energy dissipation controls.	Transport/Contractor	Detailed design/ Pre-construction
Hydrology, flooding and coastal processes - Site facilities and flood emergency management within ancillary sites, management of adverse flood impacts on neighbouring properties	H2	The CEMP will include a Construction Flood Management Plan Sub-Plan. This Sub-Plan will include details and procedures to minimise the potential for construction activities within EIS proposal areas 1, 2 and 3 to adversely impact on flood behaviour in neighbouring properties. Measures to manage residual flood impacts will include: • staging construction to limit the extent and duration of temporary works on the floodplain • ensuring construction equipment and materials are removed from floodplain areas at the completion of each work activity or should a weather warning be issued of impending flood producing rain • providing temporary flood protection to properties identified as being at risk of adverse flood impacts during any stage of construction of the proposal • developing flood emergency response procedures to remove temporary works during periods of heavy rainfall.	Contractor	Pre-construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		For the ancillary facility in EIS proposal area 3, the Construction Flood Management Sub-Plan will include the following additional components: • Limit the extent of works located in floodway areas • A procedure to monitor weather conditions (existing and forecast conditions), including minor rain events, local weather warnings and river water level data • A communication protocol to disseminate warnings to construction personnel of impending flood producing rain or predicted flooding in the Georges River and actions required to make construction areas stable and safe • An evacuation plan for construction personnel should a severe weather warning or flood alert for the Georges River be issued.		
Hydrology, flooding and coastal processes - Material storage and stockpiling within ancillary sites	H3	The storage of hazardous material in EIS proposal area 3 will be confined to areas that are not subject to flooding during a 1% AEP extent or either: • Stored in a manner that prevents their mobilisation during times of flood • Be removed from the floodplain when minor rain events are predicted to inundate storage areas and at the onset of a flood. The Construction Flood Management Sub-Plan will define the flood immunity criteria (including consideration of inundation from minor rain events) for material storage and stockpile areas proposed to be located in EIS proposal area 3. Erosion and sediment (ERSED) controls are to be installed around the ancillary site in EIS proposal area 3 to reduce the risk of sediment runoff to the east into Milperra Drain near the Bankstown Golf Course. These ERSED controls are to be integrated into any exclusion zone or property boundary demarcation.	Contractor	Pre-construction/ Construction
Hydrology, flooding and coastal processes - Management of adverse flood impacts on the existing environment	H4	A detailed hydrologic and hydraulic (flood) assessment will be undertaken during detailed design to assess the impacts of the EIS proposal on flood behaviour and the associated measures which are required to mitigate those impacts. Subject to the flood assessment during detailed design a detailed ground survey (including floor levels of buildings) may need to be undertaken in affected areas to determine whether the proposal would increase flood damages in adjacent development (i.e. in properties where there is a potential for increases in peak flood levels for events up to 1% AEP in magnitude).	Transport	Detailed design

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Hydrology, flooding and coastal processes - Management of adverse flood impacts on the existing environment	H5	During detailed design, the following measures will be implemented to manage adverse flood impacts: • The road alignment will be further refined to minimise the increase in road levels and peak flood levels compared to pre-proposal conditions. • Works within the floodplain will be designed to minimise adverse impacts on surrounding development for flooding up to the 1% AEP event in magnitude. This is relevant for the EIS proposal as all EIS proposal areas are within either the 1% AEP Georges River event and/or the 1% AEP Milperra catchment event. Assessment will also be made of impacts during floods up to the PMF in the context of impacts on critical infrastructure and flood hazards. • Incorporate measures that are aimed at mitigating its impact on flood behaviour in properties where existing buildings would experience above-floor inundation during floods up to the 1% AEP event. • The provision of scour protection and energy dissipation measures will be included in order to mitigate the localised increases in flow velocities at the outlets that are to be upgraded, relocated or new stormwater drainage systems. This is relevant for EIS proposal areas 1 and 2 as the outlet to transverse drainage structures are located within these areas.	Transport	Detailed design
Land use and development - Property acquisition requirements including private and crown land acquisition	L1	Land acquisition will occur in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.	Transport	Pre-construction
Groundwater and surface water – Disturbance to GDEs and coastal wetlands	G1	Where disturbance cannot be avoided, appropriate mitigation measures will be adopted to prevent impacts outside of the required areas of disturbance. This may include use of physical barriers, boundary demarcation and signage to prevent intrusion of contractors and equipment into sensitive areas, and ongoing monitoring to ensure disturbance footprints do not extend outside of set boundaries	Contractor	Construction
Groundwater and surface water - Groundwater dewatering during excavation	G2	In the event that groundwater/aquifer dewatering must occur to lower the groundwater table and reduce or prevent groundwater ingress into excavations, then potential impacts on GDEs must be quantitatively assessed prior to dewatering along with appropriate management measures and documented in a site dewatering management plan.	Contractor	Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		Quantitative assessment must include assessment of the magnitude and duration of drawdown and whether impacts are likely to adversely affect the habitat conditions and ecological communities within the GDEs. Relevant approvals and permits must be obtained prior to groundwater/aquifer dewatering.		
Groundwater and surface water - Shallow excavations within the topsoil and fill materials for embankments	G3	A Construction Soil and Water Management Plan, Construction Flora and Fauna Management Plan and a Clearing and Grubbing Plan will include mitigation measures and procedures to identify further opportunities to minimise direct impacts to coastal wetlands and GDEs.	Contractor	Construction
Groundwater and surface water - Mobilisation of acid sulfate soils	G4	An Acid Sulfate Soil Management Plan (ASSMP) will be prepared and implemented to manage PASS or ASS exposed from excavations of soils between 2 and 4 metres, changes to groundwater levels and stockpiling. The ASSMP should be informed by the results of the Detailed Site Investigation that would include the identification of presence and extent of ASS/PASS.	Contractor	Construction
Groundwater and surface water - Groundwater contamination	G5	A site contamination management plan (CMP) will be prepared and implemented in the event that contaminated groundwater is encountered during construction activities, this should be completed before construction occurs. During construction any intercepted groundwater, including piling works, will be managed under the project CEMP to mitigate risks associated with the potential mobilisation or release of contamination to the groundwater, improper storage and disposal of intercepted groundwater. Excavations should also be monitored for volatile gases that may be present as a result of hydrocarbon contamination, which may pose a risk to human health and built environment. A baseline groundwater monitoring program of the overall proposal area will be undertaken during detailed design.	Contractor	Pre-construction/ Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Groundwater and surface water – Construction surface water quality	G6	The Concept Design Erosion and Sedimentation Strategy will be reviewed and updated during detailed design. The Strategy will be based on detailed design construction staging plans and construction methodologies. The Strategy will be revised in accordance with Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom 2004) and 2D (main road construction) (DECC 2008) and Transport's Environmental Management of Construction Dewatering (RTA 2011). A site specific Erosion and Sediment Control Plan/s (ESCP) will be prepared and implemented as part of the Construction Soil and Water Management Plan. These Plans will further develop the Construction Erosion and Sediment Control Strategy developed in detailed design and be consistent with the above guidelines of the 'Blue Book' (Landcom, 2004, DECC 2008 and RTA 2011). The ESCP will include arrangements for managing wet weather events, including monitoring of potential high risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Transport Contractor	Detailed design Pre-construction/ Construction
Groundwater and surface water – Contamination of surface water	G7	The refuelling and maintenance of plant and equipment will be undertaken in a designated sealed bunded area at ancillary facilities, where possible.	Contractor	During Construction
Groundwater and surface water – Contamination of surface water	G8	Vehicle wash downs and concrete washouts will be carried out within designated sealed bunded areas at construction ancillary facilities, or carried out off-site.	Contractor	During Construction
Groundwater and surface water – Contamination of surface water	G9	Regular visual water quality checks (include for turbid plumes and hydrocarbon spills or slicks) will be carried out when working in or near waterways. Construction water quality monitoring will be undertaken upstream and downstream of the EIS proposal to ensure that controls and site practices are effective at maintaining current environmental values. Monitoring will be undertaken in accordance with the Guideline for Construction Water Quality Monitoring (RTA, undated).	Contractor	During Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Groundwater and surface water – Accidental spill	G10	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 would address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport and EPA).	Contractor	Pre-construction/ During Construction
Groundwater and surface water – Accidental spill	G11	Emergency spill kit will be kept on site at all times. Spill kits will be located at all ancillary facilities and main construction work areas. All staff would be made aware of the location of the spill kit and trained in its use.	Contractor	During Construction
Groundwater and surface water – Stormwater runoff and water quality of the Georges River and Milperra Drain	G12	The Concept Design Operational Water Quality Strategy will be reviewed and updated during detailed design to achieve the operational water quality objective, identify additional opportunities to reduce total nitrogen loads to Georges River and Milperra Drain, and reduce impacts from potential contaminants that may be mobilised from the soil and/or groundwater. This will be undertaken in consultation with Canterbury Bankstown City Council. The Operational Water Quality Strategy will be in accordance with Transport's Water Sensitive Urban Design Guidelines (RMS 2017) and minimise potential impacts to coastal wetlands.	Transport	Detailed design
Visual - Visual amenity and urban design	V1	Urban design development of the proposal will continue through to detailed design for the overall proposal, of which a portion includes the EIS Proposal. Urban design will be integrated into project development processes. The following policy/guidelines will guide future design development of the proposal: • Transport Urban Design Policy (Beyond the Pavement) • Transport Urban Design Guidelines. The urban design objectives, principles and concept design strategy presented in the urban design report for the REF and EIS proposals will form the basis for future design development and consultation with stakeholders.	Transport	Detailed design
Visual – Earthworks and landscape character	V2	Integrate earthworks with adjoining landform to avoid sharp transition in profile through the adoption of appropriate grades, where possible.	Transport	Detailed design

