



# **Sydney Metro West Eastern Creek Precast Facilities**

**Review of Environmental Factors  
Volume 1 Main Document and Appendix A  
November 2020**





# Executive summary

Sydney Metro is proposing to construct and operate two adjacent precast facilities to support the construction of the proposed Sydney Metro West. The proposal is located in Eastern Creek within the Blacktown City Council local government area. The proposal would be located on Lenore Drive, Eastern Creek (the proposal site).

Sydney Metro West would connect Greater Parramatta with the Sydney CBD (central business district), and involve the construction and operation of around 24 kilometres of twin tunnels, between Westmead and Sydney CBD. The precast facilities which are the subject of this proposal would manufacture precast concrete segments for the purpose of lining the Sydney Metro West tunnels. The precast facilities would be able to be operated independently of each other.

It has been identified through detailed construction planning that additional precast facilities would be required to enable the efficient delivery of Sydney Metro West (including the section from The Bays to the Sydney CBD). Due to the scale of Sydney Metro West, the tunnelling and station excavation works have been separated into geographically-specific contract packages between Westmead and the Sydney CBD. Based on the delivery strategy for Sydney Metro West, multiple tunnelling packages would be in delivery at the same time and separate precast facilities would be required for each tunnelling contractor.

Additional precast capacity at the proposal site would provide the ability to align the production of precast segments with the delivery strategy, while supporting multiple tunnelling contractors concurrently.

The proposal would create around 120 jobs during construction and around 120 jobs during operation of the proposal.

Sydney Metro, a NSW Government agency, is the proponent and determining authority for this proposal under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The purpose of this Review of Environmental Factors (REF) is to describe the proposal, to document potential impacts of the proposal on the environment, and to detail mitigation measures to be implemented.

## Description of the proposal

The proposal would comprise the following key features and activities:

- Site establishment at the proposal site at Eastern Creek including vegetation clearing, remediation, and earthworks
- The establishment and operation of two separate and adjacent precast facilities on the proposal site, the northern and southern precast facilities. Each precast facility would include:
  - A precast yard including a shed for construction of precast concrete segments and storage laydown areas
  - Boiler, aggregate bins and consumables
  - Office facilities
  - On-site parking for up to 60 light vehicles
- Internal roads (one lane in each direction) with entrances to each facility from the Western Access Road located between the northern and southern precast facilities (external roads would be subject to separate approvals). Sydney Metro is working with Transport for NSW to provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and a Western Access Road between the northern and southern precast sites. An Addendum to the Archbold Road Upgrade and Extension REF (Transport for NSW, 2017) details this work and is subject to determination by Transport for NSW. As a result, the proposal does not include any external road works. Further extensions to Archbold Road would be completed at a later stage
- Ancillary supporting infrastructure, including utilities installation (power, water, sewerage, gas and communications), lighting, signage and landscaping.

The facilities would operate concurrently, 24 hours a day, seven days a week for the majority of the lifespan of the project.

The proposal would be temporary, operating for an approximate timeframe of four to five years, subject to the delivery strategy and construction program for Sydney Metro West.

The proposal site would be subdivided to create two separate lots, one for each precast facility.

A small portion located in the south-west section of the proposal site at Eastern Creek would be conserved as an environmental protection area associated with the presence of Cumberland Plain Woodland and Shale-Gravel Transition Forest. Vegetation within this area would be retained and protected during construction and operation of the proposal.

Key features of the proposal are shown in Figure O-1.

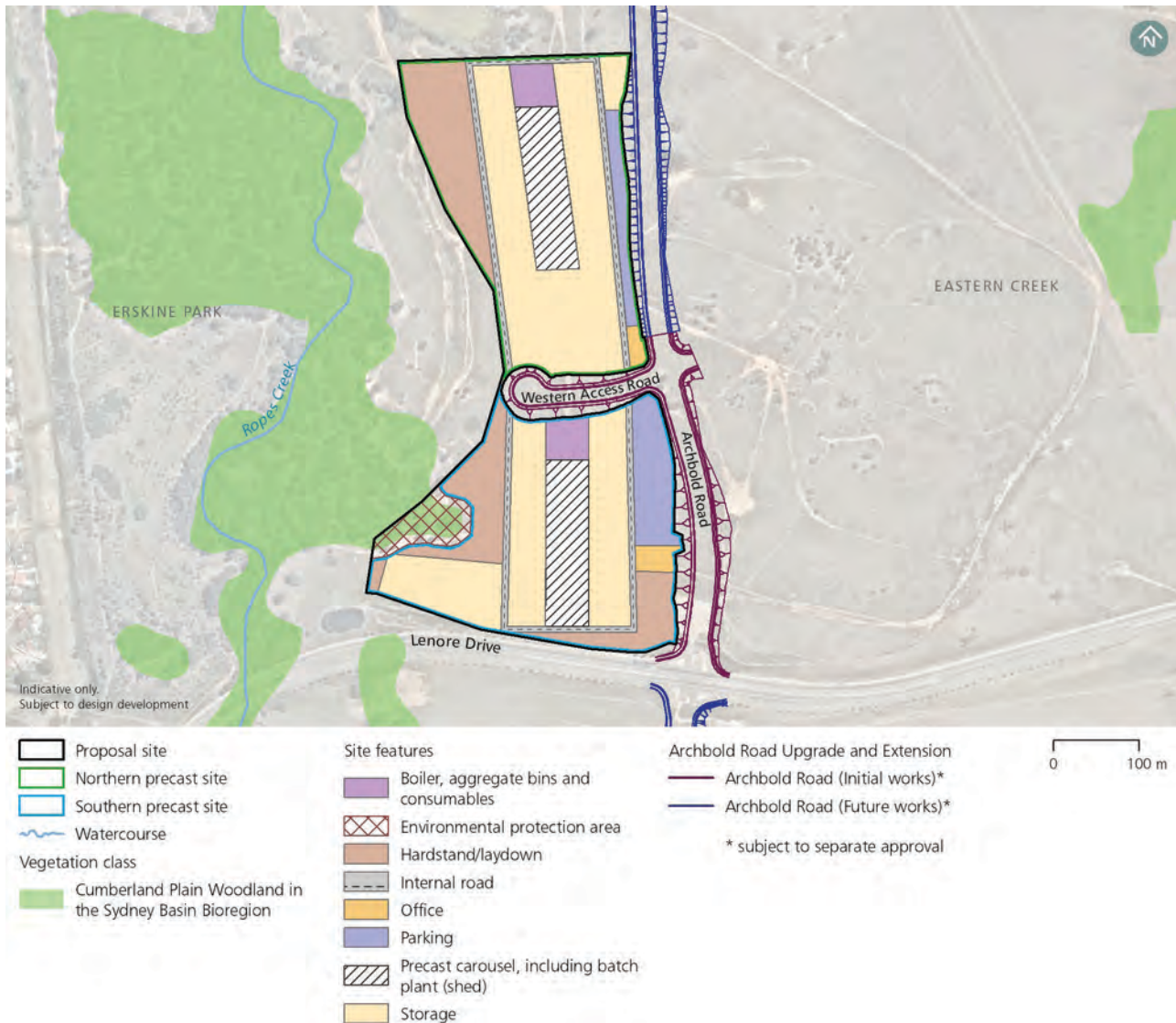


Figure O-1: Indicative site layout

## Need for the proposal

Sydney Metro West would involve the construction and operation of a metro rail line between Westmead and Sydney CBD, including about 24 kilometres of underground twin tunnels. These tunnels would be lined with precast concrete segments which are erected by tunnel boring machines as they move forward. The need for Sydney Metro West is detailed in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a).

Stage 1 of the works for Sydney Metro West includes the tunnel and station excavation works from Westmead to The Bays. Future stage(s) of works, including tunnel excavation between The Bays and Sydney CBD, would be subject to future Environmental Impact Statement(s). While the design of major civil elements between Westmead and The Bays is well progressed, further planning is underway on elements such as tunnel alignment east of The Bays and through the complex Sydney CBD, and the overall delivery strategy for Sydney Metro West.

It has been identified through detailed construction planning that additional precast facilities would be required to enable the efficient delivery of Sydney Metro West (including the section from The Bays to the Sydney CBD).

Due to the scale of Sydney Metro West, the tunnelling and station excavation works have been separated into geographically-specific contract packages between Westmead and the Sydney CBD. Based on the delivery strategy for Sydney Metro West, multiple tunnelling packages would be in delivery at the same time and separate precast facilities would be required for each tunnelling contractor.

The precast facility at the Clyde stabling and maintenance facility construction site proposed as part of Stage 1 of the works for Sydney Metro West would not provide sufficient space or be able to meet the productivity requirements to support the Sydney Metro West delivery strategy. Furthermore, while tunnelling works are still underway, the precast facility at Clyde would need to be decommissioned for the land to support future construction activities, including fit out of the tunnels.

Additional precast capacity would provide the ability to align the production of precast segments with the delivery strategy, while supporting multiple tunnelling contractors concurrently. Precast facilities separate from the Clyde site would also be able to be used over the entire duration of Sydney Metro West tunnelling works, as they would not be required to be decommissioned to allow future construction activities to commence.

## Options considered

Options considered to provide precast segments for Sydney Metro West included a 'do nothing' option, the establishment of additional precast capacity within or adjacent to proposed Sydney Metro West construction sites, or the option of establishing and operating additional precast facilities at a new location.

The 'do nothing' option would not support the efficient delivery of construction works. The establishment of additional precast capacity within or adjacent to Sydney Metro West construction sites would require additional property acquisition, likely to be the acquisition of private residential, commercial or industrial land.

Constructing and operating additional precast facilities in a new location would allow the selection of a site with sufficient size to establish two standalone precast facilities, to meet precast segment production requirements for Sydney Metro West. This option would ensure Sydney Metro West has the capacity to meet the precast segment production requirements identified during the detailed construction planning phase of the project. This option would also minimise the need for private property acquisition as it would allow for the selection of government owned land for the proposal site.

Undertaking the proposal was identified as the preferred option, and is the subject of this REF.

## Statutory considerations

The EP&A Act provides for the environmental assessment of development in NSW. Part 5, Division 5.1 of the EP&A Act generally specifies the environmental impact assessment requirements for activities carried out by public authorities, such as Sydney Metro, which do not require development consent.

The proposal is categorised as a temporary facility, operating for an indicative timeframe of four to five years, for the management of railway construction (the construction of Sydney Metro West) that is in a rail corridor, pursuant to clause 79 clause 2(a)(v) of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP). Under clause 78, the proposal site is considered a rail corridor as it is land owned by a public authority (Sydney Metro) for the purpose of railway or rail infrastructure facilities (being Sydney Metro West). As such, the proposal is permissible without consent under Part 4 of the EP&A Act when undertaken by a public authority. The proposal is not State Significant Infrastructure or State Significant Development and accordingly can be assessed under Division 5.1 of Part 5 of the EP&A Act.

This REF has been prepared to assess the construction and operational environmental impacts of the proposal. The REF has been prepared in accordance with clause 228 of the *Environment Planning and Assessment Regulation 2000*.

In accordance with section 5.5 of the EP&A Act, Sydney Metro, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. Based on the assessment contained in this REF, it is considered that the proposed activity is not likely to have a significant impact upon the environment.

Chapter 8 (Environmental impact assessment) of this REF presents the environmental impact assessment for the proposal, in accordance with these requirements.

## Environmental impact assessment

This REF assesses potential construction and operational environmental impacts of the proposal. Management and mitigation measures would be implemented to minimise the potential impacts of the proposal.

Due to the location of the proposal and its distance from the nearest receivers, the potential amenity related impacts (such as noise and air quality) associated with the construction and operation of the proposal would be negligible to minor.

The following potential key impacts have been identified:

- **Aboriginal heritage:** The preparation of an Aboriginal Heritage Impact Permit (AHIP), supported by test excavation and comprehensive Aboriginal stakeholder consultation, would be completed to manage potential impacts to Aboriginal heritage. The proposal would result in the partial to total loss of value of 10 Aboriginal sites. The overall archaeological significance of seven of these sites has been assessed as low. One site, RCAS 09 (AHIMS ID 45-5-5355) has been assessed as having moderate overall significance and two sites (AHIMS ID 45-3-3159 and AHIMS ID 45-5-0559) having high overall significance. One of the sites, AIF-06 (AHIMS ID 45-5-4599) is also within the boundary of the planned Archbold Road upgrade and extension. Sydney Metro and other relevant parts of Transport for NSW would coordinate any future Aboriginal Cultural Heritage Assessment Report(s) and AHIP application(s)
- **Biodiversity:** The proposal has sought to minimise impacts to biodiversity, including through establishing an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. Construction of the proposal would require clearing of about 1.92 hectares of native vegetation, a subset of which is listed under the *Biodiversity Conservation Act (2016)* and *Environmental Protection of Biodiversity Conservation Act (1999)* as endangered and critically endangered community, respectively. This vegetation provides habitat (or has the potential to support) other protected threatened species
- **Cumulative impacts:** Co-ordination and consultation with relevant stakeholders (including other parts of Transport for NSW) would occur where required to manage the interface of projects under construction at the same time. Potential temporary cumulative impacts with other projects, on noise and vibration, traffic and transport, Aboriginal heritage, non-Aboriginal heritage flooding and biodiversity, may occur given the potential overlap with other projects including the planned Archbold upgrade and extension.

An assessment of each of the above and other environmental issues such as noise and vibration, traffic and transport, landscape and visual character, non-Aboriginal heritage, land use and socio-economic, flooding, soils and surface water, groundwater, contamination, waste and resource management, air quality, bushfire and sustainability, climate change and greenhouse gas is provided in Chapter 8 (Environmental impact assessment) of this REF.

## Benefits of the proposal

The proposal would support the delivery of the proposed Sydney Metro West and ensure the project has the capacity to meet the precast segment production requirements identified during the detailed construction planning phase of the project. It would also deliver social and economic benefits by providing around 120 jobs during construction and around 120 jobs during the operation of the proposal. The proposal would be designed and managed to provide operational efficiencies and to appropriately mitigate impacts on the surrounding environment and local community.

With the implementation of the proposed mitigation measures in Chapter 9 (Environmental management), any potential environmental impacts of the proposal would be adequately mitigated and managed and are therefore not considered to be significant.

## Justification and conclusion

This REF has been prepared having regard to sections 5.5 and 5.7 of the EP&A Act, and clause 228 of the EP&A Regulation that provides for Sydney Metro as a determining authority to take into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposal and whether or not the activity is likely to significantly affect the environment.

Should the proposal proceed, any potential associated adverse impacts would be appropriately managed in accordance with the mitigation measures outlined in this REF, and any conditions imposed in the Determination Report.

The proposal would not affect Commonwealth land or have a significant impact on any matters of national environmental significance, therefore a referral of the proposal for a controlled activity determination under the EPBC Act would not be required.

On balance, the proposal's long-term benefits would outweigh its impacts, and the proposal is considered to be justified.

## Next steps

Sydney Metro will exhibit the REF for a three-week period commencing in November 2020 to allow the community to provide written comments on the proposal.

The details of the proposal, the planning process and engagement activities would be communicated at the commencement of public exhibition through targeted stakeholder meetings, a newsletter delivered to nearby properties, emails to registered parties, information provided on the Sydney Metro website and on the Sydney Metro West interactive portal. Additional stakeholder and community consultation would continue to be implemented to inform the community and stakeholders prior to and during the proposal's construction (should it be approved during the proposal's determination phase).

Sydney Metro would continue to incorporate consultation outcomes based on feedback from residents, community and stakeholders during development of the proposal. Sydney Metro invites comments on this REF during public display. Submissions received during the public display period will be considered and addressed, and may inform any amendments to the proposal. The REF and submissions received will be used by Sydney Metro to assess and determine the proposal.

After this consideration, Sydney Metro will determine if the proposal should proceed as outlined and would inform the community and stakeholders of this decision. If the proposal is determined to proceed, Sydney Metro would continue to undertake activities in line with the requirements of the Sydney Metro Overarching Community Communications Strategy.

*This page has intentionally been left blank*



# Contents

<b>Executive summary</b> .....	i
<b>1 Introduction</b> .....	1
1.1 <b>Background</b> .....	1
1.2 <b>Overview of the proposal</b> .....	2
1.2.1 Location of the proposal.....	2
1.2.2 Key features of the proposal .....	3
1.2.3 Relevant development proposals and approvals .....	4
1.3 <b>Purpose of this Review of Environmental Factors</b> .....	5
1.4 <b>Structure and content of the REF</b> .....	6
<b>2 Need for the proposal</b> .....	7
2.1 <b>Need for the proposal</b> .....	7
2.2 <b>Consistency with strategic planning and policy</b> .....	7
2.2.1 Western Sydney Employment Area.....	7
2.2.2 Greater Sydney Region Plan: A Metropolis of Three Cities.....	8
2.2.3 Central City District Plan.....	8
2.2.4 Blacktown Local Strategic Planning Statement 2020 .....	8
2.2.5 Our Blacktown 2036 - Draft Community Strategic Plan .....	8
2.3 <b>Proposal objectives</b> .....	9
<b>3 Options development and selection</b> .....	11
3.1 <b>Identified options</b> .....	11
3.1.1 Option 1 - 'Do nothing'.....	11
3.1.2 Option 2 - Establish additional precast capacity within or adjacent to proposed Sydney Metro West construction sites.....	11
3.1.3 Option 3 - Establish additional precast facilities at a new location .....	11
3.2 <b>Proposal site selection</b> .....	12
<b>4 Statutory and planning considerations</b> .....	13
4.1 <b>NSW Legislation and regulations</b> .....	13
4.1.1 Environmental Planning and Assessment Act 1979.....	13
4.1.2 State Environmental Planning Policy - Infrastructure 2007.....	14
4.1.3 State Environmental Planning Policy No. 55 - Remediation of Land .....	15
4.1.4 State Environmental Planning Policy - 33 Hazardous and Offensive Development .....	15
4.1.5 State Environmental Planning Policy (Western Sydney Employment Area) 2009.....	15
4.1.6 Local Environmental Plan .....	16
4.1.7 Ropes Creek Precinct Draft Development Control Plan (Draft).....	17
4.1.8 Other relevant NSW legislation.....	17
4.2 <b>Commonwealth legislation</b> .....	20
4.2.1 Environment Protection and Biodiversity Conservation Act 1999.....	20
4.3 <b>Summary of statutory requirements</b> .....	21
<b>5 Description of the proposal</b> .....	23
5.1 <b>Proposed works</b> .....	23
5.2 <b>Construction</b> .....	24
5.2.1 Site establishment.....	25
5.2.2 Civil and building work.....	26
5.2.3 Commissioning .....	26
5.2.4 Construction program.....	26
5.2.5 Construction workforce.....	26
5.2.6 Construction plant and equipment .....	26
5.2.7 Resources, materials and sourcing .....	27
5.2.8 Waste.....	27
5.2.9 Traffic management, haul routes and access .....	27
5.2.10 Water management.....	28
5.2.11 Utilities .....	28
5.2.12 Hours of work.....	28
5.3 <b>Operation and maintenance</b> .....	29
5.3.1 Built form.....	29
5.3.2 Operation.....	29
5.3.3 Operational workforce .....	30

5.3.4	Traffic management .....	30
5.3.5	Operational ancillary infrastructure .....	31
5.3.6	Maintenance .....	31
<b>5.4</b>	<b>Property acquisition .....</b>	<b>31</b>
<b>6</b>	<b>Stakeholder and community consultation.....</b>	<b>33</b>
<b>6.1</b>	<b>Consultation objectives .....</b>	<b>33</b>
<b>6.2</b>	<b>Statutory notification requirements .....</b>	<b>33</b>
6.2.1	Infrastructure SEPP notification .....	33
<b>6.3</b>	<b>Aboriginal community involvement .....</b>	<b>35</b>
<b>6.4</b>	<b>Consultation during REF exhibition.....</b>	<b>35</b>
6.4.1	Consultation activities proposed during public exhibition.....	35
6.4.2	Engagement activities and tools .....	35
<b>6.5</b>	<b>Response to Submissions .....</b>	<b>36</b>
<b>6.6</b>	<b>Post-determination consultation activities.....</b>	<b>36</b>
<b>7</b>	<b>Related development.....</b>	<b>37</b>
<b>7.1</b>	<b>Sydney Metro West .....</b>	<b>37</b>
7.1.1	Background .....	37
7.1.2	Summary of potential impacts.....	38
<b>8</b>	<b>Environmental impact assessment.....</b>	<b>45</b>
<b>8.1</b>	<b>Noise and vibration .....</b>	<b>45</b>
8.1.1	Methodology.....	45
8.1.2	Existing environment .....	48
8.1.3	Potential impacts - construction .....	50
8.1.4	Potential impacts - operation.....	52
8.1.5	Management and mitigation measures .....	55
<b>8.2</b>	<b>Traffic, transport and access .....</b>	<b>56</b>
8.2.1	Methodology.....	56
8.2.2	Existing environment .....	56
8.2.3	Potential impacts.....	59
8.2.4	Management and mitigation measures .....	62
<b>8.3</b>	<b>Landscape and visual character.....</b>	<b>63</b>
8.3.1	Methodology.....	63
8.3.2	Existing environment .....	66
8.3.3	Potential impacts.....	68
8.3.4	Management and mitigation measures .....	77
<b>8.4</b>	<b>Non-Aboriginal heritage.....</b>	<b>78</b>
8.4.1	Methodology.....	78
8.4.2	Existing environment .....	79
8.4.3	Potential impacts.....	80
8.4.4	Management and mitigation measures .....	81
<b>8.5</b>	<b>Aboriginal heritage .....</b>	<b>82</b>
8.5.1	Methodology.....	82
8.5.2	Existing environment .....	83
8.5.3	Potential impacts.....	87
8.5.4	Management and mitigation measures .....	87
<b>8.6</b>	<b>Land use, property and socio-economic.....</b>	<b>89</b>
8.6.1	Methodology.....	89
8.6.2	Existing environment .....	89
8.6.3	Potential impacts.....	90
8.6.4	Management and mitigation measures .....	91
<b>8.7</b>	<b>Flooding .....</b>	<b>92</b>
8.7.1	Methodology.....	92
8.7.2	Existing environment .....	92
8.7.3	Potential impacts.....	95
8.7.4	Management and mitigation measures .....	96
<b>8.8</b>	<b>Soils and surface water quality .....</b>	<b>97</b>
8.8.1	Methodology.....	97
8.8.2	Existing environment .....	98