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Visual - Earthworks and landscape character	V3	Stabilise and progressively revegetate exposed ground as works progress to limit erosion and visual impacts through early integration with surrounding vegetation. Use cleared material as part of revegetation works, where possible.	Contractor	During construction
Visual - Retention of existing vegetation	V4	Design the EIS proposal to avoid impact to prominent trees and vegetation communities where possible. Existing threatened species in the EIS proposal areas will be retained and protected where possible.	Transport	Detailed design
Visual - Retention of existing vegetation and coastal wetlands	V5	Define and demarcate clearing boundary limits and exclusion zones in the EIS proposal areas to protect neighbouring vegetation cover and coastal wetlands.	Contractor	During construction
Visual - Revegetation	V6	Plants used in revegetation will be consistent with existing communities, including riparian vegetation and support the existing landscape character. Revegetation will use local provenance material and proposed tree species which provide canopy cover and minimise urban heat effects.	Transport	Detailed design
Visual - Tree management and removal	V7	Any tree removal or pruning will be undertaken by a qualified specialist and in accordance with AS4970: 2009: Protection of Trees on Development Sites (Standards Australia, 2009) and AS4373:2007: Pruning of Amenity Trees and WorkCover Amenity Tree Industry Code of Practice 1998.	Contractor	Pre-construction/ During Construction
Visual - Minimise road furniture and signage	V8	Provide minimum signage requirements and limit structural elements to provide an open and permeable setting	Transport	Detailed design
Visual - Lighting	V9	Minimise lighting and potential for light spill	Transport	Detailed design
Visual - Lighting	V10	Minimise night works and provide lighting which minimises light spill	Contractor	During construction
Visual - View management	V11	Provide and implement visual screening in accordance with urban design and Landscaping Plans to minimise the visual impact in areas identified as moderate or high impact	Transport/Contractor	Detailed design/ During Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Visual – Ancillary facilities	V12	The layout of the ancillary facility site in EIS proposal areas 1 and 3 will be designed to minimise visual amenity impacts. The design will consider: • screening of boundaries facing sensitive receivers or views • careful placement of structures and buildings to maintain viewpoints or provide additional screening of site activities	Contractor	Pre-construction/ During Construction
Visual – Ancillary facilities	V13	The ancillary facilities in EIS proposal areas 1 and 3 will be maintained, kept tidy and well-presented including sorting regular removal of excess materials to reduce visual impact.	Contractor	During construction
Visual – Ancillary facilities	V14	Ancillary facility sites and temporary construction areas will be progressively restored to at least their pre-construction conditions or in accordance with Landscaping Plans, when no longer required.	Contractor	During construction
Traffic – Traffic Management Plan	T1	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport for NSW Traffic Control at Work Sites Manual (RMS, 2020) and QA Specification G10 Control of Traffic (Transport, 2020). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Detours during temporary access changes • Construction traffic control plans outlining site-specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access (with the implementation of a Vehicle Movement Plan) • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion from cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms.	Contractor	Pre-construction/ During Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		The TMP will ensure the following: • Alternative routes for active transport users will be clearly identified by signage and the use of traffic controllers where required. • Public transport providers and users will be notified in advance of any changes to bus stop locations through signage at the existing bus stops on Milperra Road. • Canterbury Bankstown City Council will be consulted of any detours in accordance with the Traffic Management Plan and the Community Liaison Plan (CLP).		
Traffic – Traffic impacts	T2	Further traffic modelling will be carried out during detailed design based on detailed construction methods and traffic staging. Traffic modelling will assess the potential traffic impacts from detailed design and identify whether any additional mitigation measures or traffic control measures will be required.	Transport	Detailed design
Traffic – Impact on bus stops or routes	T3	Temporary and permanent bus stop relocation will be discussed with the relevant bus operator.	Transport/Contractor	Detailed design/ during Construction
Traffic – Construction traffic	T4	Heavy vehicle movements to be minimised during peak traffic periods (i.e. between 7.15 and 8.15 am or 4.45 and 5.45 pm), where practical.	Contractor	During Construction
Traffic – Traffic management measures	T5	Any temporary traffic diversions, clearways and lane closures for work carried out in the EIS proposal areas will be implemented in accordance with Transport Management Centre (TMC) and Canterbury – Bankstown City Council requirements.	Contractor	During Construction
Traffic – Parking	T6	Off-road parking for construction vehicles will be provided within the ancillary facility and construction areas.	Contractor	During Construction
Traffic – Damage to local roads	T7	Any damage to the local road network identified to be caused by construction vehicles will be remediated to pre-existing road conditions.	Contractor	During Construction
Noise – Construction noise and vibration	N1	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will be prepared in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016) NSW EPA Interim Construction Noise Guideline and identify: • All potential significant noise and vibration generating activities associated with the activity	Contractor	Pre-construction/ during Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		• A monitoring program to assess performance against the 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.		
Noise – Out of hours work	N2	Out of hours works will be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime 2016). This includes: • Offer respite and/or restricted construction hours where noise intensive works are planned over extended periods, especially where they occur outside of standard hours. This may include moving the construction work front to different areas so that sensitive receivers are not impacted for longer than two consecutive days • No more than two consecutive nights of noise with special audible characteristics and/or vibration generating work may be undertaken in the same NCA over any 7-day period, unless otherwise negotiated with affected receivers.	Contractor	During Construction
Noise – Out of hours work	N3	Noisiest activities should be limited to standard construction hours, where practicable	Contractor	During Construction
Noise – Noise and vibration	N4	All sensitive receivers (eg local residents) likely to be affected will be notified at least 5 days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will 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.	Contractor	During Construction
Noise – Noise and vibration	N5	A register of most affected noise and vibration sensitive receivers (NVSRs) will be kept on site and maintained. The register will include the following details for each NVSR: • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number.	Contractor	During Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		The register is to be included as part of the Project's CLP or similar document and maintained in accordance with the requirements of this plan.		
Noise – Noise and vibration	N6	Source controls will be employed to minimise noise impacts, such as using noise screens and mufflers, maximising offset distance, and orienting plant away from sensitive receivers.	Contractor	During Construction
Noise – Noise and vibration	N7	The selection of plant and machinery will consider noise emissions, and operated to reduce maximum noise levels, maintained regularly and turned off when not in use.	Contractor	During Construction
Socio-economic - Community impacts during construction including noise, visual and access impacts	S1	A CLP will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CLP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, broader community, recreational groups, businesses and other stakeholders including changed traffic and access conditions • Contact name and number for complaints. The CLP will be prepared in accordance with: • Transport's stakeholder engagement tool kit • Transport's Stakeholder and Community Engagement Policy 2019	Contractor	Pre-construction/ during construction
Socio-economic - Community consultation during detailed design and construction, property impacts as a result of temporary access changes and property acquisition	S2	Transport will continue to consult with the community, recreational groups, businesses and other stakeholders until the completion of the overall proposal. Discussions will include: • Changes to the overall proposal as a result of detailed design, the nature and timing of construction works • Mitigation measures for residents, stakeholders and people using the overall proposal • Mitigation measures for noise, traffic, access and visual impacts.	Transport and Contractor	Detailed design/ pre-construction/ during construction
Socio-economic - Potential impacts on Aboriginal Heritage and areas of significance	S3	Transport will continue to consult with Local Aboriginal Land Councils during detailed design phase to minimise impacts to both the acquired land and adjacent Aboriginal claim land.	Transport	Detailed design/ pre-construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
Socio-economic - Social infrastructure impacts including access and amenity impacts	S4	Operators of the Georges River Golf Course and Bankstown Golf Course, public transport providers as well as Council in reference to Gordon Parker Reserve, Vale of Ah Reserve and the vegetated corridor between the Georges River and Henry Lawson Drive will be consulted and informed regarding construction activities to mitigate any impacts during busy periods and events at these facilities.	Contractor	Pre-construction/ during Construction
Air quality - General air quality impacts	AQ1	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include: • Identification of potential risks and impacts from dust generating activities • Management measures to minimise risk of dust generation • A process for monitoring dust on-site • A process for altering management measures as required and reprogramming construction activities if the safeguards and management measures do not adequately reduce dust generation.	Contractor	Pre-construction/ during Construction
Air quality – Dust emissions	AQ2	Dust generating work will cease when levels of visible airborne dust become excessive.	Contractor	During Construction
Air quality – Dust emissions	AQ3	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h) when this may affect receivers (visibility on roads; dust and debris near recreational areas residences and commercial premises).	Contractor	During Construction
Air quality – Dust emissions	AQ4	Stockpiled materials will be covered stabilised or stored in areas not subject to high wind.	Contractor	During Construction
Air quality – Dust emissions	AQ5	All trucks will be covered when transporting material to and from the site.	Contractor	During Construction
Risk/hazard – Bushfire risk	R1	The CEMP will include a bushfire management plan prepared in accordance with the Planning for Bush Fire Protection 2019 (Rural Fire Service 2006). Measures to be implemented to manage bushfire risk include: • Monitoring of weather and local bush fire ratings • Consultation requirements for community notifications in the event of a bushfire • Maintaining equipment in good working order • Ensuring plant and equipment are fitted with appropriate spark arrestors, where practicable	Contractor	Pre-construction/ during Construction

Environmental issue	ID	Environmental management measures	Responsibility	Timing
		• Ensuring site workers are informed of the site rules including designated smoking areas and putting rubbish in designated bins. • Obtaining hot work permits and implementing total fire bans as required Implementing adequate storage and handling requirements for potentially flammable substances in accordance with the relevant guidelines.		
Risk/hazard - Consultation with emergency services	R2	Consultation with emergency services will be undertaken, including the Rural Fire Service and Fire and Rescue NSW to: • Ensure emergency access is maintained during and after construction • Co-ordinate any bush fire emergency actions as outlined in the project's Bushfire Management Plan.	Contractor	During Construction
Cumulative – Cumulative impacts	CU1	Ongoing coordination and consultation will be undertaken between the proposal contractors and other developments in the area to make sure cumulative traffic impacts are appropriately assessed and managed particularly during peak holiday periods.	Contractor	Pre-construction/ during Construction

10.3 Licensing and approvals

Table 10-2 outlines the relevant licence/approval requirements needed to construct and operate the EIS proposal.

As recognised in Section 10.2, relevant approvals and permits must be obtained prior to groundwater/aquifer dewatering if they are required. It is noted that there is the potential to need an Aquifer Interference Approval or a water access licence if dewatering is required of a certain scale and further quantitative assessments will be carried out in order to clarify this need. The approvals process for these operates under the WM Act.

Table 10-2 Summary of licensing and approvals required

Instrument	Requirement	Timing
Roads and works permits	All impacts to the road network would be undertaken in accordance with a Road Occupancy Licence (ROL) to be obtained from the Traffic Management Centre.	Pre-construction

11 Project justification and conclusion

This chapter presents a justification of the EIS and overall proposal and a conclusion to the EIS. The justification considers how the proposal balances strategic and proposal needs against the protection of the environment and planning outcomes outlined in the objects of the EP&A Act, including ESD and community consultation.