8.8.3	Potential impacts.....	100
8.8.4	Management and mitigation measures .....	102
<b>8.9</b>	<b>Groundwater .....</b>	<b>104</b>
8.9.1	Methodology.....	104
8.9.2	Existing environment .....	104
8.9.3	Potential impacts.....	105
8.9.4	Management and mitigation measures .....	106
<b>8.10</b>	<b>Contamination.....</b>	<b>107</b>
8.10.1	Methodology.....	107
8.10.2	Existing environment .....	109
8.10.3	Potential impacts.....	110
8.10.4	Management and mitigation measures .....	115
<b>8.11</b>	<b>Biodiversity.....</b>	<b>117</b>
8.11.1	Methodology.....	117
8.11.2	Existing environment.....	117
8.11.3	Potential impacts.....	124
8.11.4	Management and mitigation measures .....	129
<b>8.12</b>	<b>Resource use and waste management .....</b>	<b>131</b>
8.12.1	Methodology.....	131
8.12.2	Potential impacts.....	131
8.12.3	Management and mitigation measures .....	132
<b>8.13</b>	<b>Air quality.....</b>	<b>134</b>
8.13.1	Methodology.....	134
8.13.2	Existing environment .....	135
8.13.3	Potential impacts.....	137
8.13.4	Management and mitigation measures .....	139
<b>8.14</b>	<b>Bushfire.....</b>	<b>140</b>
8.14.1	Methodology.....	140
8.14.2	Existing environment.....	141
8.14.3	Potential impacts.....	142
8.14.4	Management and mitigation measures .....	144
<b>8.15</b>	<b>Sustainability, climate change and greenhouse gases.....</b>	<b>146</b>
8.15.1	Sustainability overview.....	146
8.15.2	Climate change and greenhouse gases.....	147
8.15.3	Management and mitigation measures .....	147
<b>8.16</b>	<b>Cumulative impacts .....</b>	<b>149</b>
8.16.1	Methodology.....	149
8.16.2	Potential impacts.....	150
8.16.3	Management and mitigation measures .....	156
<b>9</b>	<b>Environmental management .....</b>	<b>157</b>
<b>9.1</b>	<b>Environmental management systems .....</b>	<b>157</b>
<b>9.2</b>	<b>Environmental Management Plans.....</b>	<b>157</b>
9.2.1	Construction Environmental Management Framework.....	157
9.2.2	Construction Noise and Vibration Standard.....	157
9.2.3	Construction Traffic Management Framework.....	157
<b>9.3</b>	<b>Management and mitigation measures .....</b>	<b>158</b>
<b>10</b>	<b>Justification and conclusion.....</b>	<b>167</b>
<b>10.1</b>	<b>Justification .....</b>	<b>167</b>
10.1.1	Need for the proposal .....	167
10.1.2	Benefits and impacts of the proposal.....	167
<b>10.2</b>	<b>Objects of the EP&amp;A Act .....</b>	<b>168</b>
<b>10.3</b>	<b>Ecologically sustainable development .....</b>	<b>170</b>
<b>10.4</b>	<b>Conclusion .....</b>	<b>171</b>
<b>11</b>	<b>References.....</b>	<b>173</b>
<b>12</b>	<b>Glossary.....</b>	<b>177</b>
<b>Appendix A.....</b>		<b>181</b>

# List of Tables

Table 1-1:	Structure and content of the REF .....	6
Table 4-1:	Other relevant NSW legislation applicable to the proposal.....	17
Table 4-2:	Summary of potential licences, permits and approvals .....	21
Table 5-1:	Proposed indicative construction stages .....	25
Table 5-2:	Indicative earthworks volumes .....	26
Table 5-3:	Indicative operational vehicle movements.....	31
Table 6-1:	ISEPP consultation requirements .....	33
Table 6-2:	Key community and stakeholder engagement tools and activities .....	35
Table 6-3:	Key community and stakeholder engagement activities during proposal delivery phase.....	36
Table 7-1:	Summary of potential impacts – Sydney Metro West Stage 1.....	39
Table 8-1:	Determination of NMLs for residential receivers .....	46
Table 8-2:	Exceedance bands and corresponding subjective response to impacts .....	47
Table 8-3:	Construction scenario descriptions.....	47
Table 8-4:	Project noise trigger levels – Operational noise assessment.....	48
Table 8-5:	NCAAs and associated land uses .....	49
Table 8-6:	Summary of unattended noise monitoring results.....	50
Table 8-7:	Predicted worst-case construction noise impacts .....	51
Table 8-8:	Operational noise assessment.....	53
Table 8-9:	Summary of predicted sleep disturbance noise levels .....	54
Table 8-10:	Management and mitigation measures – noise and vibration.....	55
Table 8-11:	Intersection level of service criteria.....	56
Table 8-12:	Existing peak hour traffic volumes by direction (2019).....	58
Table 8-13:	Modelling peak hour intersection performance (2022) without and with the proposal – construction .....	60
Table 8-14:	Modelling peak hour intersection performance (2026) without and with the proposal – operation .....	61
Table 8-15:	Management and mitigation measures – traffic, transport and access.....	62
Table 8-16:	Landscape sensitivity levels and magnitude of change.....	63
Table 8-17:	Landscape impact level.....	64
Table 8-18:	Visual sensitivity and magnitude of change – daytime.....	64
Table 8-19:	Visual impact levels – daytime.....	65
Table 8-20:	Environmental zone sensitivity and modification level – night-time.....	66
Table 8-21:	Visual impact levels – night-time .....	66
Table 8-22:	Summary of visual amenity impacts (construction).....	75
Table 8-23:	Summary of visual amenity impacts (operation).....	77
Table 8-24:	Management and mitigation measures – landscape and visual.....	77
Table 8-25:	Summary of archaeological potential and heritage significance .....	80
Table 8-26:	Statement of heritage impact for the proposal .....	81
Table 8-27:	Management and mitigation measures - Non-Aboriginal heritage.....	81
Table 8-28:	Recorded Aboriginal sites and additional sites.....	84
Table 8-29:	Summary of archaeological significance .....	86
Table 8-30:	Summary of impacts on identified Aboriginal sites .....	87
Table 8-31:	Management and mitigation measures - Aboriginal heritage.....	88
Table 8-32:	Existing peak flows and critical storm duration at selected locations in the proposal site .....	93
Table 8-33:	Comparison of existing and developed (no mitigation) case peak flows and critical storm duration at selected locations <sup>1</sup> .....	95
Table 8-34:	Management and mitigation measures – hydrology and flooding.....	96
Table 8-35:	Assessment of the proposal against the relevant water quality objectives.....	101
Table 8-36:	Mitigation measures - surface water quality .....	103
Table 8-37:	Contamination severity and extent categories.....	107
Table 8-38:	Contamination pathways and receptor categories .....	107
Table 8-39:	Potential contamination risk categories .....	108
Table 8-40:	Potential contamination risk.....	112
Table 8-41:	Management and mitigation measures – soils and contamination.....	115
Table 8-42:	Other threatened fauna.....	121
Table 8-43:	Potential impacts to fauna habitat .....	125
Table 8-44:	Assessment of significance – EPBC Act.....	127
Table 8-45:	Potential indirect biodiversity impacts.....	128
Table 8-46:	Biodiversity management and mitigation measures .....	129
Table 8-47:	Waste and resource mitigation measures .....	133
Table 8-48:	Magnitude definitions for air quality assessment .....	134
Table 8-49:	Likelihood definitions for air quality assessment .....	135
Table 8-50:	Air quality risk assessment matrix .....	135
Table 8-51:	Background air quality data.....	136
Table 8-52:	Potential air quality impacts during construction.....	137
Table 8-53:	Potential air quality impacts during operation .....	138

Table 8-54: Management and mitigation measures – air quality .....	139
Table 8-55: Bushfire attack levels (AS3959) .....	140
Table 8-56: Management and mitigation measures – bushfire .....	145
Table 8-57: Climate change and greenhouse gases safeguards and management measures.....	148
Table 8-58: Cumulative impact assessment criteria .....	149
Table 8-59: Projects assessed as part of the cumulative impact assessment.....	150
Table 8-60: Management and mitigation measures – Cumulative impacts.....	156
Table 9-1: Environmental management measures (compiled from Section 7 mitigation measures).....	158
Table 10-1: Assessment of the proposal against the objects of the EP&A Act.....	168
Table 10-2: Adherence with the principles of ESD.....	170
Table A1-1: Review of clause 228(2) environmental factors.....	181
Table A1-2: Checklist of EPBC Act matters .....	186

# List of Figures

Figure 0-1:	Indicative site layout.....	ii
Figure 1-1:	Sydney Metro West overview.....	1
Figure 1-2:	Local context.....	3
Figure 4-1:	Planning approvals process for the proposal.....	14
Figure 4-2:	Land zoning map.....	16
Figure 5-1:	Indicative site layout.....	24
Figure 5-2:	Operational process of precast facilities.....	30
Figure 7-1:	Sydney Metro West.....	38
Figure 8-1:	NCA's for the proposal.....	49
Figure 8-2:	Predicted construction noise level contours - Site establishment - earthworks.....	52
Figure 8-3:	Predicted operation noise level contours.....	54
Figure 8-4:	Existing road network in the vicinity of the proposal.....	57
Figure 8-5:	Proposed haulage routes.....	59
Figure 8-6:	Landscape and visual features of the proposal site and surrounds.....	67
Figure 8-7:	Representative viewpoints around the proposal site.....	68
Figure 8-8:	Viewpoint 1 - View south from the M4 Western Motorway.....	69
Figure 8-9:	Viewpoint 2 - View south-west from Hanson Place.....	70
Figure 8-10:	Viewpoint 3 - Existing view north-west from future upgraded Archbold Road / Lenore Drive intersection.....	71
Figure 8-11:	Viewpoint 3 - View north-west from future upgraded Archbold Road / Lenore Drive intersection, indicative extent of proposal site (shown by yellow shading).....	71
Figure 8-12:	Viewpoint 4 - View north-east from Lenore Drive at the Ropes Creek crossing.....	72
Figure 8-13:	Viewpoint 4 - View north-east from Lenore Drive at the Ropes Creek crossing (indicative location of proposal site shown in yellow).....	73
Figure 8-14:	Viewpoint 5 - View east from Aquarius Crescent, Erskine Park.....	74
Figure 8-15:	Viewpoint 6 - Existing view east from park on Sennar Road, Erskine Park.....	74
Figure 8-16:	Viewpoint 6 - View east from Park on Sennar Road, Erskine Park, indicative extent of the proposal site (shown by yellow shading).....	75
Figure 8-17:	Areas of historical archaeological potential relating to phases two and three at the proposal site.....	80
Figure 8-18:	Survey units within the proposal site.....	83
Figure 8-19:	Terrain and hydrologic sub-catchments at the proposal site and surrounds.....	93
Figure 8-20:	Overland flood depths at the proposal site and surrounds (Ropes Creek one per cent AEP event).....	94
Figure 8-21:	Surface water study area.....	97
Figure 8-22:	Ropes Creek facing upstream.....	99
Figure 8-23:	Ropes Creek facing downstream.....	99
Figure 8-24:	Groundwater study area.....	104
Figure 8-25:	Contamination study area.....	108
Figure 8-26:	Key areas of potential contamination within the proposal site.....	110
Figure 8-27:	Plant Community Types.....	118
Figure 8-28:	Threatened Ecological Communities.....	119
Figure 8-29:	<i>Grevillea juniperina</i> subsp. <i>Juniperina</i> (Location: Along the northern dam bank of the ecological study area and outside the proposal site. View facing west along the southern bank of the large dam).....	120
Figure 8-30:	<i>Grevillea juniperina</i> subsp. <i>Juniperina</i> (Location: Along the northern dam bank of the ecological study area and outside the proposal site (close-up of Figure 8-29)).....	120
Figure 8-31:	Recorded threatened species in the ecological study area.....	122
Figure 8-32:	Wildlife connectivity corridors in the ecological study area.....	123
Figure 8-33:	Matters of National Environmental Significance.....	124
Figure 8-34:	Bushfire prone land map.....	142
Figure 8-35:	Bushfire attack levels for the proposal.....	143
Figure 8-36:	Asset protection zones for the proposal.....	144
Figure 8-37:	Sustainability principles and objectives.....	146
Figure 8-38:	Nearby projects.....	152
Figure 8-39:	Aboriginal heritage study area for Archbold Road upgrade and extension and the proposal (Source of Archbold Road upgrade and extension Aboriginal study area: Artefact, 2017).....	154
Figure 8-40:	Detailed view of shed and yard complex (Artefact, 2017).....	155

*This page has intentionally been left blank*

*This page has intentionally been left blank*



# 1 Introduction

This chapter describes the background to the proposal, an overview of the proposal, and the purpose and an outline of the structure of this Review of Environmental Factors (REF).

## 1.1 Background

The proposed Sydney Metro West would connect Greater Parramatta with the Sydney CBD (central business district), doubling the rail capacity of Parramatta to the Sydney CBD corridor with a travel time target between the two centres of about 20 minutes. Sydney Metro West (the Concept) would involve the construction and operation of a metro rail line between Westmead and Sydney CBD, including about 24 kilometres of underground twin tunnels (refer to Figure 1-1). Stage 1 of the works for Sydney Metro West would involve major civil construction work between Westmead and the Bays including tunnelling and station excavation.

Sydney Metro West would deliver metro stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock and The Bays with future planning and design work underway to determine a Sydney CBD station location. A potential station at Pyrmont is under consideration.

Sydney Metro (as 'the proponent') is seeking approval for the construction and operation of two adjacent precast facilities (the proposal) located on Lenore Drive, Eastern Creek (the proposal site) to support the construction of the proposed Sydney Metro West. The precast facilities subject to this proposal would manufacture precast concrete segments for the purpose of lining the Sydney Metro West tunnels. The precast facilities would be able to be operated independently of each other.

The precast facilities do not form part of the Sydney Metro West Critical State Significant Infrastructure project, which would be approved separately.

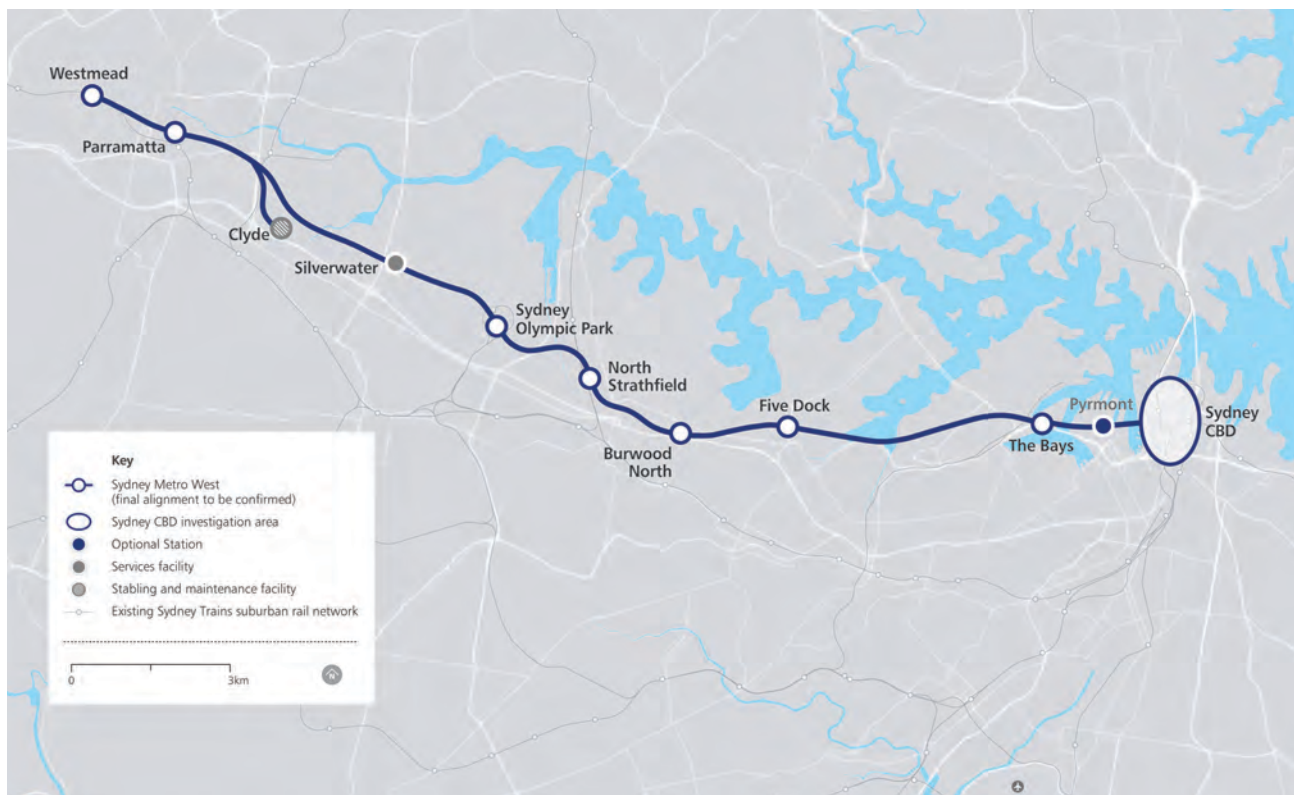


Figure 1-1: Sydney Metro West overview

## 1.2 Overview of the proposal

### 1.2.1 Location of the proposal

The proposal is located in Eastern Creek within the Blacktown City Council local government area (LGA). The proposal would be located on Lenore Drive, Eastern Creek (the proposal site). The proposal site has been identified as the preferred location as it has access to arterial roads for haulage, is within an area zoned for industrial use and has adequate buffers to residential areas. The proposal site is not within the land subject to the declaration of Sydney Metro West as Critical State Significant Infrastructure.

The 'proposal site' refers to the area that would be directly impacted by the proposal as shown in Figure 1-2. The proposal site is an undeveloped greenfield site within the broader context of surrounding planned and established industrial areas at Eastern Creek.

Directly to the north and east, the proposal site is bounded by undeveloped land zoned for future industrial use under the *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (WSEA SEPP) and owned by the Office of Strategic Lands (part of the Department of Planning, Industry and Environment Cluster). Further to the north of the proposal site, beyond the M4 Western Motorway, is an existing industrial and logistics area at Minchinbury. Further to the east of the proposal site is the Bingo Eastern Creek Recycling Facility and the wider Eastern Creek industrial precinct. To the south of the proposal site there is a zoned public recreation area. An electrical substation (owned by TransGrid) is located to the south-east of the proposal site. To the west of the proposal site is Ropes Creek and riparian vegetation. The Erskine Park residential area extends further west (about 375 metres) from the proposal site.

Beyond the proposal site, the wider locality features a mix of land uses, including residential, commercial, public recreation and a number of industrial sites.

The proposal site is under the ownership of Sydney Metro, and was acquired from the Office of Strategic Lands.



Figure 1-2: Local context

### 1.2.2 Key features of the proposal

The proposal would comprise the following key features and activities:

- Site establishment at the proposal site at Eastern Creek including vegetation clearing, remediation, and earthworks
- The establishment and operation of two separate adjacent precast facilities, the northern and southern precast facilities, on the proposal site. Each precast facility would include:
  - A precast yard including a shed for construction of precast concrete segments and storage laydown areas
  - Boiler, aggregate bins and consumables
  - Office facilities
  - On-site parking for up to 60 light vehicles
- Internal roads with entrances to each facility from the Western Access Road located between the northern and southern precast facilities (external roads would be subject to separate approvals)
- Ancillary supporting infrastructure, including utilities installation (power, water, sewerage, gas and communications), lighting, signage and landscaping.

The precast facilities would operate concurrently, 24 hours a day, seven days a week, for the majority of the lifespan of the project.

The proposal site would be subdivided to create two separate lots, one for each precast facility.

The proposal would be temporary, operating for an approximate timeframe of four to five years, subject to the delivery strategy and construction program for Sydney Metro West.

The proposal is described further in Chapter 5 (Description of the proposal).

### 1.2.3 Relevant development proposals and approvals

Other development proposals and approvals that are relevant to this proposal are discussed below. These proposals do not form part of the activity which is assessed in this Review of Environmental Factors.

#### Sydney Metro West

The proposal would support the construction of the proposed Sydney Metro West. The precast facilities would manufacture precast concrete segments necessary for lining the underground twin tunnels.

A temporary precast concrete segment production facility (Clyde facility) is included within the Clyde stabling and maintenance facility construction site as part of Stage 1 of the works for Sydney Metro West. This would also support tunnelling works for Sydney Metro West. Further information on Sydney Metro West is included in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a) (SSI-10038).

It has been identified through detailed construction planning that additional precast facilities would be required to support the production and storage needs for tunnelling (including the section from The Bays to Sydney CBD). The additional precast capacity would maximise productivity and enable the efficient delivery of Sydney Metro West. Further details regarding the need for the proposal are outlined in Chapter 2 (Need for the proposal). Further detail on Sydney Metro West including a summary of the potential environmental impact associated with carrying out the project is discussed in Chapter 7 (Related development).

#### Archbold Road Upgrade and Extension

Transport for NSW has plans to upgrade and extend Archbold Road adjacent to the precast facility proposal site. The Archbold Road Upgrade and Extension REF (Transport for NSW, 2017) was determined in December 2017 and would include a future upgrade and extension of Archbold Road between the Great Western Highway, Minchinbury and Old Wallgrove Road, Eastern Creek. Once complete, Archbold Road would be a key north-south route providing access to the Western Sydney Employment Area (WSEA). Transport for NSW is the proponent of the Archbold Road Upgrade and Extension REF.