Secretary's requirements	Where addressed in EIS
Project justification – including: • The need for the proposal, the suitability of the site for the development, a demonstration that the proposal is consistent with relevant strategic planning documents, a consideration of impacts of 'no action' and a consideration of alternative options and operation technologies.	Chapter 5, Chapter 9 and Chapter 11

11.1 Justification

11.1.1 Proposal justification

The EIS proposal forms part of the overall proposal and without the EIS proposal, the overall proposal is unable to be realised. This would result in the overall proposal objectives not being met.

The overall proposal, is considered to be consistent with a number of strategies and plans including:

- Premier's Priorities
- Future Transport Strategy 2056
- State Infrastructure Strategy 2018-2038: Building Momentum
- Greater Sydney Region Plan: A Metropolis of Three Cities

The overall proposal would meet the key strategic objectives within the above strategies and plans (refer to Section 4.1.2).

The overall proposal is needed to:

- Alleviate congestion along the corridor that causes frustrating and costly delays for all road users across spreading peaks
- Address a road environment contributing to a high rate of casualty crashes
- Support growth in the area from large scale development in and around Milperra and the Bankstown Airport.

Without the overall proposal, Henry Lawson Drive would remain in its current state, with increasing congestion, particularly at intersections, and substantially increasing travel times, particularly during peak periods. Although the performance of the main intersection of Newbridge Road/Henry Lawson Drive/Milperra Road, in terms of Level of Service, would remain the same (LoS of F), the overall proposal would provide additional capacity and reduce delays, and would help alleviate congestion along the corridor that causes frustrating and costly delays for all road users across spreading peaks. The existing road environment also contributes to a high rate of casualty crashes. By providing additional capacity, the overall proposal would help alleviate this congestion along the corridor that causes frustrating and costly delays for all road users across spreading peaks. The existing road environment also contributes to a high rate of casualty crashes. The overall proposal would assist in improving road safety through the increased intersection capacity and smoother operation of the network in general, as well as the provision of appropriate shoulder width and an increased median width to separate opposing travel lanes.

In addition, there are three large-scale traffic generating developments proposed around the overall proposal area that would increase traffic demand on Henry Lawson Drive and could exacerbate the existing congestion issues. The improvements to traffic flow, connectivity and safety for pedestrians and cyclists from the overall proposal would therefore support these developments by providing sufficient capacity.

Therefore, while the overall proposal has several potential adverse impacts the following benefits would be experienced:

- The overall proposal is aligned with government strategies and policies, has social, economic and environmental benefits, and is deliverable.
- It is located in the 'fast-growing city' of Sydney and is also nearby/connects to the M5 Motorway, which is linked to priority initiatives such as the A3 and A6 corridor capacity and Heathcote Road capacity and safety.
- There would be increased travel efficiency for local road users, through the provision of greater capacity which would provide benefits for future growth and development within the broader study area.
- There would be benefits to commercial operations and businesses within and travelling through the direct study area through increased road capacity and improved travel times.
- The provision of new footpaths to connect the bus stops on Milperra Road to the Henry Lawson Drive/Milperra Road/Newbridge Road intersection would improve connectivity for public transport users.
- Motorists, active transport users, businesses, freight operators and buses would benefit from the increased road capacity which would reduce pressure on the local road network and make it easier for people to move around.

The overall proposal, forming part of the broader Henry Lawson Drive Upgrade would also ease existing traffic issues between the M5 Motorway and Hume Highway and improve freight access to surrounding areas and to the M5 Motorway and the Hume Highway. It is expected that once all four stages are online the average network speed is likely to increase as well as a decrease in average vehicle delay in comparison to the base scenario benefiting the overall performance of the Henry Lawson Drive corridor.

However, community consultation undertaken as part of the proposal identified community concern around the changed layout of the Auld Avenue intersection. During detailed design, the intersection layout will be further investigated to confirm the optimal layout in consideration of network performance, road safety requirements and as well as considering any future opportunities for broader connectivity.

While there would be some environmental impacts from the proposal, they have been avoided or minimised wherever possible through design and site-specific safeguards. The beneficial effects of improving safety and freight efficiency are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal.

11.1.2 Objects of the EP&A Act

The objects of the EP&A Act provide a framework within which the justification of the proposal can be considered. A summary of this assessment is provided in Table 11-1.

Table 11-1 Objects of the EP&A Act

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The overall proposal is needed to ensure that Henry Lawson Drive, which is a major metropolitan transport and freight route, remains a functional and improved route in the future. The proposal would increase capacity to improve movement and connectivity along the Henry Lawson Drive corridor. This would improve the existing congestion issues which is frustrating for local road users and people travelling, and results in amenity impacts relating to noise, visual, air quality and safety. There would also be economic flow on benefits to economic productivity and growth for freight carriers and vehicles travelling to the industrial precincts in the broader study area, in addition to benefits for existing and future businesses in the surrounding area (such as Bankstown Airport). However, it is recognised that there would be some short-term socio-economic impacts during construction (due to the necessary acquisition of properties and amenity impacts). The overall proposal has been designed where possible to minimise impacts on the environment and the community. A number of safeguards and management measures would be implemented to minimise any environmental impacts associated with the overall proposal.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	ESD has been considered throughout the proposal, with the legislative context of ecological sustainable development considered in Chapter 3 and the impact of the overall proposal and the EIS proposal is considered in detail in Section 11.1.3. An options process was also undertaken for the proposal that has considered a range of constraints (refer to Chapter 5) as well as feedback from the community during early consultation activities (refer to Chapter 7). The EIS proposal has currently been designed to minimise impacts to mapped coastal wetlands (eg to 0.26 ha) as far as possible but would unavoidably result in encroachment into coastal wetlands as the existing Henry Lawson Drive already sits within or immediately adjacent to the areas mapped under the Coastal Management SEPP. Impacts on GDEs and coastal wetlands are considered very high as a result of the EIS proposal due to the direct loss of habitat caused by excavation and disturbance. A Construction Soil and Water Management Plan, Construction Flora and Fauna Management Plan and a Clearing and Grubbing Plan would include mitigation measures and procedures to identify further opportunities to minimise direct impacts to coastal wetlands and GDEs. Mitigation measures are proposed to be implemented to minimise indirect impacts including potential water quality impacts, on the coastal wetlands.
1.3(c) To promote the orderly and economic use and development of land.	The overall proposal is required to cater for the safe and efficient movement of people and goods along Henry Lawson Drive, and to support the nearby large-scale traffic generating development.

Object	Comment
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the EIS and overall proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Construction of the overall proposal would require the removal of vegetation. These impacts have however been minimised where possible and offset where impacts could not be mitigated. The potential impacts on vegetation, threatened species, population and ecological communities are discussed in Section 8.1. Impacts to coastal wetlands have been minimised where possible. This is shown in the small areas that comprise the EIS proposal area. Native vegetation would be re-established in accordance with Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (Roads and Traffic Authority, 2011) and the EIS and overall proposal's Landscaping Plans.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The EIS proposal would not impact on any known Aboriginal and non-Aboriginal heritage items or places. An unexpected finds procedure would be put in place during construction to manage should any sites/items be identified.
1.3(g) To promote good design and amenity of the built environment.	The urban design and the landscape concept for the overall proposal has been developed to achieve an integrated outcome that helps fit the overall proposal as sensitively as possible into its context and to minimise the impacts of the overall proposal on the existing landscape character of the surrounding area. Mitigation measures would be implemented in the detailed design stage to ensure that the design objectives are realised. Activities within the EIS proposal would also directly support improved connectivity and safety for pedestrians and cyclists through the provision of pedestrian and shared paths. Progressive landscaping would be undertaken throughout the construction, and Landscaping Plans would include revegetation with local native vegetation species, suitable for the riparian zone. During construction and operation there would be impacts on amenity and community values. These are discussed in Section 9.3. Adverse amenity impacts during construction and operation would be mitigated through a range of mitigation measures.
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 EIS and overall proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the EIS and overall proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation with the community and relevant government agencies was undertaken during the development of the overall proposal. Details of this consultation can be found in Chapter 7. This EIS would also be placed on public display seeking community feedback.

11.1.3 Sustainability and ecologically sustainable development

Sustainability

The Transport for NSW's environment and sustainability policy (2020) provides strategic direction to fulfil 'a duty to undertake our activities in the interest of the greater good, moving beyond compliance, and being a genuine leader in environment and sustainability performance'.

The Policy provides a clear commitment 'to delivering transport which contributes to economic prosperity and social inclusion in an environmentally responsible and sustainable manner, consistent with the Future Transport Strategy 2056'.

Supporting the policy is the Technical Guide: Sustainability in infrastructure design and construction (Roads and Maritime Services 2016) that sets out sustainability objectives relevant to roads, maritime and transport projects. Table 11-2 details the sustainability themes and objectives of the Technical Guides and describes how the overall proposal meets those objectives.

Table 11-2 Technical Guide Sustainability in infrastructure design - governing sustainability objectives

Sustainability theme	Sustainability objective	Proposal response
Energy management	To minimise energy use and reduce greenhouse gas emissions without compromising the delivery of services to our customers.	Transport's G36 Environmental Protection specifications for construction will require contractors to demonstrate energy-efficient and time-efficient methods for handling and transporting materials and operation of plant. This would typically include reducing idling time, reducing the length of haulage routes by sourcing material locally and considering using a sustainable energy alternative for temporary lighting during night-work. This would minimise energy use and reducing greenhouse gas emissions during construction of the proposal. During operation, the proposal would reduce delay times and congestion, thereby reducing idling time and consumption of fuels in vehicles. Ongoing energy consumption for the proposal would be for street lighting. Street lighting will use energy efficient luminaires (e.g. LED technology) in accordance with Transport's Luminaires for Road Lighting Specification TSI-SP-041.
Resource use and waste management	To minimise the use of non-renewable resources and minimise the quantity of waste disposed to landfill.	The cut and fill earthwork requirements for this proposal are relatively minor. Transport's detailed design process under specification PS311 Environment Design and Compliance involves the development of a Material Re-Use and Management Plan to identify strategies of 'avoid', 'reduce', 'reuse' and 'recycle' materials. The proposal would also rehabilitate the existing pavement, rather than removing it to go to landfill. Re-use of other 'waste' materials could include reusing vegetation cleared on site in mulch or for re-snagging waterways.

Sustainability theme	Sustainability objective	Proposal response
Climate change resilience	To design and construct transport infrastructure to be resilient to climate change impacts.	Flooding impacts associated with climate change and sea level rise have been assessed during the preparation of this EIS. Potential impacts have been identified (see Section 8.5.5) and these will be further investigated during detailed design with consideration of road levels and the surrounding existing and proposed terrain levels (see Section 8.5.6). Revegetation of the road corridor will be undertaken in accordance with Landscaping Plans. These plans will identify tree species suitable to provide canopy cover to minimise urban heat effects (see Section 8.8.5).
Pollution control	To minimise noise, land and water pollution from construction, operation and maintenance activities.	The overall proposal would result in noise impacts and has identified potential land and water pollution risks. However, Chapter 8 and Chapter 9 of this EIS describes the proposed management measures that will be implemented to minimise noise, land and water pollution from the proposal. At property noise attenuation treatments will be offered to a number of residential properties that are eligible for operational noise mitigation. Detailed design would also undertake a contaminated sites Detailed Site Investigation to identify presence and extent of potential soil and water contaminants and acid sulfate soils and what further remediation or measures would be required for the proposal. Operational water quality treatments will be further investigated during detailed design in accordance with Transport's Water Sensitive Urban Design guidelines and in consultation with Council.
Air quality	To minimise the air quality impacts of road projects and support initiatives that aim to reduce transport related air emissions.	Air emissions as a result of energy consumption is discussed above under 'energy management'. Dust generation is common during construction and dust suppression management measures will be implemented by the construction contractor so that they comply with Transport's G36 Environmental Protection specifications. The overall proposal also provides for active and public transport in accordance with Transport for NSW's draft Providing for Walking and Cycling in Transport Projects Policy. The proposal would re-establish and extend the existing shared use paths and provide appropriate access to existing bus stops in the study area.
Biodiversity	To improve outcomes for biodiversity by avoiding, minimising or offsetting the potential impacts of road and maritime projects on plants, animals and their environments.	The development of the design has avoided and minimised impacts on threatened biodiversity, by largely remaining within the existing road infrastructure corridor. Road widening is also proposed in areas that minimise impacts on coastal wetlands and threatened biodiversity (see Chapter 5 and Section 8.1.4). Ongoing design development will further investigate potential opportunities to reduce direct footprint impacts (see Section 8.1.5). Residual impacts on threatened biodiversity will be offset (see Section 8.1.5).

Sustainability theme	Sustainability objective	Proposal response
Heritage	To ensure cultural heritage is conserved and managed according to its heritage significance and that that it contributes positively to awareness of the past.	Aboriginal cultural heritage has been assessed in consultation with Aboriginal representatives. The proposal will have a minor impact and will require an AHIP for the direct impact on a single isolated artefact find. Urban design principles and objectives for the proposal include the acknowledgment and response to Aboriginal values and places in the broader landscape; and for the consideration of interpretation of the heritage areas along the corridor (see Section 6.3.2).
Liveable communities	To provide high quality urban design outcomes that contribute to the liveability of communities in NSW.	Urban design has been integrated into the design development of the proposal and will continue through the detailed design process. Appendix K includes the Urban Design report for the concept design. The proposal also includes improved active transport links for the community. The provision of new footpaths to connect the bus stops on Milperra Road to the Henry Lawson Drive/Milperra Road/Newbridge Road intersection would improve connectivity for public transport users. Transport is aware of community concerns from residents affected by proposed changes to the Henry Lawson Drive/ Auld Avenue intersection and the proposed new median along Henry Lawson Drive that would prevent some turning movements into and out of property driveways. Further investigation to identify and assess alternatives to the Henry Lawson Drive/Auld Avenue intersection is being undertaken during detailed design. Access to properties is also being considered in relation to sight distances, setbacks and gradients in accordance with the Austroads Road Design Guides, RMS (Transport for NSW) Supplements and Council Standard Drawings. Transport will continue consultation with affected residents on these potential impacts during detailed design.
Sustainable procurement	To procure goods and services and construction that over their lifecycle deliver value for money and contribute to the environmental, social and economic wellbeing of the community.	Sustainable procurement will be carried out adopting the following initiatives: • All tendered procurement would include non-price selection criteria that assesses relevant sustainability and social procurement measures. • Implementing the Aboriginal Participation in Construction Policy. • Where possible, procuring from small and medium-sized enterprises Aboriginal business and Australian Disability enterprises. • Monitoring the supply chain to identify and address issues related to poor labour practices. • Supporting local suppliers to minimise haulage distances of construction material when feasible.