The construction of this project will be delivered in stages as funding becomes available and as required by adjacent development. The first stage of works is currently in planning and construction would include about 700 metres of the 'new' Archbold Road heading north from the Archbold Road and Lenore Drive intersection. As part of these works an Archbold Road Upgrade and Extension Addendum REF was prepared to assess design changes to this section of road and include construction of a Western Access Road between the northern and southern precast sites. Sydney Metro is working with Transport for NSW to provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and a Western Access Road between the northern and southern precast sites.

An Addendum to the Archbold Road Upgrade and Extension REF details this work and is subject to determination by Transport for NSW. As a result, the proposal does not include any external road works.

This first stage of the planned Archbold Road upgrade and extension would provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and the Western Access Road. As a result, this proposal (for the precast facilities) does not include any external road works. Sydney Metro is working in collaboration with Transport for NSW to co-ordinate the efficient delivery of these projects, so that construction of future stages of Archbold Road does not restrict access to the precast facilities.

Works for the Western Access Road would take place on land under the ownership of Sydney Metro, however Transport for NSW would be the proponent of these works and they do not form part of this proposal (for the precast facilities) or the proposal site. Following construction, the Western Access Road is intended to be dedicated as a public road.

Further extensions of Archbold Road would be completed at a later stage and do not form part of this proposal for the precast facilities.

#### Ropes Creek Precinct Draft Development Control Plan

Ropes Creek Precinct Draft Development Control Plan (DCP) was prepared in November 2016 for the Ropes Creek Precinct (NSW Department of Planning, Industry & Environment (DPIE), 2016). The aim of this Draft DCP is to ensure the orderly and efficient development of the Ropes Creek Precinct as envisaged by the WSEA SEPP. The Ropes Creek Precinct, where the proposal site would be located, would be subject to a masterplan process. This masterplan would be developed in accordance with the controls established by the DCP, once finalised.

### 1.3 Purpose of this Review of Environmental Factors

This REF describes the proposal (refer to Chapter 5 (Description of the proposal)), documents its likely environmental impacts (refer to Chapter 8 (Environmental impact assessment)) and details the measures that would be implemented to mitigate and manage against any potential impacts (refer to Chapter 9 (Environmental management)). Sydney Metro, a NSW Government agency, is the proponent and a determining authority for this proposal under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The REF has been prepared to meet the environmental assessment requirements of Division 5.1 of Part 5 of the EP&A Act (refer to Section 4.1.1).

The environmental impacts of the proposal have been assessed in accordance with Clause 228(1) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), the *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The REF helps fulfil the requirements of section 5.5 of the EP&A Act; namely that Sydney Metro examines and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the proposed activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the need for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of Part 5 of the EP&A Act
- The significance of any impact on threatened species, populations and communities as defined by the BC Act, in accordance with section 7.8 of the *Biodiversity Conservation Regulation (2017)* and therefore the requirement to prepare a species impact statement
- The potential for the proposal to significantly impact a Matter of National Environmental Significance or Commonwealth land and the need to make a referral to the Commonwealth Department of Agriculture, Water and the Environment for a decision by the Minister for the Environment on whether assessment and approval is required under the EPBC Act (refer to Section 4.2.1).

## 1.4 Structure and content of the REF

The structure and content of the REF is outlined in Table 1-1.

Table 1-1: Structure and content of the REF

Chapter	Description
<b>Chapter 1 – Introduction</b>	Outlines the background of the proposal
<b>Chapter 2 – Need for the proposal</b>	Outlines the need for the proposal
<b>Chapter 3 – Options development and selection</b>	Provides an overview of the options that were considered during the development of the proposal
<b>Chapter 4 – Statutory and planning considerations</b>	Outlines the relevant environmental planning instruments and policies and provides an assessment of their relevance to the proposal
<b>Chapter 5 – Description of the proposal</b>	Provides a detailed description of the proposal, including the elements of the proposal, construction and operation
<b>Chapter 6 – Stakeholder and community consultation</b>	Outlines the planned community and stakeholder engagement activities to be carried out to support the REF exhibition and construction phase
<b>Chapter 7 – Related development</b>	Provides an overview of the proposed Sydney Metro West and a summary of the potential environmental impacts associated with carrying out the project
<b>Chapter 8 – Environmental impact assessment</b>	Provides an assessment of the potential environmental impacts associated with the construction and operation of the proposal
<b>Chapter 9 – Environmental management</b>	Outlines the proposed environmental management systems to be implemented and provides the management and mitigation measures to be implemented during the construction and operation of the proposal, to manage the impacts identified in the REF
<b>Chapter 10 – Justification and conclusion</b>	Provides the justification for the proposal and an outline of the key conclusions of this report.

The REF has been informed by key technical papers, which provide detailed assessment of specific environmental issues associated with the proposal. These technical papers form appendices to this REF as follows:

- Appendix B – Noise and Vibration Technical Paper (SLR, 2020)
- Appendix C – Traffic and Transport Assessment (Jacobs, 2020)
- Appendix D – Landscape and Visual Impact Assessment (Iris, 2020)
- Appendix E – Statement of Heritage Impact (Artefact, 2020)
- Appendix F – Archaeological Survey Report (Artefact, 2020)
- Appendix G – Hydrology and Flooding Technical Paper (Jacobs, 2020)
- Appendix H – Preliminary Site Contamination Investigation (Jacobs, 2020)
- Appendix I – Biodiversity Assessment Report (Jacobs, 2020)
- Appendix J – Bushfire Risk Assessment (Blackash Bushfire Consulting, 2020).

## 2 Need for the proposal

This chapter discusses the need for and objectives of the proposal. It also provides an outline of the consistency of the proposal with relevant government policies and strategies.

---

### 2.1 Need for the proposal

Sydney Metro West would involve the construction and operation of a metro rail line between Westmead and Sydney CBD, including about 24 kilometres of underground twin tunnels. These tunnels would be lined with precast concrete segments which are erected by tunnel boring machines as they move forward. The need for Sydney Metro West is detailed in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a).

Stage 1 of the works for Sydney Metro West includes the tunnel and station excavation works from Westmead to The Bays. Future stage(s), including tunnel excavation between The Bays and Sydney CBD, would be subject to future Environmental Impact Statement(s). While the design of major civil elements between Westmead and The Bays is well progressed, further planning is underway on elements such as tunnel alignment east of The Bays and through the complex Sydney CBD, and the overall delivery strategy for Sydney Metro West.

It has been identified through detailed construction planning that additional precast facilities would be required to enable the efficient delivery of Sydney Metro West (including the section from The Bays to the Sydney CBD).

Due to the scale of Sydney Metro West, the tunnelling and station excavation works have been separated into geographically-specific contract packages between Westmead and the Sydney CBD. Based on the delivery strategy for Sydney Metro West, multiple tunnelling packages would be in delivery at the same time and separate precast facilities would be required for each tunnelling contractor.

The precast facility at the Clyde stabling and maintenance facility construction site proposed as part of Stage 1 of the works for Sydney Metro West would not provide sufficient space or be able to meet the productivity requirements to support the Sydney Metro West delivery strategy. Furthermore, while tunnelling works are still underway, the precast facility at Clyde would need to be decommissioned for the land to support future construction activities, including fit out of the tunnels.

Additional precast capacity would provide the ability to align the production of precast segments with the delivery strategy, while supporting multiple tunnelling contractors concurrently. Precast facilities separate from the Clyde site would also be able to be used over the entire duration of Sydney Metro West tunnelling works, as they would not be required to be decommissioned to allow future construction activities to commence.

### 2.2 Consistency with strategic planning and policy

The proposal aligns with key NSW Government policies and strategies as it would enable the efficient delivery of the proposed Sydney Metro West. The consistency of Sydney Metro West with these policies and strategies is described in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a). Further discussion of how this proposal is consistent with NSW and local government policies and strategies is provided below.

#### 2.2.1 Western Sydney Employment Area

The proposal site is located within the Ropes Creek Precinct of the WSEA. The WSEA was established to supply employment land close to major road transport and provide jobs for Western Sydney. The proposal would support the WSEA by providing employment for around 120 workers during construction of the proposal and around 120 workers during operation. Development within the WSEA is governed by *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (WSEA SEPP) (discussed further in Chapter 4 (Statutory and planning considerations)).

## 2.2.2 Greater Sydney Region Plan: A Metropolis of Three Cities

The *Greater Sydney Region Plan: A Metropolis of Three Cities* (Greater Sydney Commission, 2018a) sets the 40-year vision and 20-year implementation plan for Sydney to develop as three unique and connected cities – the Western Parkland City, the Central River City and the Eastern Harbour City. The proposal site is located in the Blacktown LGA, which is on the western boundary of the Central River City.

The plan recognises the strategic location of Blacktown LGA, straddling the boundary between the Central River City and Western Parkland City. The plan discusses the need for creating conditions for a stronger economy. The proposal aligns with this vision by providing employment for skilled and specialised workers.

## 2.2.3 Central City District Plan

The *Central City District Plan* (Greater Sydney Commission, 2018b) is the 20-year plan for the implementation of the vision detailed in the Greater Sydney Region Plan. The Central City District includes the Blacktown, Cumberland, Parramatta and The Hills LGAs, with Greater Parramatta as its metropolitan centre. The Plan establishes key goals for the growth and development of the Central City District which align with the directions and objectives outlined in the Greater Sydney Region Plan (Greater Sydney Commission, 2018a).

The following goals are applicable to the proposal:

*C1. Planning for a city supported by infrastructure including new public transport services.*

The proposal would support the construction of Sydney Metro West, which is consistent with this aim.

*C11. Industrial and urban services land is planned and managed.*

The proposal supports this objective as it would utilise land for industrial services while providing employment opportunities. The proposal would also support economic development in the WSEA which has been identified as part of the district's industrial and urban services land supply.

## 2.2.4 Blacktown Local Strategic Planning Statement 2020

The *Blacktown Local Strategic Planning Statement (LSPS) 2020* (Blacktown City Council, 2020) provides a 20-year land use vision for Blacktown City, and directs how future growth and change will be managed. The *Blacktown LSPS* gives effect to the *Central City District Plan* outlined above.

The Blacktown LSPS supports the delivery of Sydney Metro and other transport services with a view of achieving a 30-minute city. The proposal would support the construction of Sydney Metro West which would bring direct, fast, and reliable public transport to enable access to education, employment, and other services.

The Blacktown LSPS also supports growing targeted industry sectors and maximising opportunities to attract advanced manufacturing in industrial land. The proposal would utilise land for industrial services while providing employment opportunities. The proposal is within the Mount Druitt Precinct as identified in the Blacktown LSPS. As noted above, the proposal is also within the WSEA, located to the south of the Mount Druitt Precinct. The proposal would therefore contribute to this major employment and industrial area by providing additional jobs in Western Sydney.

## 2.2.5 Our Blacktown 2036 – Draft Community Strategic Plan

The *Our Blacktown 2036 – Community Strategic Plan* (Blacktown City Council, 2017) reflects Blacktown City's growing population and the changing needs of the community. It incorporates the principles of social justice, ecologically sustainable development, and the quadruple bottom line (environmental, social, economic, and civic leadership considerations).

The Plan envisions a growing city supported by accessible infrastructure that meets the diverse needs of the growing community, including the provision of transport networks that connect the city of Blacktown for vehicle and non-vehicle users. The proposal is consistent with this aim as it would assist in the delivery of public transport infrastructure to improve connectivity and accessibility across Greater Sydney as the population grows.

A core element of the Plan is a smart and prosperous economy focused on creation of local jobs. The proposal would create around 120 construction jobs and around 120 jobs during operation.



## 2.3 Proposal objectives

The objectives of the proposal are to:

- Support the efficient delivery of construction works for Sydney Metro West through the provision of precast concrete segments to line tunnels
- Provide an approach to the production of precast segments which aligns with the delivery strategy for Sydney Metro West
- Be designed and managed to provide operational efficiencies and to appropriately mitigate impacts on the surrounding environment and local community.

*This page has intentionally been left blank*

## 3 Options development and selection

This chapter outlines the options considered as part of the proposal.

---

### 3.1 Identified options

Options considered to provide precast segments for Sydney Metro West included a 'do nothing' option or the establishment of new precast facilities. These options are discussed in the following sections.

#### 3.1.1 Option 1 – 'Do nothing'

The 'do nothing' option would involve using a single precast facility at Clyde (proposed as part of Stage 1 of the works for Sydney Metro West). The proposed facility at Clyde only has the capacity to support one independently operating precast facility and would not be able to meet the productivity requirements to support the Sydney Metro West delivery strategy identified during the detailed construction planning phase. As such, this option would not achieve the objectives of the proposal as it would not support the efficient delivery of construction works.

#### 3.1.2 Option 2 – Establish additional precast capacity within or adjacent to proposed Sydney Metro West construction sites

The proposed construction sites identified in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a) do not allow for capacity for the establishment of additional precast facilities. Establishing precast facilities on land adjacent to these construction sites would require additional property acquisition, likely to be the acquisition of private residential, commercial or industrial land.

The footprint of the precast facility within the existing site Clyde would not be able to be expanded as the remainder of site is required for other construction activities. Expansion of the site beyond the existing footprint at Clyde would require additional private property acquisition.

This option would meet the objectives of the proposal related to the efficient delivery of Sydney Metro West however it would result in unnecessary impacts associated with additional private property acquisition.

#### 3.1.3 Option 3 – Establish additional precast facilities at a new location

This option would involve constructing and operating two adjacent precast facilities in a suitably determined location (outside of the Sydney Metro West construction footprint). This option would allow the selection of a site with sufficient size to establish two separate precast facilities, to meet precast segment production requirements for Sydney Metro West. This option would also allow for the selection of government owned land, and avoid the need for acquisition of private residential, commercial or industrial land. Standalone facilities would also offer greater flexibility, as they would not be required to be decommissioned to allow future Sydney Metro West construction activities to commence in a timely manner.

Furthermore, the construction and operation of precast facilities outside of the Sydney Metro West construction footprint would offer the opportunity to support job creation and economic development across Greater Sydney.

Based on the above evaluation, Option 3 best meets the objectives of the proposal and was selected as the preferred option.

## 3.2 Proposal site selection

Once it was determined that a new site for precast facilities would be required, Sydney Metro undertook a search for potential sites to establish the proposal. Principles influencing the selection of the proposal site included:

- Availability of land to establish two precast facilities, with a preference for government-owned land, in order to minimise the need for private property acquisition and associated impacts, and land zoned for industrial uses
- Accessibility to the arterial road network from the site to enable efficient transportation of input materials and final precast products to minimise impacts to local roads
- Relative proximity to the proposed Sydney Metro West (i.e. within the Sydney Metropolitan area)
- Topography, proximity of adjacent infrastructure, and engineering requirements
- Minimal impact or capability to mitigate impacts to the environment including impacts to noise and visual sensitive receivers, traffic, biodiversity, and water and air quality.

Sydney Metro undertook a search of properties within NSW Government-owned land and properties available for sale of the necessary size to support the precast facilities. Private land which was already for sale was also considered in the search for a site, however resulted in limited options of the appropriate size and zoning for the precast facilities.

Sydney Metro identified a land holding (the proposal site) by the Office of Strategic Lands in the Blacktown LGA (which has since been acquired by Sydney Metro). The particular land holding on Lenore Drive in Eastern Creek (the proposal site) was determined to satisfy the above criteria and would be an ideal location for the new precast facility.

The proposal site was selected as the preferred location for the proposed precast facility as it is located relatively close to the Sydney Metro West construction sites and provides an adequate land parcel within an existing industrial zone. The proposal site was located on a government land holding, which avoided the need for private property acquisition and associated impacts. The proposal site is located along Lenore Drive which minimises requirements for road construction works and accommodates efficient vehicular access via arterial roads during construction and operation of the proposal. The site is located in close proximity to the M7 Motorway providing efficient access and egress with the ability to avoid residential areas. In addition, the proposal site is sufficiently separated from residential receivers, with the nearest residential receivers about 375 metres to the west. Ropes Creek and riparian vegetation provide a buffer between the site and the residential area thereby minimising potential amenity-related impacts associated with the construction and operation of the proposal.

Once the preferred site was selected, the indicative layout of the proposal was planned in response to the key ecological constraints on site, which include Ropes Creek at the western boundary of the proposal site and the associated riparian vegetation. An environmental protection area has been established in the south-west of the proposal site to provide an adequate buffer to avoid any ecological impacts on this riparian vegetation from the construction and operation of the proposal.

## 4 Statutory and planning considerations

This chapter outlines the relevant statutory requirements and explains the environmental planning and approvals process for the proposal. The environmental planning instruments relevant to the proposal are also outlined.

---

### 4.1 NSW Legislation and regulations

#### 4.1.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the main legislation regulating land use planning and development assessment in NSW.

The applicable planning approvals pathway for a development under the EP&A Act is generally dependent on the development's size, environmental impact and capital cost, as well as relevant planning provisions under other NSW legislation, including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs). Further discussion on SEPPs and LEPs likely to be applicable to the proposal is provided below. The main part of the EP&A Act that is relevant to the proposal that would be carried out by or on behalf of Sydney Metro is Part 5, which is discussed in the following section.

##### Part 5 of the EP&A Act

Part 5 of the EP&A Act applies to activities that are permissible without consent and are generally carried out by a public authority. Activities under Part 5 of the EP&A Act are assessed and determined by either a Minister or public authority – referred to as a determining authority. Sydney Metro is a public authority and is the proponent and determining authority of the proposed works.

The proposal comprises an 'activity' for the purposes of Part 5 of the EP&A Act by reason of clause 79 of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) (refer to Section 4.1.2).

As the determining authority for the purposes of Division 5.1 of Part 5 of the EP&A Act, Sydney Metro must:

- a. Examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity, in accordance with section 5.5 of the EP&A Act
- b. Consider whether or not the activity is likely to significantly affect the environment or is likely to significantly affect threatened species, populations and ecological communities.

Chapter 8 (Environmental impact assessment) of this REF assesses the likely effect of the proposal on the environment and threatened species, populations and ecological communities.

Clause 228 of the EP&A Regulation defines the factors which must be considered when assessing the likely impact of an activity on the environment under Part 5 of the EP&A Act. Appendix A specifically responds to the factors for consideration under clause 228. An environmental impact statement would be required for the proposal if Sydney Metro considers the proposal to be likely to significantly affect the environment, including critical habitat or threatened species, populations or ecological communities and their habitats.

Clause 228 of the EP&A Regulation contains a detailed list of factors that must be taken into account when assessing the impact of an activity on the environment. Where the only anticipated significant impacts relate to threatened species, population or ecological communities or their habitats or critical habitat, then a species impact statement may be prepared instead of an environmental impact statement.

The proposal is not likely to have significant impact on the environment including threatened species, populations or ecological communities or their habitats or critical habitat (refer to Section 8.11 (Biodiversity)); therefore neither an environmental impact statement nor species impact statement is required. In this situation a REF is typically prepared, hence the decision to prepare this document.

During the exhibition period, the community would be encouraged to make submissions to Sydney Metro on the proposal and information contained in the REF.

Following the exhibition period, Sydney Metro will consider issues raised in submissions and respond to community and stakeholder feedback. If required, Sydney Metro may also propose changes to the proposal. Documentation of any proposed changes to the proposal will be available to the public via the Sydney Metro website ([sydneymetro.info/west](http://sydneymetro.info/west)).

Following consideration of community and stakeholder feedback received during exhibition of the REF, Sydney Metro will determine whether to proceed with the proposal. If the proposal proceeds, it would be designed, constructed and operated in accordance with the mitigation measures outlined in this REF, any subsequent documents and any additional conditions.

The planning approvals process for the proposal under Division 5.1 of Part 5 the EP&A Act is outlined in Figure 4-1

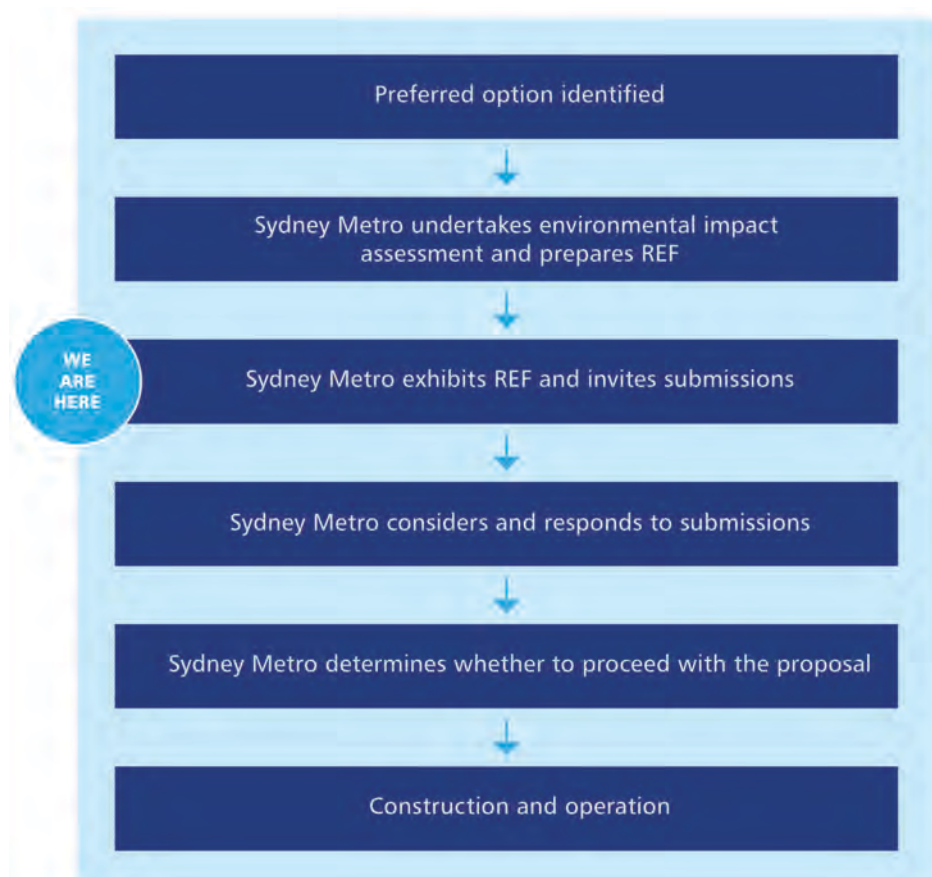


Figure 4-1: Planning approvals process for the proposal

### 4.1.2 State Environmental Planning Policy – Infrastructure 2007

ISEPP is the primary environmental planning instrument relevant to the proposal. One of the aims of the ISEPP is to provide a consistent planning framework for the delivery of infrastructure and the provision of services across NSW. Part 3 of the ISEPP identifies the development controls for certain types of infrastructure or services, including railways and road infrastructure facilities. The development controls specify the following planning categories:

- Development permissible without consent
- Development permissible with consent
- Exempt development
- Prohibited development
- Complying development.