Ecologically sustainable development

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

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

Precautionary principle

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

This principle was considered during route options development (refer to Chapter 5). Evaluation and assessment of alternative options have aimed to reduce the risk impacts on the environment and society through considering biodiversity impacts and property impacts.

The EIS proposal has currently been designed to minimise impacts to mapped coastal wetlands as far as possible. Stakeholder consultation considered issues raised by stakeholders and a range of specialist studies were undertaken for key issues to provide accurate and impartial information to assist in the evaluation of options. The concept design of the overall proposal (and the EIS proposal) has sought to minimise impacts on the amenity of the study area while maintaining engineering feasibility and safety for all road users.

A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the overall proposal. No safeguards have been postponed as a result of lack of scientific certainty. A CEMP would be prepared before construction starts. This requirement would ensure the overall proposal achieves a high-level of environmental performance. No safeguards and management measures would be postponed as a result of a lack of information.

Inter-generational equity

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

The EIS proposal (as part of the overall proposal) would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The EIS proposal (as part of the overall proposal) would ensure that road and traffic conditions within the overall proposal area would not continue to worsen in the future. The key risks of 'do nothing' are that:

- Congestion would worsen along the corridor causing frustrating and costly delays for all road users across spreading peaks
- Poor driver behaviour would occur in an unforgiving road environment which would contribute to a high rate of casualty crashes
- Traffic demand from nearby future developments would not be accommodated with the existing road capacity.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would inherit a lower road condition which could involve substantial increases in travel times due to a lack of alternative routes. Chapter 5 also highlights the lack of options for the EIS proposal due to the need to work within the existing highway environment, which is very constrained due to the surrounding urban environment.

Conservation of biological diversity and ecological integrity

As stated earlier, the EIS and overall proposal has been designed in order to limit the removal of native vegetation and TEC's where practical. A thorough assessment of the existing biodiversity environment was undertaken to identify and manage any potential impacts of the EIS proposal on local biodiversity. It is acknowledged that the EIS proposal would result in impacts on biodiversity, largely due to the 0.25 hectares removal of vegetation that is the habitat to several native plant communities, TECs, flora and fauna species. The BDAR determined that the EIS proposal is unlikely to lead to a significant impact on threatened species, populations, ecological communities or their habitats, and a referral of this proposal for consideration as a controlled action under the EPBC Act is not required.

It is noted that residential and infrastructure development in the locality in historic and recent times has led to extensive vegetation clearing in the locality and at the catchment scale. Remaining remnant vegetation/habitat has also been affected by a variety of disturbance mechanisms, including clearing of undergrowth, altered fire regimes, feral animals and weed invasion. This habitat loss and disturbance has resulted in the local extinction of a number of species which are less tolerant of habitat loss and disturbance (e.g. woodland birds and small mammals) and an increased risk of extinction to a number of vegetation communities.

When considering the cumulative impacts to Freshwater Wetlands on Coastal Floodplains from the EIS proposal and the overall proposal, the combined impact of the proposal would be the direct removal of 0.09 hectares of PCT 781: Coastal Freshwater Lagoons of the Sydney Basin and South East Corner. These Freshwater Wetlands are listed as Vulnerable under the BC Act.
To reduce the impacts as far as practical, the EIS proposal has proposed various environmental management measures. In addition, the EIS proposal would mitigate the residual impacts through offsetting the impacts by retiring biodiversity credits.
A BDAR and site-specific safeguards are provided in Section 8.1.

Improved valuation and pricing of environmental resources

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

The EIS has examined the environmental consequences of the EIS proposal and identified safeguards and management measures to manage the potential for adverse impacts. The requirement to implement these safeguards and management measures would result in an economic cost to Transport. Some of these measures include:

- Replacement or re-instated of revegetation with local native vegetation species
- Urban design and landscaping
- Implementation of pre-work microbat inspection procedure for culverts structures
- Biodiversity offsetting
- Connectivity measures would be implemented in accordance with the Wildlife Connectivity Guidelines for Road Projects
- Provision of scour protection and energy dissipation measures
- Construction water quality monitoring would be undertaken upstream and downstream of the EIS proposal to ensure that controls and site practices are effective at maintaining current environmental values
- Provision of visual screening through landscaping within EIS proposal areas 1 and 2.

The implementation of safeguards and management measures would increase both the capital and operating costs of the EIS proposal (as part of the overall proposal). This signifies that environmental resources have been given appropriate valuation. The concept design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the overall proposal is being developed with an environmental objective in mind.

11.1.4 Suitability of the site and public interest

Suitability of the site

As highlighted in Chapter 5, the EIS proposal and overall proposal are the result of the development of strategic alternatives and options to try and resolve the challenges on the Henry Lawson Drive corridor. As the option to improve the corridor was to widen the existing formation, looking at options either side of the existing road was the only solution. The options considered a range of different issues including impacts to properties and biodiversity impacts so that the overall proposal, and the EIS proposal is considered to work best with the site attributes, while minimising the amount of land acquisition required and the environmental impacts from the construction and operation phase.

Public interest

As discussed in Chapter 7, the EIS proposal and overall proposal has involved consultation with the relevant local and State government authorities, service providers and community groups. In addition, community feedback was sought to the current design. Where possible, issues raised by the community have been addressed in either the REF or the EIS. In the case of the feedback around Auld Avenue, due to the community concern on the changes to this intersection, Transport has committed to further detailed investigation of the intersection layout during the detailed design phase. This would include further traffic assessment and looking at other potential future opportunities to provide connectivity to the area, in consideration of road safety and road network performance.

Transport would also continue to identify and manage issues of interest or concern to the community during the assessment and approval process, and during its construction (if the proposal is approved).

11.2 Conclusion

This EIS has addressed the key issues identified in the SEARs issued under Part 4 of the EP&A Act and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. A checklist showing where the SEARs are addressed in this environmental assessment is provided in Appendix A.

The EIS proposal (as part of the overall proposal) meets the overall proposal objectives and would help to maintain efficient operation of Henry Lawson Drive, involving improving travel times, freight efficiency, improving connectivity and safety for pedestrians and cyclists and supporting new development in the precinct.

A number of potential environmental impacts have been avoided or reduced during the concept design development and options assessment for the overall proposal. However, the overall proposal and the EIS proposal would result in some environmental impacts, including clearance of vegetation, noise and vibration impacts during construction and operation, impacts on non-Aboriginal and Aboriginal heritage items, changes to flood patterns and potential impacts on water quality during construction. Implementation of the safeguards and management measures detailed in this EIS would minimise potential impacts.

The EIS proposal is not likely to have a significant impact on MNES or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Department of the Environment and Energy is not required.

On balance, the EIS proposal is considered justified as the environmental impacts would be outweighed by the economic benefits and improved functionality of the upgrade to Henry Lawson Drive.

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Appendix A

Secretary’s environmental assessment requirements and checklist

Secretary's Environmental Assessment Requirements and checklist

General requirements

Secretary's Requirement	Where addressed in the EIS
The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.	Appendix B
The Secretary requires the matters detailed below to be addressed as part of the EIS. The Department of Planning, Industry and Environment (the Department) advocates the preparation of concise, accessible and justified EISs, focusing on the proposed development, its likely environmental impacts and the mitigation of those impacts. All EISs should be prepared to allow government agencies and the public to fully comprehend the environmental implications of the proposed development. The EIS must clearly outline the statutory planning provisions that apply to the proposal.	Throughout this EIS

Key issues

Secretary's Requirement	Where addressed in the EIS
The EIS must include an assessment of potential impacts of the proposed development on the existing environment, during construction and operation (including cumulative impacts if necessary), and develop appropriate measures to avoid, minimise, mitigate offset, manage and/or monitor these potential impacts.	Chapter 8 and Chapter 9
Project justification – including: The need for the proposal, the suitability of the site for the development, a demonstration that the proposal is consistent with relevant strategic planning documents, a consideration of impacts of 'no action' and a consideration of alternative options and operation technologies.	Chapter 4, Chapter 9 and Chapter 11
Biodiversity – including: • a detailed assessment of the ecological value and potential impacts of biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act). If the proposed development is likely to significantly affect threatened species, the application for development consent is to be accompanied by a Biodiversity Development Assessment Report (BDAR) prepared in accordance with Part 6 of the BC Act, and • a detailed assessment of the potential impacts (direct and indirect) to coastal wetlands and aquatic species/habitats listed under the *Fisheries Management Act 1994* and any offset requirements resulting from this assessment.	Section 8.1 Section 8.1.4

Secretary's Requirement	Where addressed in the EIS
Heritage – including: • impacts on Aboriginal and non-Aboriginal heritage items (National, State and local) within and near the site, including built heritage and landscapes, and • an assessment of any other heritage items or issues not yet identified that may need to be considered during design development.	Section 8.2 and Section 8.3. Section 8.2 and Section 8.3.
Contamination and soil quality – including: • an investigation to identify the extent and type of any contaminated materials or acid sulfate soils that may be encountered during construction of the proposal, and associated impacts, including those from uncontrolled historic filling; and • downstream impacts of contaminated soils on aquatic ecology.	Section 8.4 Section 8.1.4
Coastal Processes – including: • the effects of coastal processes and coastal hazards including the effects of sea level rise and climate change, and • consistency with coastal zone management plans, floodplain risk management plans and flood hazards associated with the land.	Section 8.5.5 Section 8.5.3
Land-use and development – including: • the assessment for impacts of construction and operation on and from surrounding land uses, • an assessment of safety and access to intersections and properties during construction, and • consideration and details to whether the proposed development is within, adjacent to, or in proximity to, or in proximity to a watercourse that flows directly into EES Group-managed conservation estate (e.g. a national park, nature reserve, state conservation area, land which is declared wilderness under the *Wilderness Act 1987*), requirements for consultation with EES and consistency with relevant guidelines.	Section 8.6.4 and Section 9.1.3 Section 8.6 'access and connectivity' and in Section 9.1 for active transport. Section 8.6.2
Groundwater and surface water – including: • an assessment of hydrology, and potential impacts on the quality and quantity of surface and groundwater resources with reference to the ANZG (2018) Guidelines for Fresh and Marine Water Quality or equivalent water quality guidelines, • details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*, and • flooding – consideration of the impacts of the proposal on the hydraulic and hydrologic regime of the area.	Section 8.5 Quality and quantity of surface and groundwater resources is discussed in Section 8.7. Water usage is discussed in Section 6.4.8. Section 8.5
Visual – including: • an impact assessment at private receptors and public vantage points.	Section 8.8
Environmental Monitoring and Management – including: • a detailed description of what measures would be implemented to manage, mitigate or offset the potential impacts (including cumulative impacts) of the proposal (as identified above) during construction and operation as relevant, and where required, and describe how the environmental performance of the proposal would be monitored and managed over time. Where possible, reasonable and feasible mitigation measures should be developed in consultation with surrounding affected landowners and relevant public authorities.	Chapter 10

Consultation

Secretary's Requirement	Where addressed in the EIS
During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment, Energy and Science Group (Biodiversity and Conservation, and Environment Protection Authority); Regions, Industry, Agriculture and Resources Group (former Department of Industry) of the Department Planning, Industry and Environment; • Department of Premier and Cabinet (Heritage) • Rural Fire Service; • Fire & Rescue NSW; • Canterbury-Bankstown Council; • Bankstown Airport; • NSW SES; • Sydney Water; • Special interest groups, including the Gandangara Local Aboriginal Land Council and Registered Aboriginal Parties, and; • the surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.	Chapter 7

Environmental Assessment Requirements

Section 4.12 (8) of the *Environmental Planning and Assessment Act 1979.*

Designated Development

SEARs Number	1438
Proposal	Widening and intersection upgrades of Henry Lawson Drive at Milperra Road and Tower Road within Coastal Management SEPP coastal wetlands
Location	Henry Lawson Drive, Bankstown (Canterbury-Bankstown LGA)
Applicant	Transport for NSW
Date of Issue	8 April 2020
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. The Secretary requires the matters detailed below to be addressed as part of the EIS. The Department of Planning, Industry and Environment (the Department) advocates the preparation of concise, accessible and justified EISs, focusing on the proposed development, its likely environmental impacts and the mitigation of those impacts. All EISs should be prepared to allow government agencies and the public to fully comprehend the environmental implications of the proposed development. The EIS must clearly outline the statutory planning provisions that apply to the proposal.

Key Issues	The Department has identified the following issues which are likely to be of key significance to the environmental planning and assessment of the proposed development. These issues do not relieve the Applicant from assessing any other key issues that may be identified during the EIS preparation.
	