Clause 79 clause 2(a)(v) of ISEPP outlines that temporary facilities for the management of railway construction that are in or adjacent to a rail corridor, are permissible without the need for development consent under Part 4 of the EP&A Act when undertaken by a public authority. Under clause 78, the proposal site is considered a rail corridor as it is land owned by a public authority (Sydney Metro) for the purpose of railway or rail infrastructure facilities (being Sydney Metro West). The proposal would support the construction of the proposed Sydney Metro West by producing precast concrete segments required for tunnelling works. By virtue of the above, the proposal is permissible without development consent.

Division 1 of Part 2 of ISEPP also contains provisions for public authorities to consult with local councils and other agencies prior to the commencement of certain types of development. Chapter 6 of this REF discusses the consultation requirements of ISEPP and their relevance to the proposal.

### 4.1.3 State Environmental Planning Policy No. 55 – Remediation of Land

*State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment.

Clause 7 of the SEPP 55 requires a consent authority to consider:

- Whether the land is contaminated
- Whether the land in its contaminated state would be suitable for carrying out of development as proposed
- If the land requires remediation to be suitable for the proposed development and is satisfied that the land will be remediated prior to being used for the proposed purpose.

The majority of works associated with the proposal would be superficial (or up to two metres below existing site levels), however there is potential to encounter contamination during excavation. Potential for contamination of soils and groundwater within/beneath the proposal site may be associated with current and historical activities and the possible inappropriate management of hazardous building materials in former structures adjacent to the proposal site.

A range of mitigation measures have been included to manage potential contamination during construction and operation of the proposal.

The potential for contamination, and mitigation measures, are discussed further in Section 8.10 (Contamination) of this REF.

### 4.1.4 State Environmental Planning Policy – 33 Hazardous and Offensive Development

*State Environmental Planning Policy – 33 Hazardous and Offensive Development* (SEPP 33) aims to ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact.

Potentially hazardous means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:

- To human health, life or property, or
- To the biophysical environment, and
- Includes a hazardous industry and a hazardous storage establishment.

The proposal includes the importation of aggregate and concrete batching for the construction of precast concrete segments. Based on the nature of the proposal and the mitigation measures to be implemented it is not considered to be a 'potentially hazardous industry' or 'potentially offensive industry' under SEPP 33.

Some dangerous goods would be stored on site including chemicals used in the manufacture of concrete, oils for lubrication of moulds and maintenance chemicals, oils, and lubricants for the plant. The quantities of all dangerous goods stored onsite would however be well below the SEPP 33 thresholds.

### 4.1.5 State Environmental Planning Policy (Western Sydney Employment Area) 2009

The proposal site is subject to the WSEA SEPP as shown in Figure 4-2.

The proposal is located within land zoned as IN1 – General Industrial under the WSEA SEPP.

The land use objectives of this zone include:

- To facilitate a wide range of employment-generating development including industrial, manufacturing, warehousing, storage and research uses and ancillary office space
- To encourage employment opportunities along motorway corridors, including the M7 and M4
- To minimise any adverse effect of industry on other land uses
- To facilitate road network links to the M7 and M4 Motorways
- To encourage a high standard of development that does not prejudice the sustainability of other enterprises or the environment
- To provide for small-scale local services such as commercial, retail and community facilities (including child-care facilities) that service or support the needs of employment-generating uses in the zone.

The proposal would be consistent with the above objectives for the following reasons:

- The proposal would encourage temporary employment opportunities during construction and operation of the precast facilities
- The operation of the proposal would be industrial in nature and therefore, would allow for the continuous growth and establishment of the industrial precinct where it is located
- The proposal has been designed with sufficient buffers and is adjacent to land zoned for industrial use. Therefore, with the implementation of adequate mitigation and management measures, the proposal is anticipated to have minimal environmental impacts as described in Chapter 8 (Environmental impact assessment) of this REF.

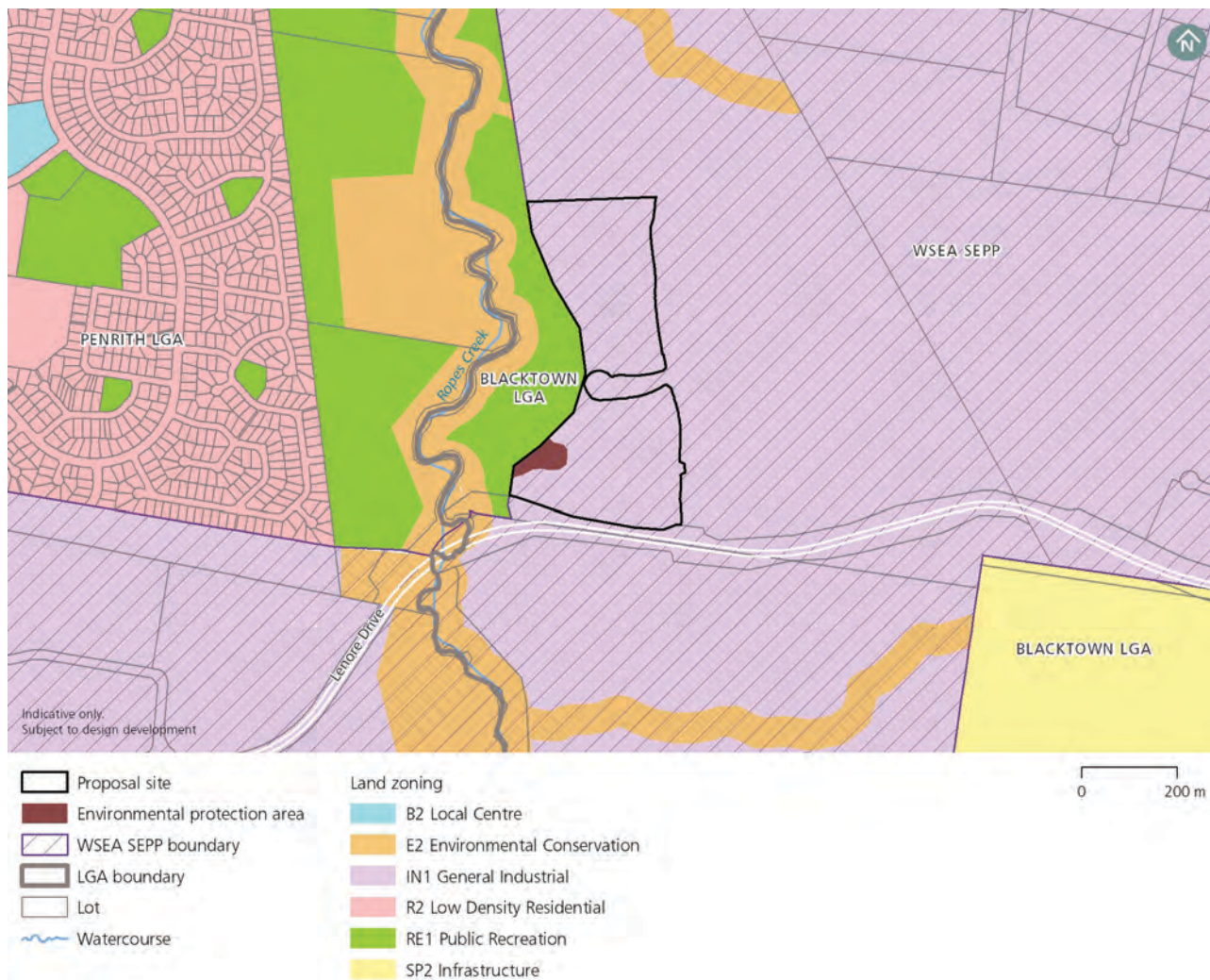


Figure 4-2: Land zoning map

#### 4.1.6 Local Environmental Plan

The proposal site is located within the Blacktown LGA. The operation of ISEPP however means that the LEP does not govern permissibility of the proposal. In addition, the provisions of the Blacktown LEP 2015 do not apply as the land is not included in the land application map and the WSEA SEPP includes both zoning and controls for the proposal site.



#### 4.1.7 Ropes Creek Precinct Draft Development Control Plan (Draft)

A Draft DCP was developed in November 2016 for the Ropes Creek Precinct (DPIE, 2016). The aim of this Draft DCP is to ensure the orderly and efficient development of the Ropes Creek Precinct as envisaged by the WSEA SEPP. The Ropes Creek Precinct, where the proposal site would be located, would be subject to a masterplan process. This masterplan would be developed in accordance with the controls established by the DCP.

The Draft DCP includes the following development controls relevant to the proposal:

- Built form and streetscape amenity
- Subdivision requirements
- Landscape design
- Traffic, parking and access
- Infrastructure services
- Environmental management.

Once the Draft DCP becomes effective it would provide the planning objectives and controls against which the consent authority will assess future Development Applications.

Key sections of the DCP that have been considered for the proposal include:

- **Built form and streetscape amenity** – Section 8.3 (Landscape and visual) and Appendix D (Landscape and Visual Impact Assessment)
- **Traffic, parking and access** – Section 8.2 (Traffic and transport) and Appendix C (Traffic and Transport Assessment)
- **Environmental management** – Section 8.7 (Flooding), Section 8.10 (Contamination), Appendix G (Hydrology and Flooding Technical Paper) and Appendix H (Preliminary Site Contamination Investigation).

#### 4.1.8 Other relevant NSW legislation

Table 4-1 provides an overview of other relevant NSW legislation that is potentially relevant to the proposal.

Table 4-1: Other relevant NSW legislation applicable to the proposal

NSW legislation	Requirements for the proposal
<b>Aboriginal Land Rights Act 1983</b>	The NSW <i>Aboriginal Land Rights Act 1983</i> applies to Crown lands that are not lawfully needed for an essential public purpose; referred to as claimable Crown land. No claimable Crown lands would be affected by the proposal.
<b>Biodiversity Conservation Act 2016</b>	The BC Act provides for the protection of threatened species, populations and ecological communities in NSW. If a threatened species, population or ecological community, or its habitat, is likely to occur in any area that may be affected by the proposal then an assessment of significance must be prepared to determine whether the proposal would have a significant impact. If it is concluded that there would be a significant impact, then Sydney Metro would be required to prepare a Biodiversity Development Assessment Report for approval by the Environment, Energy and Science Group of the Department of Planning, Industry and Environment (former NSW Office of Environment and Heritage). The proposal is unlikely to have a significant impact on any threatened species or community listed under the BC Act (refer to Section 8.11 (Biodiversity)). Therefore, the provisions of this Act would not influence how the proposal would be approved. The Act has been considered for completeness in accordance with the requirements under Part 5 of the EP&A Act.

NSW legislation	Requirements for the proposal
<b>Biosecurity Act 2015</b>	<p>The <i>Biosecurity Act 2015</i> and its subordinate legislation commenced on 1 July 2017. The <i>Biosecurity Act 2015</i> replaces wholly or in part 14 separate pieces of biosecurity related legislation including the <i>Noxious Weeds Act 1993</i>. Under the <i>Biosecurity Act 2015</i>, all plants, including weeds, 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.</p> <p>The <i>Biosecurity Act 2015</i> and regulations provide specific legal requirements for high risk activities and State level priority weeds. The State level priority weeds and associated legal requirements relevant to the region are outlined in the <i>Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022</i> (Greater Sydney Local Land Services, 2017) together with the high-risk priority weeds from the regional prioritisation process.</p> <p>As such, if present, priority weeds on the proposal site would be assessed and controlled to fulfil the General Biosecurity Duty and minimise biosecurity risks.</p> <p>Biosecurity risks are discussed further in Section 8.11 (Biodiversity).</p>
<b>Contaminated Land Management Act 1997</b>	<p>Section 60 of the <i>Contaminated Land Management Act 1997</i> (CLM Act) imposes a duty on landowners to notify the NSW Environment Protection Authority (EPA), and potentially investigate and remediate land if contamination is above EPA guideline levels.</p> <p>Given the proposed works are predominately surficial or up to two metres below existing site levels, contamination risk is considered manageable.</p> <p>Contamination is discussed further in Section 8.10 (Contamination) of this REF.</p>
<b>Crown Land Management Act 2016</b>	<p>The <i>Crown Land Management Act 2016</i> sets out requirements for the management of Crown land in NSW. Crown land is land owned by the State Government for the people of NSW under the care and control of the Minister for Lands. The proposal would not impact on Crown land.</p>
<b>Heritage Act 1977</b>	<p>The NSW <i>Heritage Act 1977</i> (Heritage Act) provides protection for items of 'environmental heritage' in NSW. Items considered to be significant to the State are listed on the State Heritage Register and cannot be demolished, altered, moved or damaged, or their significance altered without approval from the Heritage Council of NSW.</p> <p>The State Heritage Register was established under section 22 of the Heritage Act and is a list of places and objects of particular importance to the people of NSW, including archaeological sites.</p> <p>Sections 139 to 145 of the Heritage Act prevent the excavation or disturbance of land known or likely to contain relics, unless in accordance with an excavation permit. There are no listed items of heritage significance identified within the proposal site. Refer to Section 8.6 (Non-Aboriginal heritage) and Section 8.7 (Aboriginal heritage) for further information regarding impacts to heritage items.</p>
<b>National Parks and Wildlife Act 1974</b>	<p>Sections 86, 87 and 90 of the <i>National Parks and Wildlife Act 1974</i> require consent from the Department of Premier and Cabinet (DPC) for the destruction or damage of Aboriginal objects. There are no gazetted Aboriginal Places in the proposal site however there are ten Aboriginal sites within the proposal site that the proposal is likely to impact. Therefore, an Aboriginal Heritage Impact Permit (AHIP) is required under section 90 of this Act. Refer to Section 8.7 (Aboriginal heritage) for further information including mitigation measures to manage the impacts.</p>
<b>Native Title (New South Wales) Act 1994</b>	<p>This Act provides for native title in relation to land or waters. No Native Title Claims within the proposal site were identified therefore the proposal would not affect land subject to native title or to which an Indigenous Land Use Agreement applies.</p>

NSW legislation	Requirements for the proposal
<b>Protection of the Environment Operations Act 1997</b>	<p>The <i>Protection of the Environment Operations Act 1997</i> (POEO Act) administers environment protection licences (EPLs) for specific activities relating to air, water and noise pollution, and waste management. The NSW EPA and local government, where relevant, administer the POEO Act.</p> <p>Development activities require an EPL under the POEO Act if those activities meet the assessment criteria outlined in Schedule 1 of the Act. As per Schedule 1 of the POEO Act, an EPL would be required if the annual production of concrete products exceeds 30,000 tonnes per annum threshold. As the processing capacity of the proposal would be about 266,450 tonnes per annum, the proposal would meet the definition of a scheduled activity under Schedule 1 and an environment protection licence(s) would be required.</p> <p>In addition, the POEO Act would require construction to be managed to prevent and avoid the potential to cause water, noise and/or air pollution. The Act also includes requirements in relation to the management of waste.</p> <p>This would be achieved through implementing the mitigation and management measures identified in Chapter 9 (Environmental management). Notification to the EPA would also be required (as the administrators of this Act) in instances where any pollution incident has the potential to cause or threaten material harm to the environment (refer to section 148 of the Act).</p>
<b>Roads Act 1993</b>	<p>In accordance with section 138 of the <i>Roads Act 1993</i>, consent from Transport for NSW would be required for the carrying out of work in, on or over a classified road.</p> <p>For works on unclassified roads, Clause 5 of Schedule 2 of the Act provides that a public authority is not required to obtain a road authority's consent.</p> <p>The proposal would not include carrying out work in, on or over a classified road therefore consent from Transport for NSW would not be required.</p>
<b>Waste Avoidance and Resource Recovery Act 2001</b>	<p>The purpose of the <i>Waste Avoidance and Resource Recovery Act 2001</i> is to develop and support the implementation of regional and local programs to meet the outcomes of a State-wide strategy for waste avoidance and resource recovery. It also aims to 'minimise the consumption of natural resources and final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste'.</p> <p>Waste generation and disposal reporting would be carried out during the construction and operation of the proposal. Procedures would be implemented in an attempt to promote the objectives of the Act.</p> <p>Waste and resource management is further discussed in Section 8.12 (Waste and resource management).</p>
<b>Water Act 1912 and Water Management Act 2000</b>	<p>The <i>Water Act 1912</i> and the <i>Water Management Act 2000</i> (WM Act) are the two key pieces of legislation for the management of water in NSW and contain provisions for the licensing of water access and use. Groundwater extraction or extraction from Ropes Creek is not expected to occur and approvals under the WM Act would not be required.</p>
<b>Fisheries Management Act 1994</b>	<p>The <i>Fisheries Management Act 1994</i> provides for the protection of threatened fish and marine vegetation and aims to conserve, develop and share fishery resources and conserve marine species, habitats and diversity.</p> <p>The proposal would not involve explosives, obstruct fish passage or require any dredging or reclamation works.</p>
<b>Rural Fires Act 1997</b>	<p>The <i>Rural Fires Act 1997</i> makes provision for the prevention, mitigation and suppression of bush and other fires in LGAs of NSW and rural fire districts.</p> <p>Section 52 of this Act requires Bushfire Management Committees to prepare Bushfire Risk Management Plans across a fire district. The proposal site is within the Cumberland Bushfire Risk Management Plan area, which has been reviewed as part of the bushfire assessment in Section 8.14 (Bushfire).</p> <p>Section 63 of this Act establishes the duties of public authorities and owners and occupiers of land to prevent bushfires. As noted in Section 8.14 (Bushfire), the proposal would implement ongoing bushfire management measures to mitigate potential bushfire risk in the proposal site.</p>

## 4.2 Commonwealth legislation

### 4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as ‘matters of national environmental significance’.

Under the EPBC Act, a referral to the Commonwealth Department of Agriculture, Water and the Environment is required for proposed ‘actions’ that have the potential to significantly impact on any matter of national environmental significance, the environment in general, or the environment of Commonwealth land (including leased land).

An action may include a project, development, undertaking, activity, or series of activities. If the Commonwealth Minister for Environment determines that an approval is required under the EPBC Act, the proposed action is deemed to be a ‘controlled action’. It must then undergo assessment and approval under the EPBC Act before the action is carried out. The Act provides that a proponent of an action that may be, or is, a controlled action must refer the proposal to the Commonwealth Minister for the Commonwealth Minister’s decision as to whether or not the action is a controlled action.

One threatened ecological community was identified within the proposal site: Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (listed as critically endangered under the EPBC Act). In addition, three threatened animal species listed under the EPBC Act are considered moderately likely to occur in the proposal site, including the Green and Golden Bell Frog (listed as endangered under the EPBC Act), the Swift Parrot (listed as critically endangered under the EPBC Act) and the Grey-headed Flying-fox (listed as vulnerable under the EPBC Act).

As noted in Section 8.11 (Biodiversity), the proposal may result in partial clearing (<0.001 hectares) of the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community. In addition, the proposal would result in a minor reduction in extent of suitable foraging habitat for the Green and Golden Bell Frog, Swift Parrot and Grey-headed Flying-fox. However, the EPBC Act assessments of significance indicate that there is a high level of certainty that the impacts to threatened biodiversity for any Matter of National Environmental Significance are unlikely to be significant and an EPBC Act referral is not required. Refer to Appendix I (Biodiversity Assessment Report) and Section 8.11 (Biodiversity) for further information.

An EPBC search identified three Commonwealth land parcels within a one kilometre radius of the proposal site: a Director War Services Home, Telstra Corporation Limited and an unnamed site. Whilst the EPBC search tool does not explicitly identify the location of the sites, the site is not Commonwealth Land therefore the identified Commonwealth Land parcels are outside of the proposal site. The assessment provided in Chapter 8 (Environmental impact assessment) of this REF identified that there would not be a significant impact on any land, including land beyond the proposal site. In this regard the proposal would not have an impact on Commonwealth land.

### 4.3 Summary of statutory requirements

A summary of the potential licences, permits, approvals and notifications that may be required for the construction, maintenance and operation of the proposal are outlined in Table 4-2.

Table 4-2: Summary of potential licences, permits and approvals

Legislation	Authority	Requirement	Comment
<b>EP&amp;A Act</b>	Sydney Metro	Consideration: clause 79 of the Infrastructure SEPP outlines that development for the purpose of railways and railway infrastructure facilities which are permissible without the need for development consent under Part 4 of the EP&A Act when undertaken by a public authority.	This REF has been prepared to meet the assessment requirements under Part 5 of the EP&A Act.
<b>EP&amp;A Regulation</b>	Sydney Metro	Consideration: under clause 228, the factors to be taken into account concerning the impact of an activity on the environment, and the 'Is an EIS required?' guideline (Department of Urban Affairs and Planning, 1999).	This REF has considered factors under Clause 228 in Appendix A.
<b>National Parks and Wildlife Act 1974</b>	DPC	Application: an application must be sought for an AHIP under Section 90 of the <i>National Parks and Wildlife Act 1974</i> Act in order to undertake a proposed activity which is likely to involve harm to an Aboriginal Place or object,	An application for an AHIP would be required for areas within the proposal site that contain the ten AHIMS sites (one site ID pending) under section 90 of the <i>National Parks and Wildlife Act 1974</i> .
<b>Protection of the Environment Operations Act 1997 (POEO Act)</b>	EPA	Licence: an application for an EPL(s) would be required as the processing capacity of the proposal would be about 266,450 tonnes per annum, therefore the proposal would meet the definition of a scheduled activity under Schedule 1, Clause 13 (Concrete works) of the POEO Act and an EPL(s) would be required.	An application for an EPL(s) would be required as the proposal is considered as a scheduled activity under Schedule 1, Clause 13 (Concrete works) of the POEO Act.

*This page has intentionally been left blank*

# 5 Description of the proposal

The key construction and operational components of the proposal are described in this chapter.

---

## 5.1 Proposed works

The proposal consists of the construction and operation of two separate and adjacent precast concrete segment facilities to support the construction of metro tunnels for the proposed Sydney Metro West. Each facility would manufacture precast concrete segments for the purpose of lining the Sydney Metro West tunnels and would be able to be operated independently of each other by different tunnelling contractors. The proposal site would be about 16 hectares in size.

Key features of the proposal are shown in Figure 5-1.

The proposal would comprise the following key features and activities:

- Site preparation consisting of:
  - Vegetation clearing, including the removal of about two hectares of native vegetation
  - Site remediation
  - Connection of utilities (e.g. power, water, sewerage, gas and communications)
  - Earthworks to level the site (this may involve the use of retaining walls)
  - Installation of lighting and signage
- Construction and operation of two adjacent precast facilities, a northern and a southern precast facility, each being sited on about eight hectares. Each precast facility would encompass the following:
  - A double-sided casting carousel
  - Segment storage
  - A concrete batching plant (inside shed with a height of around eight metres)
  - Boiler, aggregate bins and consumables
  - A laydown/hardstand area
  - Offices and site amenities
  - Loading and unloading and circulation space for heavy vehicles
  - On-site parking for up to 60 light vehicles
- Internal roads (one lane each direction) generally around the key operational areas of the facility with entrances to each facility from the Western Access Road located between the northern and southern precast facilities
- Landscaping works along the frontage to Lenore Drive and about 50 metres north along Archbold Road.

The proposal would be temporary, operating for an approximate timeframe of four to five years, subject to the delivery strategy and construction program for Sydney Metro West. The future use of the site beyond the operation of the proposal would be determined by Sydney Metro and would be subject to separate approvals, as required. If no future use of the site is proposed at that time, the site would be placed into care and maintenance.

The proposal site would be subdivided to create two separate lots, one for each precast facility.

The proposal does not include the construction of the surrounding road network (planned Archbold Road upgrade and extension and the construction of the Western Access Road), which would be undertaken by other parts of Transport for NSW under a separate approval (refer to Section 1.2.3).

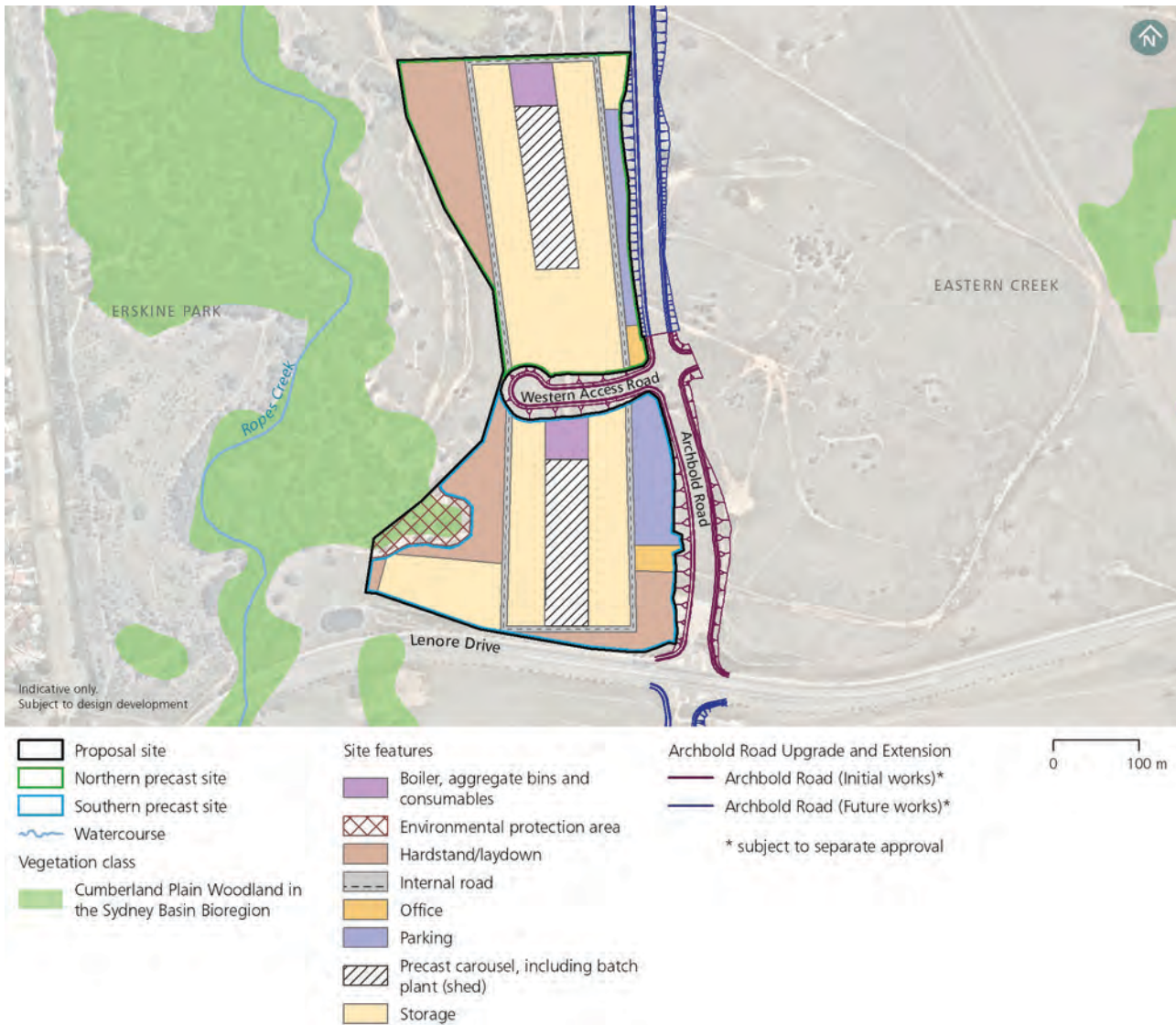


Figure 5-1: Indicative site layout

## 5.2 Construction

Construction of the proposal would comprise the key stages and activities outlined in Table 5-1. These stages would not necessarily be sequential and may be undertaken concurrently subject to the contractors' requirements.

It is expected that the southern precast facility would commence construction first, with some overlap in the construction of both facilities. Concurrent construction of the precast facilities has been assumed for the environmental impact assessment of the proposal (Chapter 8 (Environmental impact assessment)), to provide a conservative assessment of impacts.



Table 5-1: Proposed indicative construction stages

Construction stage	Description
<b>Stage A: Site establishment</b>	<p>The following works would be required to establish the proposal site:</p> <ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Installation of erosion and sediment controls and undertaking water management works</li> <li>• Remediation</li> <li>• Earthworks / levelling and creation of building and storage pads</li> <li>• Utilities connections</li> <li>• Transporting materials and equipment to the site</li> <li>• Establishment of temporary fencing around the proposal site and temporary roads/site access, which may include a temporary haul route during construction of the planned Archbold Road upgrade and extension</li> <li>• Installation of temporary construction compound, including amenities and offices.</li> </ul>
<b>Stage B: Civil and building work</b>	<ul style="list-style-type: none"> <li>• Establishment of internal roads, access and egress and car parking</li> <li>• Construction/establishment of key built form including: <ul style="list-style-type: none"> <li>• Hardstand/lay down and storage areas</li> <li>• Aggregate bins and cement silos</li> <li>• Sheds (production facilities and batch plant) - including internal assembly of batch plant facilities and boiler</li> <li>• Gantry cranes</li> <li>• Site offices.</li> </ul> </li> </ul>
<b>Stage C: Commissioning</b>	<ul style="list-style-type: none"> <li>• Decommissioning/demobilisation of the construction area</li> <li>• Fit-out of production facilities and batch plant</li> <li>• Testing and commissioning of operational facilities</li> <li>• Landscaping.</li> </ul>

## 5.2.1 Site establishment

### Preliminary works

The full extent of the proposal site would be cleared with the exception of the environmental protection area in the south-western portion of the proposal site (refer to Figure 5-1).

Installation and connection of essential services would be undertaken during site establishment to service the site amenities, including water and sewerage, power, natural gas and communications. The proposal site layout has been designed to minimise the need for vegetation clearing, including through the establishment of an environmental protection area where riparian vegetation would be retained and protected. Vegetation clearing would include the removal of about two hectares of native vegetation, however much of this is of poor quality. Further detail on impacts to native vegetation is included in Section 8.11 (Biodiversity).

### Temporary construction compounds

Temporary construction compounds to provide site offices, worker amenities and parking would be established for the duration of construction. These would generally be situated in the same location as the operational site offices (refer to Figure 5-1).

### Earthworks

Earthworks would be required to level the proposal site (up to a depth of about two metres) to provide a level surface for plant and vehicle movements, level pads for built form, storage areas, hardstand/laydown areas and internal roads for both facilities. In some locations, retaining walls may also be required. The extent of levelling required for the proposal is indicative and would be confirmed at detailed design. Indicative earthworks volumes are provided in Table 5-2.

Table 5-2: Indicative earthworks volumes

Type	Indicative volume (m <sup>3</sup> )
Total cut	11,500
Total fill	141,500
Imported fill	130,000

### 5.2.2 Civil and building work

Sealed internal access roads and car parking areas would be established.

Sealed and graded laydown and storage areas would also be established (refer to Figure 5-1). Earthworks pads would be constructed for the construction of the sheds.

### 5.2.3 Commissioning

Commissioning of the proposal would include:

- Fitting out of the production facilities, installation of utilities and establishment of warehouses
- Line marking, lighting and signposting
- Testing and commissioning of the equipment
- Finishing works including landscaping and site rehabilitation, where required.

Landscaping design and locations would be determined during detailed design. Landscaping associated with the proposal would likely include vegetation along the Lenore Drive frontage. This landscaping would likely include a mix of native shrub species endemic to the area and turfed areas that would provide visual relief from the industrial appearance of the precast facilities.

### 5.2.4 Construction program

Construction is proposed to commence in early 2021 and be completed by the end of 2022, however the timing of construction of the two precast facilities at the proposal site would depend on the final delivery strategy of Sydney Metro West and the construction contractors' requirements. The total duration of construction is anticipated to be around 20 months.

### 5.2.5 Construction workforce

The peak workforce during the construction of the proposal is anticipated to be up to about 60 workers at each separate facility at the proposal site (about 120 in total).

### 5.2.6 Construction plant and equipment

Indicative plant and equipment required during site establishment, civil and building and commissioning would include:

- Light vehicles
- Forklift (10 tonne)
- Delivery trucks
- Scissor lift
- Compressor
- Generators
- External form vibrators
- Hydraulic pump
- Weld sets
- Gantry cranes
- Truck pump
- Water cart
- Excavators
- Graders
- Paving machine
- Concrete mixer truck
- Crane (35 tonne)
- Roller.

Additional plant and equipment to that identified above may be needed. The requirement for additional equipment would be determined by the construction contractors.

### 5.2.7 Resources, materials and sourcing

The type and quantities of resources and materials needed to construct the proposal are relatively minor and readily available within Sydney. Materials required to construct the proposal would be sourced from the surrounding metropolitan area and would include:

- About 130,000 cubic metres fill deficit
- Materials for concrete hardstand areas e.g. aggregate, sand and water
- Potable water which would be connected during site establishment works
- Water to be used for construction.

Materials would be transferred to the construction site by road, primarily along the connecting motorway network.

Sydney Metro's sustainable procurement policy requirements aim to procure material locally, contain a high recycled content and a low embodied energy. Materials that are cost and performance competitive and comparable in environmental performance would be obtained.

### 5.2.8 Waste

All generated waste would be appropriately stored and separated to maximise recycling volumes. Storage would be within the proposal footprint prior to its transfer off-site. Waste volumes associated with the proposal are anticipated to be minor. The likely waste materials that would be generated during construction comprise:

- Concrete
- Asphalt
- Green waste (from removing and pruning trees and vegetation)
- Surplus building material
- Spoil, such as excavated natural material, general solid waste, special waste, restricted solid waste, and/or hazardous waste
- Sediments
- General office waste (including sewerage and grey water)
- Domestic waste from personnel (including food scraps, glass and plastic bottles, paper and plastic containers).

The waste would be transported from the construction site to an appropriately licenced facility. The location where the waste would be transferred for reuse, reprocessing or disposal would depend on its nature, type and classification. The approach to waste management is further detailed in Section 8.13 (Resource use and waste management).

There is potential for contaminated waste to be encountered during construction at the proposal site during surficial excavations. Any required testing and classification would take place on-site. The potential for contamination is discussed further in Section 8.10 (Contamination).

### 5.2.9 Traffic management, haul routes and access

Traffic management and access measures would be developed during detailed design and implemented in accordance with the Sydney Metro Construction Traffic Management Framework (refer to Section 8.2 (Traffic and transport)).

During the construction period the following indicative vehicle numbers are anticipated during standard construction hours for each precast facility:

- Eleven light vehicles per hour
- Ten heavy vehicles per hour.

Temporary traffic management controls would be implemented to allow trucks and heavy vehicles to safely enter and exit the proposal site.

A temporary haul road would be established for site access prior to completion of Archbold Road works. Site access and egress to and from the construction site would be left-in, right-out of the site via a new intersection.

The haulage route is anticipated to occur to the east of the proposal site along the following route:

- From the proposal site to the upgraded and extended Archbold Road (subject to separate approval by Transport for NSW) to Lenore Drive or to the temporary haulage route prior to the completion of Archbold Road
- Lenore Drive to Old Wallgrove Road
- Old Wallgrove Road to Wallgrove Road
- Old Wallgrove Road to Westlink M7.

No haulage routes are anticipated to travel west of the proposal site.

Parking for construction workers would be provided within the proposal site adjacent to the construction compound, generally in the same location shown as the parking area on the operational layout (refer to Figure 5-1).

### 5.2.10 Water management

The following construction water management infrastructure would be included as part of the proposal:

- Sediment basins installed at various locations around the proposal site
- Installation of diversion drains to ensure external 'clean' runoff does not enter and mix with site runoff, and internal 'dirty' runoff is conveyed to the proposed sediment basin for treatment.

### 5.2.11 Utilities

Utilities installation across the proposal site and in the immediate surrounds would be completed as part of the proposal.

The proposed utility connections include:

- Connection to power supply at Old Wallgrove Road
- Sewerage to an existing line running along the western boundary of the proposal site
- Water, natural gas and communications at street frontage.

### 5.2.12 Hours of work

The NSW Interim Construction Noise Guideline 2009 (ICNG) (NSW EPA, 2009) has identified 'recommended standard hours for construction work'. They have been established to preserve the local amenity of an area at certain times depending on the surrounding land use.

Construction works would generally be scheduled during standard construction hours, namely:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturday
- No work on Sundays or during public holidays.

Other activities that may be carried out outside of the standard daytime construction hours would include:

- Work determined to comply with the relevant noise management level at the nearest sensitive receiver
- The delivery of materials outside approved hours as required by the NSW Police or other authorities for safety reasons
- Emergency situations where it is required to avoid the loss of lives and properties and/or to prevent environmental harm
- Situations where agreement is reached with affected receivers.

No other out-of-hours works are anticipated as part of the proposal. If out-of-hours works are required, Sydney Metro would follow the ICNG and Sydney Metro Construction Noise and Vibration Standard and obtain any necessary approvals.

## 5.3 Operation and maintenance

### 5.3.1 Built form

The proposed built form that would be constructed at each of the two separate precast facilities at the proposal site would include:

- Aggregate bins enclosed on three sides including a roof structure, with a height of about four metres
- A shed (approximately 10,000 square metres footprint) with a height of about eight metres
- Concrete batch plant with silos at a height of about eight metres to contain adequate volumes of cement product
- Containerised boilers
- About six mobile gantry cranes at each facility up to 10 metres in height (electric and controlled remotely with control panels)
- Demountable-type site offices
- Water management infrastructure including rainwater tanks to capture rainwater from sheds, appropriate on-site stormwater and flood detention facilities, and a water recycling facility.

### 5.3.2 Operation

It is anticipated that the southern precast facility would start operating from around mid-2022 and the northern precast facility from around late-2022. The facilities would operate during the construction of the metro tunnels as part of Sydney Metro West. Based on the current delivery strategy, the precast facilities subject to this proposal are expected to operate for a period of around four to five years. To provide a conservative assessment, this impact assessment assumes that both of these precast facilities are operating concurrently, however there may be periods when only one precast facility is required.

Once operational, the proposal would produce precast tunnel lining segments to be transported to the Sydney Metro West tunnelling support sites. Figure 5-2 shows the key steps and locations of the processes that would take place during the operation of the precast facilities. These steps are described below with the numbers corresponding with steps shown in Figure 5-2.

Based on the process for precast facilities on previous Sydney Metro projects, the key operational processes to produce and transport precast tunnel lining segments would likely include:

1. Daily delivery of raw materials to the proposal site including sand, aggregate, cement products and steel/fibre reinforcement to storage locations
2. Storage of raw materials in aggregate bins and cement silos
3. Transfer of raw materials with front end loader to loading conveyors and hoppers to the batching plant
4. Mixing of raw materials and transport of fresh concrete mix via loading conveyor hoppers to buckets
5. Pouring of concrete mix into steel mould for compaction. Mould would then travel through the curing chambers
6. Removal of segments from mould with a vacuum lifter attached to a crane
7. Storage of segments inside shed for appropriate quality checks and identification
8. Transportation of completed segments outside to hardstand/laydown areas for stockpiling
9. Loading of segments onto delivery vehicles via gantry cranes for delivery to Sydney Metro West tunnelling support sites.

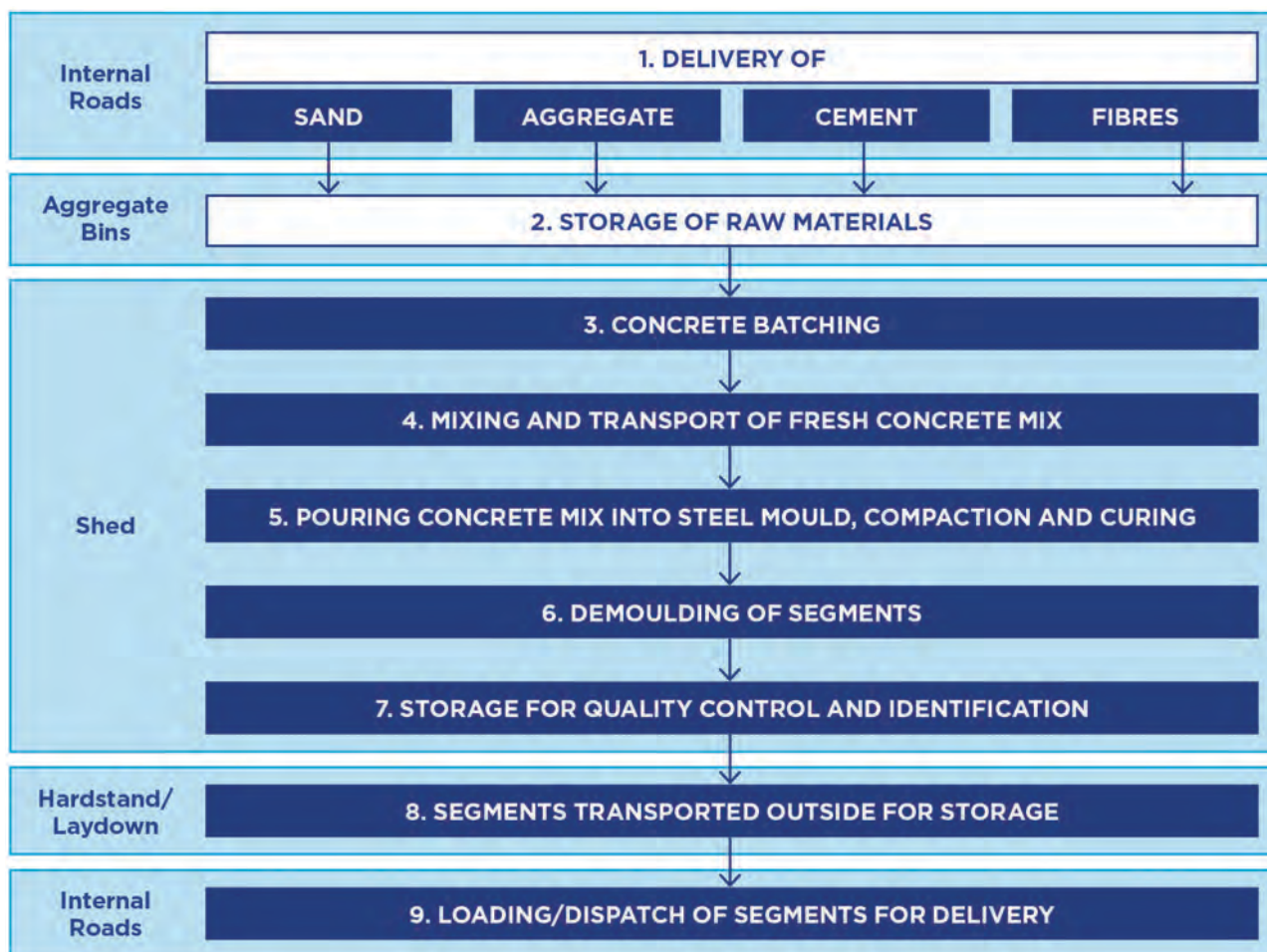


Figure 5-2: Operational process of precast facilities

To meet the demand for Sydney Metro West tunnelling requirements, the precast facilities would have a capacity to produce 730 tonnes of concrete per day and would operate up to 24 hours per day and seven days per week.

### 5.3.3 Operational workforce

The total operational workforce would be around 120 personnel (60 for each facility) on the proposal site at any one time. Indicative shift times are as follows:

- Day shift from 7.00 am to 5.00 pm
- Night shift from 7.00 pm to 5.00 am.