	The EIS must include an assessment of potential impacts of the proposed development on the existing environment, during construction and operation (including cumulative impacts if necessary), and develop appropriate measures to avoid, minimise, mitigate offset, manage and/or monitor these potential impacts. As part of the EIS assessment, the following matters must also be addressed:
	
	• **Project justification** – including:
	  ○ The need for the proposal, the suitability of the site for the development, a demonstration that the proposal is consistent with relevant strategic planning documents, a consideration of impacts of 'no action' and a consideration of alternative options and operation technologies.
	• **Biodiversity** – including:
	  ○ a detailed assessment of the ecological value and potential impacts of biodiversity values to determine if the proposed development is "likely to significantly affect threatened species" for the purposes of Section 7.2 of the Biodiversity Conservation Act 2016 (BC Act). If the proposed development is likely to significantly affect threatened species, the application for development consent is to be accompanied by a **Biodiversity Development Assessment Report (BDAR)** prepared in accordance with Part 6 of the BC Act, and
	  ○ a detailed assessment of the potential impacts (direct and indirect) to coastal wetlands and aquatic species/habitats listed under the Fisheries Management Act 1994 and any offset requirements resulting from this assessment.
	• **Heritage** – including:
	  ○ impacts on Aboriginal and non-Aboriginal heritage items (National, State and

	local) within and near the site, including built heritage and landscapes, and ○ an assessment of any other heritage items or issues not yet identified that may need to be considered during design development. • **Contamination and soil quality** – including: ○ an investigation to identify the extent and type of any contaminated materials or acid sulfate soils that may be encountered during construction of the proposal, and associated impacts, including those from uncontrolled historic filling; and ○ downstream impacts of contaminated soils on aquatic ecology. • **Coastal Processes** – including: ○ the effects of coastal processes and coastal hazards including the effects of sea level rise and climate change, and ○ consistency with coastal zone management plans, floodplain risk management plans and flood hazards associated with the land. • **Land-use and development** – including: ○ the assessment for impacts of construction and operation on and from surrounding land uses, ○ an assessment of safety and access to intersections and properties during construction, and ○ consideration and details to whether the proposed development is within, adjacent to, or in proximity to, or in proximity to a watercourse that flows directly into EES Group-managed conservation estate (e.g. a national park, nature reserve, state conservation area, land which is declared wilderness under the Wilderness Act 1987), requirements for consultation with EES and consistency with relevant guidelines. • **Groundwater and surface water** – including: ○ an assessment of hydrology, and potential impacts on the quality and quantity of surface and groundwater resources with reference to the ANZG (2018) Guidelines for Fresh and Marine Water Quality or equivalent water quality guidelines, ○ details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the Water Act 1912 and/or the Water Management Act 2000, and ○ flooding – consideration of the impacts of the proposal on the hydraulic and hydrologic regime of the area. • **Visual** – including: ○ an impact assessment at private receptors and public vantage points. • **Environmental Monitoring and Management** – including: ○ a detailed description of what measures would be implemented to manage, mitigate or offset the potential impacts (including cumulative impacts) of the proposal (as identified above) during construction and operation as relevant, and where required, and ○ describe how the environmental performance of the proposal would be monitored and managed over time. Where possible, reasonable and feasible mitigation measures should be developed in consultation with surrounding affected landowners and relevant public authorities.
Environmental Planning Instruments and other policies	The EIS must assess the proposal against the relevant environmental planning instruments and other policies, including but not limited to: • State Environmental Planning Policy (Infrastructure) 2007 • State Environmental Planning Policy (Coastal Management) 2018 • State Environmental Planning Policy 55 (Remediation of Land) • Greater Sydney Region Plan 2018 • South District Plan 2018 • Bankstown Local Environmental Plan 2015 • Draft Canterbury Bankstown Consolidated Local Environmental Plan 2020 • Canterbury Bankstown Local Strategic Planning Statement 'Connective City 2036' • Bankstown Development Control Plan 2015

	• Bankstown CBD and Bankstown Airport Place Strategy
Agency Issues and Guidelines	During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at planning.nsw.gov.au. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development. Matters to be considered and guidelines identified in consultation with agencies in the preparation of these requirements should also be addressed.
Plans and Documents	The EIS must include all relevant plans, diagrams and relevant documentation required under Schedule 1 of the Regulation. These items are to be provided as part of the EIS rather than as separate documents.
Consultation	During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment, Energy and Science Group (Biodiversity and Conservation, and Environment Protection Authority); Regions, Industry, Agriculture and Resources Group (former Department of Industry) of the Department Planning, Industry and Environment; • Department of Premier and Cabinet (Heritage) • Rural Fire Service; • Fire & Rescue NSW; • Canterbury-Bankstown Council; • Bankstown Airport; • NSW SES; • Sydney Water; • Special interest groups, including the Gandangara Local Aboriginal Land Council and Registered Aboriginal Parties, and; • the surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.
Further Consultation After Two Years	If you do not lodge an application under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* within 2 years of the issue date of these SEARs, you must consult with the Secretary in relation to any further requirements for lodgement.

Appendix B

Environmental Planning and Assessment Regulation 2000 checklist

Environmental Planning and Assessment Regulation 2000 checklist

6 Form of the environmental impact statement

Requirement	Where addressed in the EIS
An environmental impact statement must contain the following information:	
g. the name, address and professional qualifications of the person by whom the statement is prepared,	Certification page
h. the name and address of the responsible person,	Certification page
i. the address of the land: i. in respect of which the development application is made, or ii. ion which the activity or infrastructure to which the statement relates is to be carried out,	Certification page
j. a description of the development, activity or infrastructure to which the statement relates,	Certification page
k. an assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule, and	Certification page
l. a declaration by the person by whom the statement is prepared to the effect that: i. the statement has been prepared in accordance with this Schedule, and ii. the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and iii. that the information contained in the statement is neither false nor misleading.	Certification page

7 Content of the environmental impact statement

Requirement	Where addressed in the EIS
1. An environmental impact statement must also include each of the following:	
a. a summary of the environmental impact statement,	Executive Summary
b. a statement of the objectives of the development, activity or infrastructure,	Section 4.3 Project objectives
c. an analysis of any feasible alternatives to the carrying out of the development activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Chapter 5 Project development and alternatives

Requirement	Where addressed in the EIS
d. an analysis of the development, activity or infrastructure, and	
i. a full description of the development, activity or infrastructure,	Chapter 6 Project description
ii. a general description of the environment likely to be affected by the development activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and	Executive Summary Chapter 8 Assessment of key issues
iii. the likely impact on the environment of the development, activity or infrastructure, and	Chapter 8 Assessment of key issues
iv. a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and	Chapter 8 Assessment of key issues
v. a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,	Chapter 3 Statutory framework and approval requirements
e. compilation (in a single section of the environmental impact statement) of the measures referred to in item (d)(iv),	Chapter 10 Summary of environmental management measures
f. the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4) of Schedule 2 Part 3 Section 7.	Chapter 11 Project justification and conclusion Section 11.1.3 Sustainability and ecologically sustainable development
2. Subclause (1) is subject to the environmental assessment requirements that relate to the environmental impact statement.	SEARs are addressed throughout the document.
3. Not applicable	
4. Principles of ecologically sustainable development	Section 11.1.3 Sustainability and ecologically sustainable development

Appendix C

Technical working paper: BDAR

Appendix D

Technical working paper: Aboriginal Cultural Heritage Assessment

Appendix E

Technical working paper: Non-Aboriginal Heritage Statement of Heritage Impact

Appendix F

Technical working paper: Preliminary site investigation

Appendix G

Technical working paper: Flooding and hydrology

Appendix H

Technical working paper: Socio-economic

Appendix I

Technical working paper: Groundwater

Appendix J

Technical working paper: Surface water

Appendix K

Technical working paper: Landscape character and visual impact assessment

Appendix L

Technical working paper: Traffic and transport

Appendix M

Technical working paper: Noise and vibration

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