There would generally be a two-hour window between shifts for handover, and one day per week scheduled for maintenance.

### 5.3.4 Traffic management

During operations, raw materials would be delivered to the proposal site and the precast segment products transported from the proposal site. The haulage route is anticipated to occur to the east of the proposal site along the following route:

- From the proposal site to the upgraded and extended Archbold Road (subject to separate approval by others) to Lenore Drive
- Lenore Drive to Old Wallgrove Road
- Old Wallgrove Road to Wallgrove Road
- Old Wallgrove Road to Westlink M7.

No haulage routes are anticipated to travel west of the proposal site.

It is expected that the workforce would travel to and from the proposal site via light vehicles with parking provided on site. Indicative operational vehicle movements are outlined in Table 5-3.

Table 5-3: Indicative operational vehicle movements

Time of the day	Heavy vehicles (indicative maximum per hour)	Light vehicles (indicative maximum per hour, not including staff)	Light vehicles – staff (indicative maximum based on shift change times)
Day (7am – 6pm)	12	8	120 (7am and 5pm)
Evening (6pm – 10pm)	6	5	120 (7pm)
Night (10pm – 7am)	6	5	120 (5am)

### 5.3.5 Operational ancillary infrastructure

Key operational ancillary infrastructure is outlined in Table 5-4.

Table 5-4: Operational ancillary infrastructure

Item	Description
<b>Lighting</b>	Lighting would be provided throughout the operational footprint to allow for 24-hour operations. The lighting specification would be confirmed at detailed design. However, it is envisaged that lighting would comprise directional flood lighting tilted to focus on the operational areas included within each precast facility and storage areas, lighting attached to the external shed walls, and street lighting along internal roads.
<b>Signage</b>	The exact location, size and types of signage would be determined during detailed design. However, it is envisaged that illuminated signs would be located at relevant locations for the purposes of wayfinding and access to/from each precast facility, sheds and storage areas. A business identification sign would likely be located at the proposal site entrance. Additional signage necessary for the operation of the proposal (e.g. operational guidance) may also be included within the site.
<b>Fencing</b>	Security fencing would be installed along the boundaries of the proposal site.

### 5.3.6 Maintenance

The precast facilities would be placed on a routine cleaning, inspection and maintenance schedule that would be undertaken periodically throughout the operation of the proposal. Maintenance and service vehicles would park in designated parking areas at each precast facility. As noted in Section 5.3.3, a two-hour handover window would be provided between shift times, and one day per week scheduled for maintenance.

## 5.4 Property acquisition

A total of about 16 hectares of land would be needed to construct the proposal. No property acquisition would be required as Sydney Metro is the landowner.

The proposal site would be subdivided to create two separate lots, one for each precast facility.

*This page has intentionally been left blank*



## 6 Stakeholder and community consultation

This chapter summarises the planned community and stakeholder engagement activities to be undertaken to support the REF exhibition and construction phase. The REF exhibition period will include targeted consultation to provide an opportunity for stakeholders and the community to provide feedback on the proposal.

### 6.1 Consultation objectives

A communications and consultation strategy would guide and describe the key activities that would take place to inform and engage with the local community and key stakeholders across the proposal's lifecycle. The approach to stakeholder and community consultation for the proposal includes:

- Implementing a communication and engagement plan that supports the REF program
- Informing the community and other stakeholders by providing clear, factual and timely information about planned construction and operational work and its associated environmental and social impacts
- Providing a mechanism for prompt issues resolution
- Providing adequate opportunities for community members and other stakeholders to provide feedback
- Ensuring coordinated communications with other relevant government agencies and stakeholders.

This REF will be exhibited for a three-week period commencing in November 2020. Through this process the community and stakeholders will be invited to make submissions, raise issues, seek clarification or ask questions about any aspect of the proposal. All issues that are raised will be considered by Sydney Metro. Where required, community updates would be provided online and delivered to local residents.

### 6.2 Statutory notification requirements

#### 6.2.1 Infrastructure SEPP notification

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to commencing work that would affect various infrastructure. A summary of the ISEPP consultation requirements is detailed below in Table 6-1.

Table 6-1: ISEPP consultation requirements

Consultation required under clauses 13-16 of ISEPP	Relevant agency	Is consultation required?
Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	Blacktown City Council	No. The proposal would not be connected to a council owned stormwater management system.
Are the works likely to generate traffic to an extent that will strain the existing road system in a LGA?	Blacktown City Council	No. The proposal would represent a negligible increase in traffic generation and therefore would not strain the existing road system in the locality.
Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	Blacktown City Council	No. The proposal would not be connected to a council owned sewerage system.
Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	Blacktown City Council	No. The proposal would be connected to a Sydney Water owned potable water main on Lenore Drive and would not be connected to a Council owned water supply system.

Consultation required under clauses 13-16 of ISEPP	Relevant agency	Is consultation required?
Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	Blacktown City Council	No. The proposal would not involve works on a public place which is under local council management or control.
Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Blacktown City Council	No. No roads or footpaths within and around the proposal site would require excavation as part of the proposal.
Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than minor or inconsequential?	Blacktown City Council	No. There are no listed items of heritage significance identified within the proposal site and immediate surrounds.  In addition, the proposal site is not within a heritage conservation area.
Are the works located on flood liable land? If so, will the works change flooding patterns to a more than minor extent?	Blacktown City Council, NSW State Emergency Service	No. The majority of the proposal site is located outside flood liable land and therefore, the proposal would not impact flooding patterns more than a minor extent.
Are the works adjacent to a national park, nature reserve or other area reserved under the <i>National Parks and Wildlife Act 1974</i> ?	DPIE- Environment, Energy and Science Group	No. The proposal site is not located adjacent to a national park or nature reserve. The closest nature reserve is the Prospect Nature Reserve and Prospect Reservoir located about 5 km east of the proposal site.
Development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone?	DPIE - Environment, Energy and Science Group	No. The proposal site is located within an industrial zone (IN1 General Industrial) under the WSEA SEPP.
Are the works adjacent to a declared aquatic reserve or marine park under the <i>Marine Estate Management Act 2014</i> ?	DPIE	No. There are no aquatic reserves or marine parks within the proposal site or surrounds.
Are the works in the foreshore area as defined by the <i>Place Management NSW Act 1998</i> (formerly known as <i>Sydney Harbour Foreshore Authority Act 1998</i> )?	DPIE - Housing and Property (former Property NSW)	No. The proposal site is not within the foreshore area.
Do the works involve the development of a fixed or floating structure in or over navigable waters?	Transport for NSW	No. The proposal does not involve any works in or over navigable waters.
Are the works for the purpose of residential development, as educational establishment, a health services facility, a correctional facility or group home in an area that is bush fire prone land?	NSW Rural Fire Services	No. The proposal is a temporary facility for the management of railway construction.

Based on the above considerations, notification to public authorities under the ISEPP would not be required.

### 6.3 Aboriginal community involvement

Aboriginal stakeholder consultation has been undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (NSW Department of Environment, Climate Change and Water (DECCW), 2010). This consultation process and the received feedback have been documented as part of the Archaeological Survey Report (Appendix F) to support the proposal.

The Deerubbin Local Aboriginal Land Council were consulted as part of the ongoing Aboriginal consultation process for the proposal, given that the proposal site may contain Aboriginal cultural heritage and archaeological sites. Further detail is provided in Section 8.5 (Aboriginal heritage) of this REF.

Further consultation is anticipated to be undertaken separately, through the preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) and associated test excavations. This consultation would be documented within the ACHAR, as these activities are to be undertaken separate to the REF preparation.

### 6.4 Consultation during REF exhibition

#### 6.4.1 Consultation activities proposed during public exhibition

The REF will be placed on public exhibition for three weeks commencing in November 2020. During this period, written submissions will be accepted for consideration. The REF will be displayed online at [sydneymetro.info](http://sydneymetro.info) and exhibited at St Clair Library and Blacktown City Council Chambers.

Community members and stakeholders are invited to submit their feedback on the proposal to Sydney Metro by:

- Emailing: [sydneymetrowest@transport.nsw.gov.au](mailto:sydneymetrowest@transport.nsw.gov.au) or
- Writing to Sydney Metro, PO Box K659, Haymarket NSW 1240 and should be clearly marked 'Comments on Sydney Metro West Eastern Creek Precast Facilities Review of Environmental Factors'.

During the exhibition period, community members and stakeholders can direct any enquiries to Sydney Metro:

- Enquiries phone line: 1800 612 173
- Email: [sydneymetrowest@transport.nsw.gov.au](mailto:sydneymetrowest@transport.nsw.gov.au)

#### 6.4.2 Engagement activities and tools

Table 6-2 lists the key engagement activities and tools and how they will be used to engage with the community and stakeholders during the public exhibition of the REF.

Table 6-2: Key community and stakeholder engagement tools and activities

Engagement tool	Activity
<b>Proposal website and interactive portal</b>	Project information and the REF will be available via the Sydney Metro website <a href="http://sydneymetro.info">sydneymetro.info</a> and the Sydney Metro West <a href="#">interactive portal</a> .
<b>Community newsletter</b>	A newsletter will be distributed to surrounding residential, community and commercial properties. It will also be made available on the Sydney Metro website and interactive portal.
<b>Electronic direct mail</b>	An email will be sent to a targeted email distribution list.
<b>Stakeholder and government consultation</b>	Sydney Metro will consult with relevant parts of Transport for NSW, Office of Strategic Lands, Blacktown City Council and other key stakeholders as required.
<b>Sydney Metro Place Manager</b>	A dedicated Sydney Metro place manager will reach out to the nearby community and businesses to share details of the REF and explain how they can comment and make a submission. The place manager will also be available to respond to community members seeking more information on the REF and the project.

## 6.5 Response to Submissions

Following the REF exhibition, Sydney Metro will consider submissions received and will:

- Summarise the issues raised in the submissions
- Provide responses to each issue raised in the received submissions
- Describe any proposed modifications and assess the environmental impact of these changes as required
- Identify any proposed new or revised environmental management and mitigation measures.

The responses to submissions will be published on the Sydney Metro website [sydneymetro.info](http://sydneymetro.info).

## 6.6 Post-determination consultation activities

Subject to determination of the proposal, Sydney Metro would continue to engage with community and stakeholders in the lead up to, and during the construction of the proposal as per the Overarching Community Communications Strategy.

Methods used for engaging and providing information to the community and stakeholders during the proposal delivery phase are outlined in Table 6-3. These activities would be undertaken by the construction contractor in consultation with Sydney Metro.

Table 6-3: Key community and stakeholder engagement activities during proposal delivery phase

Tool	Purpose	Frequency
<b>Community emails</b>	To allow communication with the project team and inform the community of progress, key milestones or activities including traffic changes.	As required
<b>Community information line (1800 612 173)</b>	Access to the project team during construction hours with message service after hours via a 1800 number.	24 hours a day, seven days a week
<b>Letterbox notifications</b>	Notification letters to inform identified sensitive receivers (local residents and businesses) affected by changes to road network and traffic conditions.	At least seven days prior to change
<b>Project website (Sydney Metro)</b>	Documents uploaded to the website ( <a href="http://sydneymetro.info">sydneymetro.info</a> ) would include the REF, traffic alerts, notification letters and other public material related to the works.	To coincide with distribution
<b>Signposting</b>	Information or directional signage at the location of the traffic change to give advice to road users and pedestrians on duration of change and alternative paths.	At least seven days prior to change
<b>Variable Message Signs</b>	Electronic variable message signs to provide advanced notice to road users of major traffic changes, emergencies, incidents and traffic delays.	At least seven days prior to change, or as required
<b>Doorknocking</b>	Used to discuss potential impacts of the proposal on highly impacted stakeholders, especially residents and businesses directly impacted by construction activities.	As required
<b>Meetings with individual/groups</b>	Discuss project activities, including work in progress, upcoming activities and any issues associated. Meetings may also be used to discuss potential impacts and proposed mitigation measures.	As required
<b>Place Manager</b>	Maintaining close and ongoing contact with local communities and stakeholders during the delivery phase of the precast facilities.	Ongoing

## 7 Related development

This chapter identifies development which is related to the proposal that is subject to separate planning approvals.

---

Sydney Metro West is considered to be related development as the construction and operation of the precast facilities (this proposal) would support the delivery of Sydney Metro West. This chapter provides an overview of the Sydney Metro West project and a summary of the potential environmental impacts associated with carrying out the project. Stage 1 of Sydney Metro West is considered in this assessment, as subsequent stages are subject to future assessments.

Given that the location of the proposal is about 15 kilometres away, Sydney Metro West did not meet the criteria for the cumulative impact assessment (Section 8.16 (Cumulative impacts)), and is not expected to result in cumulative impacts to the same receivers.

### 7.1 Sydney Metro West

#### 7.1.1 Background

The Sydney Metro West Concept includes the construction and operation of a new 24-kilometre metro rail line between Westmead and the Sydney CBD. Stage 1 includes all major civil construction works between Westmead and The Bays, including station excavation and tunnelling. A detailed description of the Concept and Stage 1 is provided in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a).

The Sydney Metro West, Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a) was placed on public exhibition for community feedback from 30 April 2020 to 26 June 2020. Future stage(s) would be subject to subsequent Environmental Impact Statement(s).

A total of 188 submissions were received by DPIE in response to the Environmental Impact Statement during the exhibition period. Sydney Metro have reviewed all the submissions and have prepared a Submissions Report (Sydney Metro, 2020b) responding to any issues raised.

A separate Amendment Report (Sydney Metro, 2020c) has also been prepared. The Amendment Report outlines the proposed amendments since the exhibition of the Environmental Impact Statement and the associated environmental assessment.

The Sydney Metro West Concept is shown on Figure 7-1.

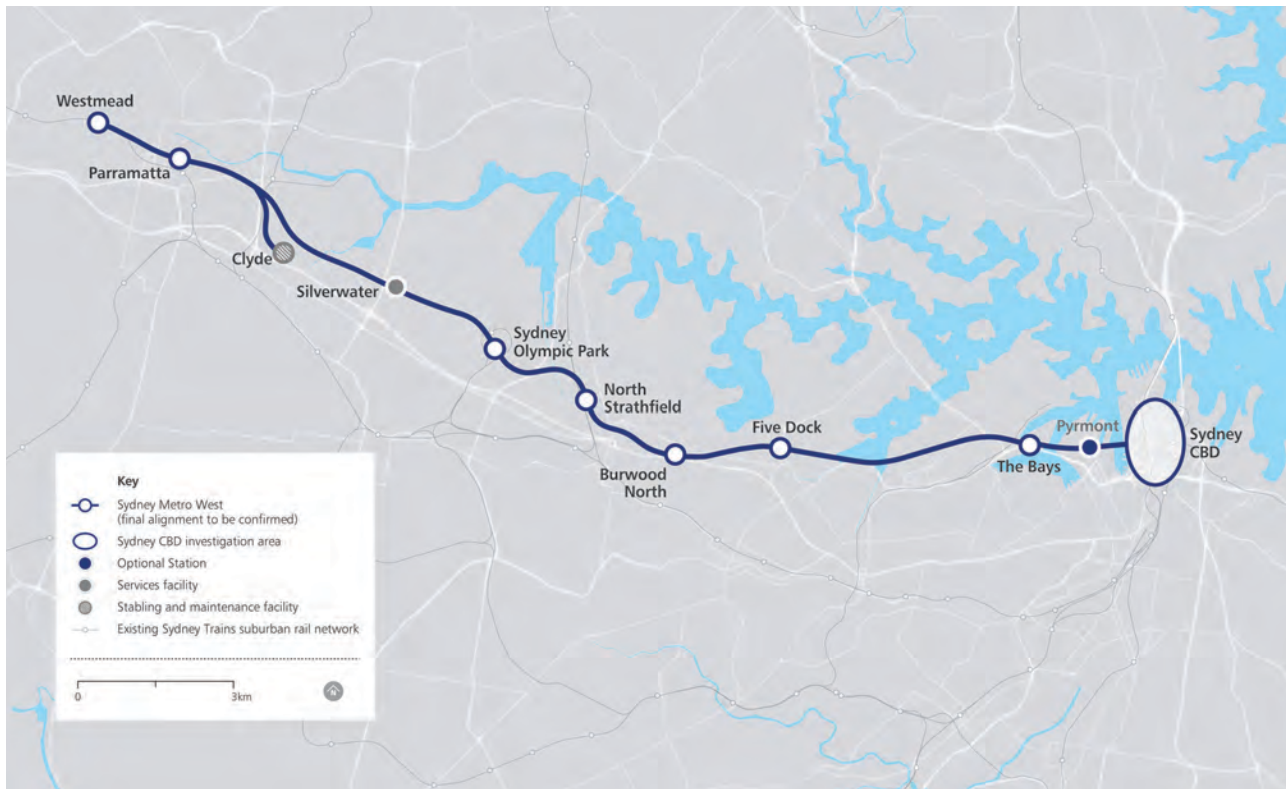


Figure 7-1: Sydney Metro West

### 7.1.2 Summary of potential impacts

An assessment of the potential environmental impacts and approach to environmental management for the project is provided in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a). A summary of potential impacts is provided in Table 7-1.

Where possible, Sydney Metro has avoided and minimised impacts as part of project development and design. Consultation has been carried out with affected stakeholders during the assessment process so that key potential impacts of the Concept and Stage 1 have been identified at an early stage, and where possible, avoided or appropriate mitigation measures developed. Potential impacts associated with Stage 1 would be adequately managed through the implementation of construction environmental management documentation and the specific performance outcomes and mitigation measures identified in the Environmental Impact Statement.

Table 7-1: Summary of potential impacts – Sydney Metro West Stage 1

Issue	Potential impact
<b>Traffic and transport</b>	<ul style="list-style-type: none"> <li>• Temporary increase in construction traffic on the local and regional road network, resulting in potentially temporary increased congestion and delays. Construction site traffic would be managed to minimise movements during peak periods and avoid school zones during pick up and drop off times</li> <li>• Potential temporary local traffic disruptions and short-term access restrictions and detours for road users. Directional signage and line marking would be used to direct and guide drivers and pedestrians past construction sites and on the surrounding network. This would be supplemented by variable message signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternate routes</li> <li>• Potential temporary access restrictions for pedestrians and cyclists within and surrounding the construction sites. Access to existing properties and buildings would be maintained in consultation with property owners</li> <li>• Potential temporary impacts to the public transport network, particularly in Westmead, North Strathfield and Burwood North, associated with the temporary relocation of bus stops and changes to bus routes resulting in minor impacts to commuters</li> <li>• Potential temporary pedestrian and cyclist safety impacts near construction site access and egress points. Vehicle access to and from construction sites would be managed to maintain pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasion, police presence</li> <li>• Several on and off-street parking spaces would be temporarily unavailable to the general public for the duration of construction, with the main potential impacts at Westmead and Parramatta.</li> </ul>
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>• Given the nature and duration of works and the close proximity of receivers, airborne noise during construction is expected to temporarily exceed noise management levels at all sites – and at some sites by possibly more than 20 dBA. Noise intensive works within the construction sites at night would generally only be completed inside acoustic sheds (or once other acoustic measures have been established). Regardless, ‘moderate’ worst-case temporary impacts are expected at some receivers</li> <li>• Potentially temporary highly noise affected receivers (subject to noise levels of 75 dBA or greater) at Westmead metro station, Clyde stabling and maintenance facility, North Strathfield metro station, Burwood North Station and Five Dock Station construction sites</li> <li>• Potentially temporary high sleep disturbance impacts at Westmead metro station and Five Dock Station construction sites. Moderate sleep disturbance impacts at Sydney Olympic Park metro station and Burwood North Station construction sites</li> <li>• Potential temporary ground-borne noise impacts at nearby receivers associated with tunnelling and excavation works at construction sites. Less ground-borne noise and vibration intensive alternative construction methodologies may be adopted where deemed feasible and reasonable</li> <li>• Potential temporary exceedances of vibration criteria including cosmetic damage screening criteria, and human comfort criteria at several buildings closest to construction sites. Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure</li> <li>• Potential minor construction and operational traffic noise impacts to receivers near Westmead metro station construction site particularly along Grand Avenue and Alexandra Avenue. Further assessment of construction traffic would be completed during detailed design and measures would be implemented to minimise temporary traffic noise impacts.</li> </ul>

Issue	Potential impact
<b>Non-Aboriginal heritage</b>	<ul style="list-style-type: none"> <li>• Potential minor direct impact on one item considered to be of State heritage significance (State Abattoirs at Sydney Olympic Park). Sydney Metro has amended the design to minimise impacts to this item</li> <li>• Potential moderate indirect visual impacts on two items listed on the State Heritage Register (Roxy Theatre at Parramatta and White Bay Power Station at The Bays) and one item considered to be of State heritage significance (State Abattoirs at Sydney Olympic Park). The policies of the White Bay Power Station Conservation Management Plan would be considered in regard to visual impacts of the Stage 1 works</li> <li>• Potential moderate indirect visual impacts on four items of local heritage significance. Archival recording would be carried out prior to the commencement of construction works</li> <li>• Potential direct impact on potential archaeological resources at Parramatta and The Bays. An archaeological research design(s) would be implemented that identifies the need for archaeological testing or monitoring. Mitigation measures would be recommended in accordance with Heritage Council guidelines.</li> </ul>
<b>Aboriginal heritage</b>	<ul style="list-style-type: none"> <li>• Potential disturbance of a potential Aboriginal archaeological deposit of moderate to high significance and moderate to high potential for intact archaeological deposits, located within the Parramatta metro station construction site. This includes a site recorded on the AHIMS register as 45-6-3582. Archaeological test excavation (and salvage when required) would be carried out where intact natural profiles with the potential to contain significant archaeological deposits are encountered</li> <li>• Potential disturbance of Aboriginal archaeological deposit of moderate significance and low to moderate potential for intact archaeological deposits, located within the Parramatta metro station, Clyde Stabling and maintenance facility and The Bays Station construction sites</li> <li>• As outlined in Section 8.5 (Aboriginal heritage), this proposal for precast facilities at Eastern Creek would result in the partial to total loss of value of ten Aboriginal sites. One of these Aboriginal sites, AIF-06 (AHIMS ID 45-5-4599), is located within the boundary of both the proposal site and the Archbold Road upgrade and extension. It is assumed the Aboriginal site would be directly impacted by the planned Archbold Road upgrade and extension. The overall archaeological significance of these sites has been assessed as low for seven of the sites, with one site (AHIMS ID 45-5-5355) having moderate overall significance and two sites (AHIMS ID 45-5-3159 and AHIMS ID 45-5-0559) having high overall significance. Combined, Stage 1 of the works for Sydney Metro West and the precast facilities would result in a potential increased loss of Aboriginal heritage value. Test excavation and further assessment would be undertaken for both projects to understand potential Aboriginal heritage impacts and to identify appropriate management approaches including salvage of identified items.</li> </ul>
<b>Property and land use</b>	<ul style="list-style-type: none"> <li>• Acquisition of private land and publicly owned land for construction sites. The construction sites are located where permanent operational infrastructure would also be required, to minimise property impacts and residual land holdings at the completion of construction. All acquisitions would be carried out in consultation with landowners and in accordance with the requirements of the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>. Sydney Metro has appointed Personal Managers to offer residents and small businesses assistance and support throughout the acquisition process</li> <li>• During construction, the use of land within the Stage 1 footprint would change from its existing use to use as a construction site. Except where required for subsequent construction activities associated with future stages of the Concept, temporary use areas for construction purposes would be stabilised and appropriately rehabilitated.</li> </ul>



Issue	Potential impact
<b>Landscape character and visual amenity</b>	<ul style="list-style-type: none"> <li>• Potential temporary visual impacts as a result of the introduction of new elements including acoustic sheds or other acoustic measures, machinery and equipment, site hoardings, partially complete structures, and other construction works. All structures (including acoustic sheds or other acoustic measures, site offices and workshop sheds) would be finished in a colour which aims to minimise their visual impact, if visible from areas external to the construction site</li> <li>• Loss of mature street trees and vegetation providing screening and amenity and opening up views towards the construction sites such as at the Clyde stabling and maintenance facility construction site. Opportunities for the retention and protection of existing street trees and trees within the site would be identified during detailed construction planning.</li> </ul>
<b>Business impacts</b>	<ul style="list-style-type: none"> <li>• Broad economic benefits by way of job generation</li> <li>• Benefits to businesses from increased demand from construction workers requiring food and beverage services and other goods</li> <li>• Potential temporary impacts to businesses including reductions in passing trade for vehicular and pedestrian traffic due to detours and road and footpath closures, and impacts on servicing and delivery/access.</li> </ul>
<b>Social impacts</b>	<ul style="list-style-type: none"> <li>• Potential and actual loss of and temporary disruption to existing social infrastructure, including open space, with associated impacts on community interactions and connectedness</li> <li>• The community's enjoyment of certain community facilities may potentially be temporarily reduced where they are located close to construction sites</li> <li>• Potential temporary changes to community character, such as changes to streetscape, access, businesses, increased numbers of workers and visitors in the area due to construction activity, resulting in changes to connections to the surrounding area</li> <li>• Potential temporary changes to sense of place due to impacts of construction, such as impacts to heritage items, loss of established businesses, changes to streetscape and urban fabric, resulting in potential loss of community connections to the surrounding area.</li> </ul>
<b>Groundwater and ground movement</b>	<ul style="list-style-type: none"> <li>• Potential minor impacts associated with localised ground movement and/or settlement due to excavation or groundwater drawdown causing damage to infrastructure. Condition surveys of buildings and structures in the vicinity of the tunnel and excavations would be carried out prior to the commencement of excavation at each site</li> <li>• Minor potential impacts on two registered groundwater users, one near Westmead metro station construction site and one near Burwood North Station construction site. Further investigations would be carried out and make good provisions implemented as required</li> <li>• Potential migration of contaminated groundwater towards, and into, station excavations, posing a potential exposure risk to site users/workers, and potentially reducing the beneficial use of the aquifer. Monitoring would occur of groundwater levels and quality of the site area before, during and after construction for potential contaminants of concern. Water level data would be regularly reviewed by a qualified hydrogeologist</li> <li>• Groundwater collected within site excavations and within the tunnels during construction would be discharged to the local stormwater system at each construction site. Temporary water treatment plants would treat collected groundwater so that the discharged water quality meets the requirements of any relevant environment protection licence for Stage 1 or the requirements of the <i>Protection of the Environment Operations Act 1997</i>.</li> </ul>

Issue	Potential impact
<b>Hydrology and flooding</b>	<ul style="list-style-type: none"> <li>• Potential for inundation of construction areas during flood events particularly in areas where flooding currently occurs (such as high flood risk areas in Parramatta metro station, Clyde stabling and maintenance facility and The Bays Station construction sites). Detailed construction planning would consider flood risk at construction sites</li> <li>• Minor potential flooding impacts associated with the interruption of overland flow paths by installation of temporary construction site infrastructure (i.e. noise barriers, acoustic sheds (or other acoustic measures), retaining walls) and/or modifications to landforms (i.e. placement of fill materials, stockpiles). Key areas of potential flooding risk include the Parramatta metro station, Clyde stabling and maintenance facility, Silverwater services facility and The Bays Station construction sites</li> <li>• Minor potential increases in peak flooding levels, increases in the extent of floods and an increase in flood hazard during flooding events at Clyde stabling and maintenance facility. These potential increases are within acceptable limits</li> <li>• Potential increases in flow velocity and scour potential may result where Stage 1 construction works alter flood flow patterns and significantly divert or concentrate flood flows. Further design refinement at the Clyde stabling and maintenance facility construction site would occur during detailed design to mitigate the identified potential impacts.</li> </ul>
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>• Direct removal of 0.18 hectares of native vegetation including 0.15 ha of Mangrove forest at Clyde and 0.03 hectares of Grey Box-Forest Red Gum grassy woodland at the Westmead metro station construction site. Biodiversity impacts, primarily at Clyde, would be offset in accordance with the requirements of the Biodiversity Conservation Act 2016 and relevant guidelines</li> <li>• Potential impacts to the habitat of seven threatened fauna species however these impacts are unlikely to detrimentally effect these species on a whole</li> <li>• Impacts to the vegetation riparian zones of Duck Creek and A'Becketts Creek that may limit the movement of threatened fauna species in that area</li> <li>• As outlined in Section 8.11 (Biodiversity), this proposal for precast facilities at Eastern Creek would require clearing of about 1.92 ha of native vegetation, a subset of which includes 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered). Combined, Stage 1 of the works for Sydney Metro West and the precast facilities would result in the direct impact to around 1.77 ha of BC Act listed Cumberland Plain Woodland. This combined impact from these projects are anticipated to be limited and adequately managed through the implementation of mitigation measures. The overall contribution to biodiversity impacts in the Cumberland Plain region is relatively low.</li> </ul>
<b>Air quality</b>	<ul style="list-style-type: none"> <li>• Some unavoidable risks of temporary nuisance impacts from dust are expected at some locations. Best-practice dust management measures would be implemented during all construction works and additional measures would be implemented if required subject to outcomes of monitoring.</li> </ul>
<b>Spoil and waste management</b>	<ul style="list-style-type: none"> <li>• Moderate potential residual impacts would include generation of unusable spoil during tunnelling due to contamination or acid sulfate soils. All waste would be assessed, classified, managed, transported and disposed of in accordance with the <i>Waste Classification Guidelines and the Protection of the Environment Operations (Waste) Regulation 2014</i>.</li> </ul>
<b>Hazards</b>	<ul style="list-style-type: none"> <li>• Potential temporary impacts associated with the storage, use and transport of dangerous goods and hazardous substances. The method for delivery of explosives would be developed prior to the commencement of blasting (if proposed) in consultation with the Department of Planning, Industry and Environment and be timed to avoid the need for on-site storage</li> <li>• Potential risk of impacts to utilities (both above ground and underground) including high voltage power lines, gas distribution lines, and high pressure gas mains near the Clyde stabling and maintenance facility construction site. Ongoing consultation would be carried out with utility providers for high pressure gas or petroleum pipelines to identify appropriate construction methodologies to be implemented.</li> </ul>

Issue	Potential impact
<b>Cumulative impacts</b>	<ul style="list-style-type: none"> <li>• Given the potential overlap of construction with a number of large infrastructure projects, potential temporary cumulative impacts have been identified at Westmead, Parramatta, Sydney Olympic Park and The Bays</li> <li>• Key potential construction stage cumulative issues are generally expected to be relatively minor and would include temporary local traffic impacts and accessibility, temporary noise and vibration (particularly night time works), temporary visual impact and amenity effects and spoil disposal and disposal routes. Sydney Metro would work closely with the proponents of other nearby projects and stakeholders such as Transport Coordination to manage and coordinate the interface with other major projects under construction at the same time.</li> </ul>

*This page has intentionally been left blank*

# 8 Environmental impact assessment

This chapter provides an environmental impact assessment for the construction and operation of the proposal.

---

## 8.1 Noise and vibration

A noise and vibration impact assessment has been prepared for the proposal. This assessment is attached as Appendix B (Noise and Vibration Technical Paper) of this REF. The methodology and results of this assessment are summarised in this section.

Potential cumulative noise impacts associated with multiple works being completed near the proposal at the same time or consecutively are discussed in Section 8.16 (Cumulative impacts).

### 8.1.1 Methodology

The noise and vibration assessment involved:

- Defining the existing background noise levels based on previously undertaken ambient noise monitoring (between 2016 and 2019)
- Establishing representative construction scenarios, locations, working times and duration of activities that would apply to construction of the proposal
- Predicting noise levels at receivers within the assessment area due to the proposed construction activities using a noise prediction model
- Assessing potential construction noise impacts with reference to the ICNG and the Sydney Metro Construction Noise and Vibration Standard
- Assessing potential construction vibration impacts
- Assessing potential operational noise impacts with reference to the Noise Policy for Industry (NPfI) and NSW Road Noise Policy (RNP)
- Identifying management and mitigation measures to minimise and manage the predicted noise and vibration impacts.

### Policies and guidelines

The following policies and guidelines were used to assess noise and vibration impacts:

- ICNG (Department of Environment and Climate Change (DECC), 2009)
- Assessing Vibration: a technical guideline (Department of Environment and Conservation, 2006)
- AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors
- 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)
- NPfI (EPA, 2017).

### Construction noise assessment

Construction noise was assessed in accordance with the ICNG. The ICNG identifies Noise Management Levels (NMLs), which are the project-specific noise criteria used to help manage noise impacts at all receiver locations. NMLs are defined by existing ambient noise levels and the receiver's sensitivity to construction noise. NMLs are categorised for residential and other sensitive land uses.

If construction noise levels are predicted to exceed NMLs, potential noise impacts would be managed through the implementation of feasible and reasonable mitigation measures.

The construction noise assessment uses the following terms:

- $L_{Aeq(15minute)}$  is the 'energy average noise level' considered over a 15-minute period. This parameter is used to assess potential construction noise impacts
- $L_{A90}$  is the 'background noise level' in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively. The  $L_{Aeq(15minute)}$  NMLs are based on  $L_{A90}$  background noise levels
- $L_{AFmax}$  is the maximum noise level measured during a monitoring period, using 'fast' weighting
- Rating Background Level (RBL) is representative of the typical lowest ambient noise level not exceeded for more than 90 per cent of the daytime, evening, or night-time period.

The ICNG provides an approach for determining  $L_{Aeq(15minute)}$  NMLs at residential receivers by applying the measured  $L_{A90}$  background noise levels, as described in Table 8-1.

Table 8-1: Determination of NMLs for residential receivers

Time of day	NML $L_{Aeq(15\ minute)}$	How to apply
<b>Standard construction hours</b> <b>Monday to Friday 7:00am to 6:00pm</b> <b>Saturday 8:00am to 1:00pm</b> <b>No work on Sundays or public holidays</b>	Noise affected RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise: <ul style="list-style-type: none"> <li>• Where the predicted or measured <math>L_{Aeq(15minute)}</math> is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to meet the noise affected level</li> <li>• The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</li> </ul>
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> <li>• Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools or mid-morning or mid-afternoon for works near residences)</li> <li>• If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ul>
<b>Outside recommended standard hours</b>	Noise affected RBL + 5 dBA	<ul style="list-style-type: none"> <li>• A strong justification would typically be required for works outside the recommended standard hours</li> <li>• The proponent would apply all feasible and reasonable work practices to meet the noise affected level</li> <li>• Where all feasible and reasonable practises have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community.</li> </ul>

*Note: The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy.*

The assessment of predicted airborne noise impacts around the construction site is based on the exceedance of the NMLs as per the construction scenarios identified in Table 8-3. The likely subjective response of people potentially affected by the impacts is shown in Table 8-2.

Table 8-2: Exceedance bands and corresponding subjective response to impacts

Exceedance of management level	Likely subjective response	Impact colouring
No exceedance	No impact	
1 to 10 dB	Minor	
11 dB to 20 dB	Moderate	
Greater than 20 dB	High	

### Construction scenario descriptions

Representative scenarios have been developed to assess the likely impacts from the various construction phases of the works. These scenarios are outlined in Table 8-3. The assessment uses realistic worst-case scenarios to determine the impacts from the noisiest 15-minute period that are likely to occur for each work scenario, as required by the ICNG. The impacts represent construction noise levels without mitigation applied.

The assessment is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios.

The equipment assumed to be in use in each scenario is included in Appendix B (Noise and Vibration Technical Paper).

Table 8-3: Construction scenario descriptions

Scenario	Activity	Description
<b>Site establishment</b>	Vegetation clearing	Clearing the proposal site of existing vegetation, trees, soil and debris
	Earthworks	Bulk earthworks including excavation, compaction and haulage of materials
	Utilities	Installation of power, water, sewerage, etc.
<b>Civil and building work</b>	Establishment of roads	Construction of pavements and sealing of internal access roads for the proposed precast facilities
	Construction of built form	Construction of precast facilities and site offices
<b>Commissioning</b>	Decommissioning and fit out	Includes decommissioning/demobilisation of the construction area, fit-out of the shed and commissioning of operational facilities
	Landscaping	Site landscaping

### Construction vibration

The potential impacts during vibration intensive works have been assessed assuming a vibratory roller could be used anywhere within the proposal site.

### Operational noise assessment

Operational noise was assessed in accordance with the NPfl (NSW EPA, 2017) which describes 'trigger levels' to inform the noise level at which feasible and reasonable noise management measures should be considered. Two forms of noise objectives are provided - one to account for 'intrusive' noise impacts (exceeding background noise levels by more than 5 dB) and one to protect the 'amenity' of particular land uses. The more stringent of these two is the project specific noise trigger level. The predicted levels represent worst-case scenarios during the concurrent operation of both facilities. Noise emissions would vary depending on delivery and production schedules and would frequently be lower than the worst-case levels presented.

The project-specific noise trigger levels for the nearest residential and commercial receivers are shown in Table 8-4. The more stringent of the intrusive and amenity trigger levels are shown in bold. The Noise Catchment Areas (NCAs) are described in section 8.1.2.

The methodology for determining the project-specific noise trigger levels is further explained in Appendix B (Noise and Vibration Technical Paper).

Table 8-4: Project noise trigger levels – Operational noise assessment

NCA	Receiver type	Period	Recommended amenity noise level $L_{A,eq}$ (dBA)	Measured noise level (dBA)		Project noise trigger level $L_{A,eq(15minute)}$ (dBA)	
				RBL	$L_{A,eq(Period)}$	Intrusiveness	Amenity <sup>1,2</sup>
NCA01, NCA03 and NCA04	Residential	Daytime	55	37	47	<b>42</b>	58
		Evening	45	37 <sup>3</sup>	46	<b>42</b>	48
		Night-time	40	37 <sup>3</sup>	45	<b>42</b>	43
	Commercial	When in use	65	-	-	-	<b>68</b>
NCA02	Residential	Daytime	55	41	55	<b>46</b>	58
		Evening	45	41 <sup>3</sup>	57	<b>46</b>	48
		Night-time	40	41	49	46	<b>43</b>
	Commercial	When in use	65	-	-	-	<b>68</b>

<sup>1</sup> The recommended amenity noise levels have been assigned as the project amenity noise level (i.e. not reduced by 5 dB) as other sources of industrial noise in the area are distant and unlikely to significantly affect receivers near to the project

<sup>2</sup> The project amenity noise levels have been converted to a 15-minute level by adding 3 dB

<sup>3</sup> The measured evening/night-time RBL was found to be higher than the daytime/evening. In these situations, the evening/night-time RBL would typically be reduced to match the daytime/evening RBL however the NPfI acknowledges this may not always be appropriate and alternate approaches may be justified. In this case, a conservative approach has been used and the RBL has been reduced.

### Sleep disturbance

The most current method for assessing sleep disturbance is contained in the NPfI. The NPfI defines sleep disturbance criterion as 52 dBA  $L_{AFmax}$  or the prevailing background level plus 15 dB, whichever is greater. The 52 dBA  $L_{AFmax}$  criterion has been used for this proposal as this is the criterion which applies to the nearest residential receivers in NCA01.

### Road traffic noise

Construction and operational traffic noise were assessed with reference to the RNP.

The RNP requires any increase in the total traffic noise level to be limited to 2 dBA above that of the existing road traffic noise level for both construction and operation.

## 8.1.2 Existing environment

### Background and ambient noise levels

Existing noise levels in the proposal site are generally controlled by road traffic noise from distant major roads, including the M4 Motorway and Great Western Highway, along with industrial noise from the surrounding existing industrial/commercial facilities.

All identified receivers surrounding the proposal site have been grouped into NCAs to assist in summarising the potential impacts. The noise study area comprises the proposal site and NCAs which are shown Figure 8-1 and described in Table 8-5.





Figure 8-1: NCAs for the proposal

Table 8-5: NCAs and associated land uses

NCAs	Description
<b>NCA01</b>	Located west of the proposal in Erskine Park. This catchment is mostly residential with the nearest receivers about 375 metres to the west of the proposal. A small number of commercial receivers are in this catchment at the Erskine Park Shopping Centre, which is off Shallow Drive.
<b>NCA02</b>	Located to the north of the proposal in Minchinbury, between the M4 Motorway and Great Western Highway. This catchment consists of commercial and industrial receivers to the immediate north of the proposal, and residential receivers to the north-east and north-west. The nearest receivers in this catchment are about 1.7 kilometres away.
<b>NCA03</b>	Located to the east of the proposal in Eastern Creek and west of M7 Motorway. This catchment is commercial and industrial. No residential land uses are located within this catchment. The nearest receiver is about 800 metres east of proposal.
<b>NCA04</b>	Located to the south of the proposal in Erskine Park (to the south-west), Eastern Creek (to the south) and Horsley Park (further south). This catchment is commercial and industrial. The nearest receivers in this catchment are about 800 metres away. No residential land uses are located within this catchment.

**Sensitive receivers**

Receivers potentially sensitive to noise and vibration have been categorised as residential buildings, commercial/ industrial buildings, or ‘other sensitive’ land uses which includes educational institutions, childcare centres, medical facilities, places of worship, outdoor recreation areas, or commercial and industrial buildings. Receiver types and locations are shown in Figure 8-1.

The noise study area includes residential buildings and other sensitive land uses such as schools, and commercial and industrial buildings. No other receivers have been identified within the noise study area.

## Background noise monitoring

Unattended noise monitoring was completed in the vicinity of the proposal site in 2016 and 2019 as part of previous nearby projects. There have not been any significant changes to the proposal site and surrounds since this monitoring was undertaken which would influence its suitability for this assessment. The measured noise levels have been used to determine the existing noise environment and to set criteria to assess the potential impacts from the proposal. The noise monitoring locations are included in Figure 8-1 and Table 8-6.

The results of the unattended ambient noise surveys are summarised in Table 8-6 as the RBL, and  $L_{Aeq}$  noise levels for the ICNG daytime (7.00 am to 6.00 pm), evening (6.00 pm to 10.00 pm) and night-time (10.00 pm to 7.00 am) periods.

Short-term attended noise monitoring was completed at each ambient noise monitoring location. Attended noise monitoring results confirmed the results of the unattended noise monitoring.

Table 8-6: Summary of unattended noise monitoring results

Noise monitoring location	Address	Measured noise level (dBA) <sup>1,2</sup>					
		Background noise (RBL)			Average noise level ( $L_{Aeq}$ )		
		Daytime	Evening	Night	Daytime	Evening	Night
L01	82 Weaver Street, Erskine Park	37	37 <sup>3</sup> (actual 40)	37 <sup>3</sup> (actual 39)	47	46	45
L02	8 Farrington Street, Minchinbury	41	41 <sup>3</sup> (actual 45)	41	55	57	49

<sup>1</sup> The RBL and  $L_{Aeq}$  noise levels have been determined with reference to the procedures in the NPfI.

<sup>2</sup> Daytime is 7.00 am to 6.00 pm, evening is 6.00 pm to 10.00 pm and night-time is 10.00 pm to 7.00 am.

<sup>3</sup> RBL for evening set at no greater than the daytime, and RBL for night-time set no greater than the day or evening following conservative principles outlined in the NPfI.

### 8.1.3 Potential impacts – construction

In summary, the assessment of potential temporary construction noise impacts has found that even with conservative assumptions, the potential for any impact from noisy activities associated with the proposal would be marginal at most. Notwithstanding, Sydney Metro is committed to minimising construction noise impacts to the greatest possible extent through the implementation of the Sydney Metro Construction Noise and Vibration Standard, the adoption of appropriate work practices and sourcing of fit-for-purpose plant and equipment.

#### Construction noise

Potential noise impacts during construction of the proposal are predicted to comply with the relevant criteria for the majority of the works.

The predicted airborne noise levels and potential NML exceedances from construction works at the proposal site are summarised in Table 8-7. The predicted noise levels assume a worst-case scenario therefore it is expected that the construction noise levels would frequently be lower than predicted at the most exposed receiver for most construction activities. The worst-case predicted noise level is 50 dBA, which is comparable to the existing  $L_{Aeq}$  noise levels in the noise catchment area (refer to Table 8-7). This noise level would be below annoyance levels with the potentially affected buildings. Therefore, this exceedance is considered to be of low significance.

At most there would be a minor temporary exceedance of the NML for some residential receivers in NCA01 during the site establishment – earthworks activity. This potential exceedance would be experienced by a small number of residential receivers (those closest to the site) for a short period of time during daytime when earthworks are occurring at the proposal site boundary closest to the sensitive receivers. The predicted levels of construction noise would be similar to the existing ambient levels of noise in the catchment.

Construction noise level contours across the proposal site are shown in Figure 8-2 for the scenario which results in the highest predicted noise levels at the closest sensitive receivers (Site establishment – earthworks).

Table 8-7: Predicted worst-case construction noise impacts

NCA	NML (dBA)	Predicted worst-case L <sub>Aeq(15minute)</sub> noise level (dBA)							
		Site establishment			Civil and building work		Commissioning work		
		Vegetation clearing	Earthworks	Utilities	Establishment of roads	Construction of built form	Decommissioning and fit out	Landscaping	
<b>Residential - Daytime</b>									
NCA01	47	47	50	34	46	45	42	31	
NCA02	51	<30	<30	<30	<30	<30	<30	<30	
NCA03	47	N/A - no residential receivers in this NCA							
NCA04	47	N/A - no residential receivers in this NCA							
<b>Commercial - Daytime</b>									
NAC01	70	39	42	<30	39	37	34	<30	
NCA02	70	32	35	<30	33	31	<30	<30	
NCA03	70	40	43	<30	40	38	35	<30	
NCA04	70	39	42	<30	38	37	34	<30	

LEGEND No Exceedance  1 - 10 dB above NML  11 - 20 dB above NML  > 20 dB above NML

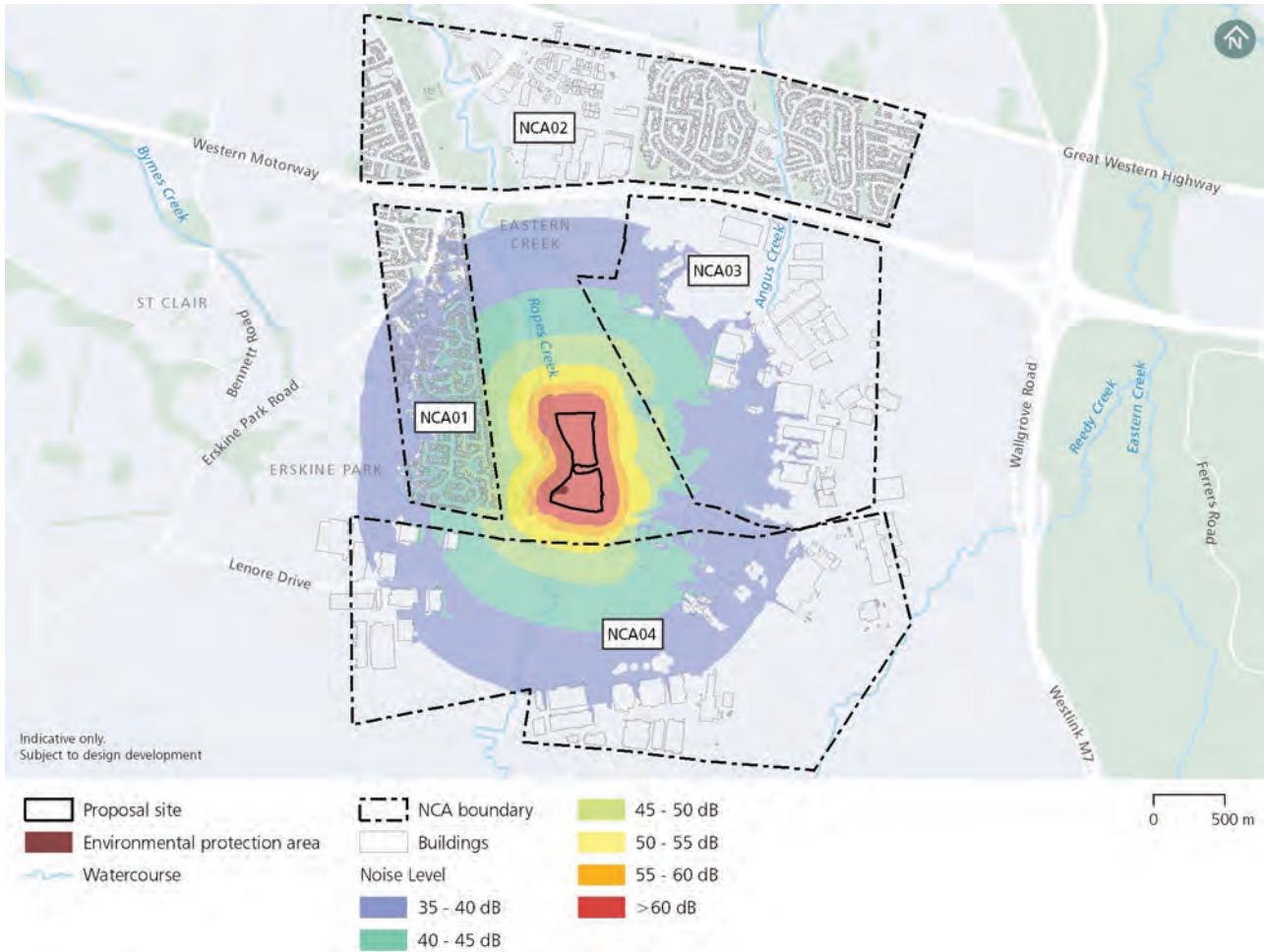


Figure 8-2: Predicted construction noise level contours – Site establishment – earthworks

**Construction road traffic noise**

Construction traffic would travel east from the proposal site and access the M7 Motorway via existing busy arterial roads through commercial/industrial areas. No noise impacts from construction traffic at sensitive receivers are expected.

**Construction vibration**

Vibration intensive equipment is proposed to be used during construction including the use of a vibratory roller. The nearest receivers are about 375 metres from the proposal site and impacts from vibration intensive works during construction of the proposal are anticipated to be negligible.

The separation distance between the proposal site and the nearest potentially affected receivers is sufficient for vibration levels to be compliant with both the human comfort and cosmetic damage criteria.

**8.1.4 Potential impacts – operation**

In summary, the assessment of potential operational noise impacts has found that even with conservative assumptions, the potential for any impact from noisy activities associated with the proposal would be marginal at most. Notwithstanding, Sydney Metro is committed to minimising operational noise impacts to the greatest possible extent through the implementation of the Sydney Metro Construction Noise and Vibration Standard, the adoption of appropriate work practices and sourcing of fit-for-purpose plant and equipment.

Although the Sydney Metro Construction Noise and Vibration Standard is typically applied to the construction phase of projects, it is proposed to adopt this standard for the operational phase of the precast facilities considering their role in supporting construction of Sydney Metro West and their use by the tunnelling contractors.

### Operational noise

The assessment shows that the concurrent operation of both the northern and southern precast facilities would comply with all relevant objectives at all receivers under neutral weather conditions during day, evening and night periods. Compliance is also predicted during noise-enhancing weather conditions, such as strong wind or rain (including wind conditions from the proposal site towards receivers).

The predicted operational noise levels at the nearest receivers from industrial noise emissions are summarised in Table 8-8 for both standard and noise-enhancing weather conditions using all conservative assumptions. Operation noise level contours are shown in Figure 8-3.

Table 8-8: Operational noise assessment

Receiver Type	Receiver Location	Period	L <sub>Aeq(15 minutes)</sub> Noise Level (dBA)			Compliance?
			Project Trigger Level	Predicted	Exceedance	
<b>Standard weather conditions</b>						
Residential	NCA01	Daytime	42	39	-	Yes
		Evening	42	38	-	Yes
		Night-time	42	38	-	Yes
	NCA02	Daytime	46	30	-	Yes
		Evening	46	<30	-	Yes
		Night-time	43	30	-	Yes
Commercial	NCA01	When in use	68	37	-	Yes
	NCA02	When in use	68	30	-	Yes
	NCA03	When in use	68	37	-	Yes
	NCA04	When in use	68	36	-	Yes
<b>Noise-enhancing weather conditions</b>						
Residential	NCA01	Daytime	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>
		Evening	42	40	-	Yes
		Night-time	42	42	-	Yes
	NCA02	Daytime	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>
		Evening	46	<30	-	Yes
		Night-time	43	31	-	Yes
Commercial	NCA01	When in use	68	41	-	Yes
	NCA02	When in use	68	35	-	Yes
	NCA03	When in use	68	41	-	Yes
	NCA04	When in use	68	40	-	Yes

<sup>1</sup> Noise-enhancing weather conditions are not a feature of the area during the daytime. Weather data for the area is included in Appendix B (Noise and Vibration Technical Paper).



Figure 8-3: Predicted operation noise level contours

**Sleep disturbance**

Maximum noise levels from the operation of the proposal are expected to comply with the relevant criteria. Truck movements and precast segment loading activities would be expected to result in the highest noise levels from the operation of the proposal. Table 8-9 shows the predicted worst-case maximum noise levels at the nearest residential receivers.

Table 8-9: Summary of predicted sleep disturbance noise levels

NCA	Source	L <sub>Amax</sub> Criteria	Noise Level (dBA)		Compliance?
			Criteria	Predicted	
NCA01	Truck movements	52		47	Yes
NCA02				35	Yes

**Operational road traffic noise**

Operational traffic would access the proposal site from Lenore Drive via a temporary haulage route. Once completed, operational traffic would access the proposal site via the planned Archbold Road upgrade and extension and generally travel east to access the M7 Motorway via existing arterial roads and through commercial/industrial areas. Therefore, no impacts to sensitive receivers are expected from operational traffic.

### 8.1.5 Management and mitigation measures

The Sydney Metro Construction Noise and Vibration Standard would be applied to the construction and operation of the proposal. The Standard aims to manage noise and vibration levels where feasible and reasonable using a variety of mitigation measures, and provides:

- A list of standard mitigation measures that would be implemented where feasible and reasonable
- Trigger levels (based on exceedances of airborne NMLs) for the implementation of additional mitigation measures.

The mitigation measures that would be implemented to address potential noise and vibration impacts are listed in Table 8-10. No operational mitigation measures for the proposal are required as operational noise levels are expected to be compliant under neutral and adverse weather conditions during the day, evening and night periods.

Table 8-10: Management and mitigation measures – noise and vibration

No.	Impact	Management and mitigation measures
<b>NV1</b>	Construction noise and vibration	During construction, receivers that would potentially be affected by noise and/or vibration from the works would be appropriately notified before the relevant works start.
<b>NV2</b>	Construction airborne noise	Noise monitoring at the most affected receiver(s) would be undertaken at the start of construction works to check the levels are as predicted and to confirm that the standard mitigation measures are adequate. If the standard mitigation measures are not found to be adequate, further mitigation measures would be considered and implemented where feasible and reasonable.

## 8.2 Traffic, transport and access

A traffic and transport assessment was carried out to assess the potential temporary impacts of the proposal for all users and relevant interfaces. This assessment is attached as Appendix C (Traffic and Transport Assessment) of this REF. The methodology and results of this assessment are summarised in this section.

Potential cumulative traffic and transport impacts associated with multiple works being completed near the proposal at the same time are discussed in Section 8.16 (Cumulative impacts).

### 8.2.1 Methodology

The traffic and transport assessment involved:

- Identifying existing conditions including site access, road network, traffic conditions, traffic volumes, parking availability, public transport and pedestrian and cyclist provisions
- Assessing the potential impact of the proposal during construction and operation, including on road network performance, parking, property access, public transport, pedestrians and cyclists. Traffic counts were collected in November 2019 to inform the assessment of road network performance. There have been no recent major roadworks, upgrades or developments within the vicinity of the proposal site that would impact on the suitability of the November 2019 traffic counts for the assessment
- Identifying management and mitigation measures to mitigate potential impacts of the proposal on the traffic and transport network.

Traffic modelling was undertaken using SIDRA Intersection 8 software to assess intersection performance during morning and evening peak periods in terms of capacity, level of service and other performance measures such as delay and maximum queue length.

Intersection level of service has been determined for intersections within the vicinity of the proposal site based on the criteria outlined in Table 8-11.

Table 8-11: Intersection level of service criteria

Level of service	Average delay per vehicle (seconds/vehicle)	Traffic signals and roundabouts
A	Less than 15	Good operation
B	15 to 28	Good with acceptable delays and 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 delays
F	Over 70	Extra capacity required

Further details relating to the traffic modelling approach and performance indicators are provided in Appendix C (Traffic and Transport Assessment).

### 8.2.2 Existing environment

#### Road network and traffic volumes

The existing road network in the vicinity of the proposal is shown in Figure 8-4. Old Wallgrove Road and Lenore Drive form an east-west arterial road that provides access to local roads servicing industrial precincts at Eastern Creek and Erskine Park. Old Wallgrove Road connects to Wallgrove Road and the M7 Motorway at its eastern end, which provide access to the wider Sydney arterial and motorway network.

Wallgrove Road and the M7 Motorway run in a north-south direction and are designated as tertiary and primary freight routes respectively. Both roads carry high volumes of freight vehicles. As a primary freight route, the M7 Motorway provides interstate access and access to strategically important ports, airports, industrial areas, freight terminals, and intermodal terminals and hubs. As a tertiary freight route, Wallgrove Road provides connections to the local road network and the lower-order elements of the State road system.



Local roads in the vicinity of the proposal site include Telopea Place, Roberts Road, Eastern Creek Drive, Southridge Street and Mini Link Road. These roads provide access to nearby industrial precincts and the intersection of these roads with Old Wallgrove Road are signalised. Unrestricted kerbside parking is permitted on Telopea Place, Roberts Road, Eastern Creek Drive and Southridge Street.

As noted in Chapter 1 (Introduction), the future road network would include the planned Archbold Road upgrade and extension which would provide a connection between the Great Western Highway, Minchinbury and Old Wallgrove Road, Eastern Creek (subject to separate approval by Transport for NSW). This first stage of the planned Archbold Road upgrade and extension would provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and the Western Access Road. As a result, this proposal (for the precast facilities) does not include any external road works. Further extensions of Archbold Road would be completed at a later stage. Prior to completion of the planned Archbold Road upgrade and extension, construction traffic generated by the proposal would utilise a temporary haul road between Lenore Drive and the proposal site access.

Existing traffic volumes are the highest on Wallgrove Road, which carries over 1,000 vehicles per hour in each direction during peak hours. Traffic volumes are also high on Old Wallgrove Road / Lenore Drive, which carries between 690 and 1,090 vehicles per hour in each direction and has a westbound peak direction during the morning peak hour, and an eastbound peak direction during the evening peak hour. Traffic volumes on all other roads near the proposal are substantially lower. Table 8-12 outlines estimated peak hour midblock volumes on the key roads within the vicinity of the proposal.

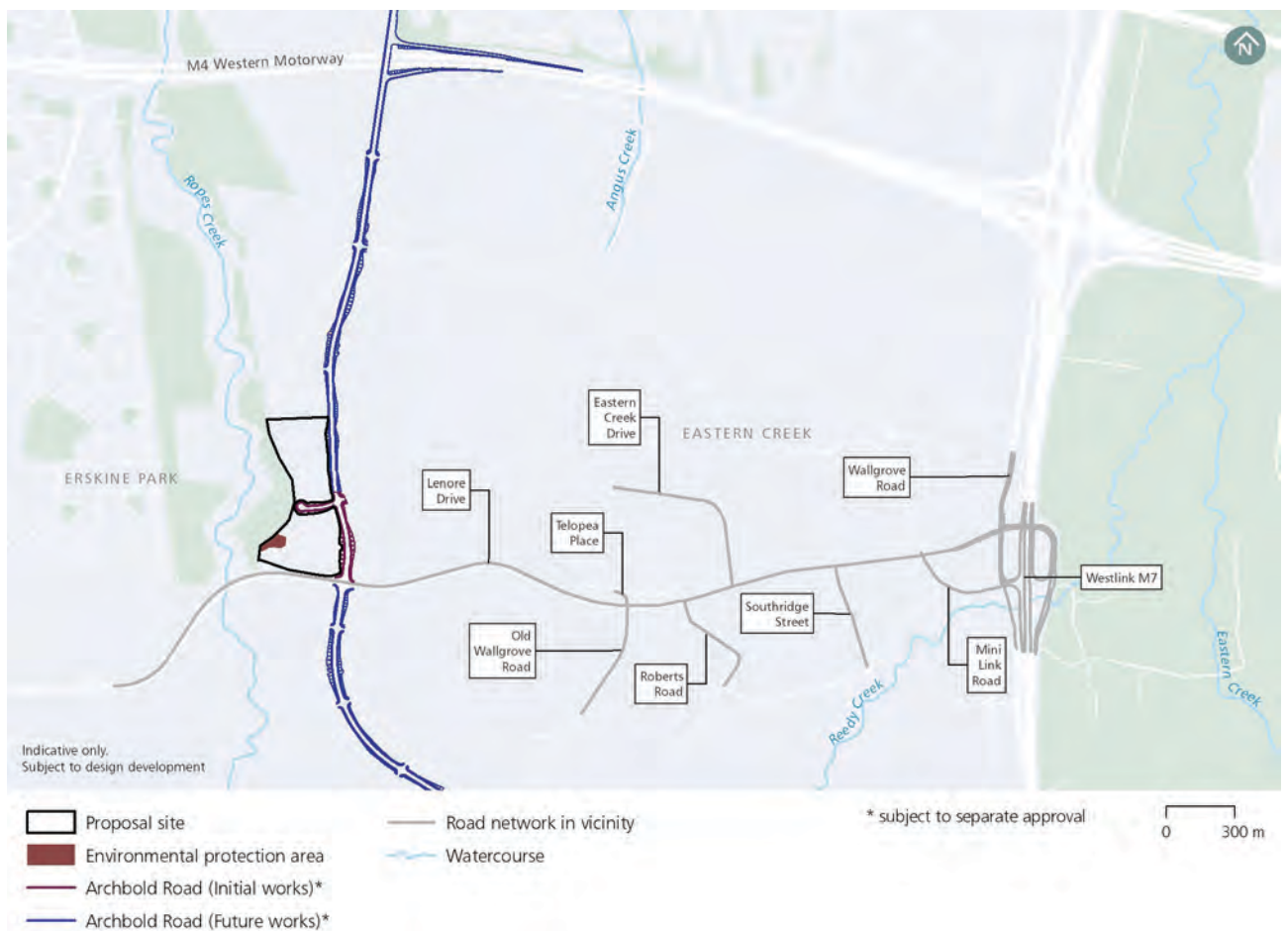


Figure 8-4: Existing road network in the vicinity of the proposal

Table 8-12: Existing peak hour traffic volumes by direction (2019)

Road	Direction	Morning peak hour volumes (vehicles per hour)	Evening peak hour volumes (vehicles per hour)
Old Wallgrove Road / Lenore Drive	Eastbound	750	880
	Westbound	1,090	690
Wallgrove Road	Northbound	1,070	1,380
	Southbound	1,410	1,480
Telopea Place / Old Wallgrove Road	Northbound	230	510
	Southbound	40	30
Roberts Road	Northbound	250	370
	Southbound	330	290
Eastern Creek Drive	Northbound	120	60
	Southbound	90	80
Southridge Street	Northbound	80	170
	Southbound	10	30
Mini Link Road / Quarry Road	Northbound	320	350
	Southbound	0	10

### Intersection performance

Modelled intersection performance during the morning and evening peak hours for key intersections in the vicinity of the proposal site identified that all intersections surrounding the proposal currently perform satisfactorily at or above level of service C. Further details regarding existing intersection performance is provided in Appendix C (Traffic and Transport Assessment).

### Public transport

There are no train stations located in close proximity to the proposal site. The closest station is Rooty Hill, located about six kilometres north of the proposal site.

Bus routes 738 and 835 operate on Old Wallgrove Road and Lenore Drive within the vicinity of the proposal site. The closest bus stops are located south and south-east of the proposal site on Lenore Drive, and service bus route 835.

Route 738 is operated by Busways and is a loop service between Mount Druitt and Horsley Park via Wallgrove Road, Old Wallgrove Road and Roberts Road. Route 738 operates at a frequency of two buses per hour during the weekday morning and evening peak periods.

Route 835 is operated by Transit Systems and travels between Western Sydney University Kingswood and Prairiewood via Lenore Drive, Old Wallgrove Road and Wallgrove Road. Route 835 operates at a frequency of two buses per hour in each direction during the weekday morning and evening peak periods.

Bus priority lanes are provided at the intersections of Old Wallgrove Road and Telopea Place, Eastern Creek Drive and Southridge Street.

### Active transport

Pedestrian activity within the immediate vicinity of the proposal is low given the industrial land uses present. Footpaths are provided on both sides of Old Wallgrove Road between Telopea Place and Wallgrove Road and include a shared user path on the northern side of the road. A shared user path is provided on the northern side of Lenore Drive, however there is no footpath on the southern side.

The cycle network in the vicinity of the proposal site is well established, with a number of off-road shared user paths. Shared user paths are provided on Lenore Drive and Old Wallgrove Road, providing connections to the regional cycle network via the M7 Motorway shared user path.

### 8.2.3 Potential impacts

#### Haulage routes

Site access and egress to and from the proposal site would be right-in, left-out via Lenore Drive, and left-in, right out via the temporary haul route prior to the completion of the first stage of the planned Archbold Road upgrade and extension (subject to separate approval). Haulage routes would generally be via arterial roads, minimising impacts to local roads in residential areas.

Haulage routes would travel east of the proposal site, generally via arterial roads, during construction and operation as follows:

- From the proposal site along the extended Archbold Road (or temporary haul road prior to the completion of the first stage of Archbold Road) to Lenore Drive
- Lenore Drive to Old Wallgrove Road
- Old Wallgrove Road to Wallgrove Road
- Old Wallgrove Road to M7 Motorway.

The haulage routes are shown in Figure 8-5.

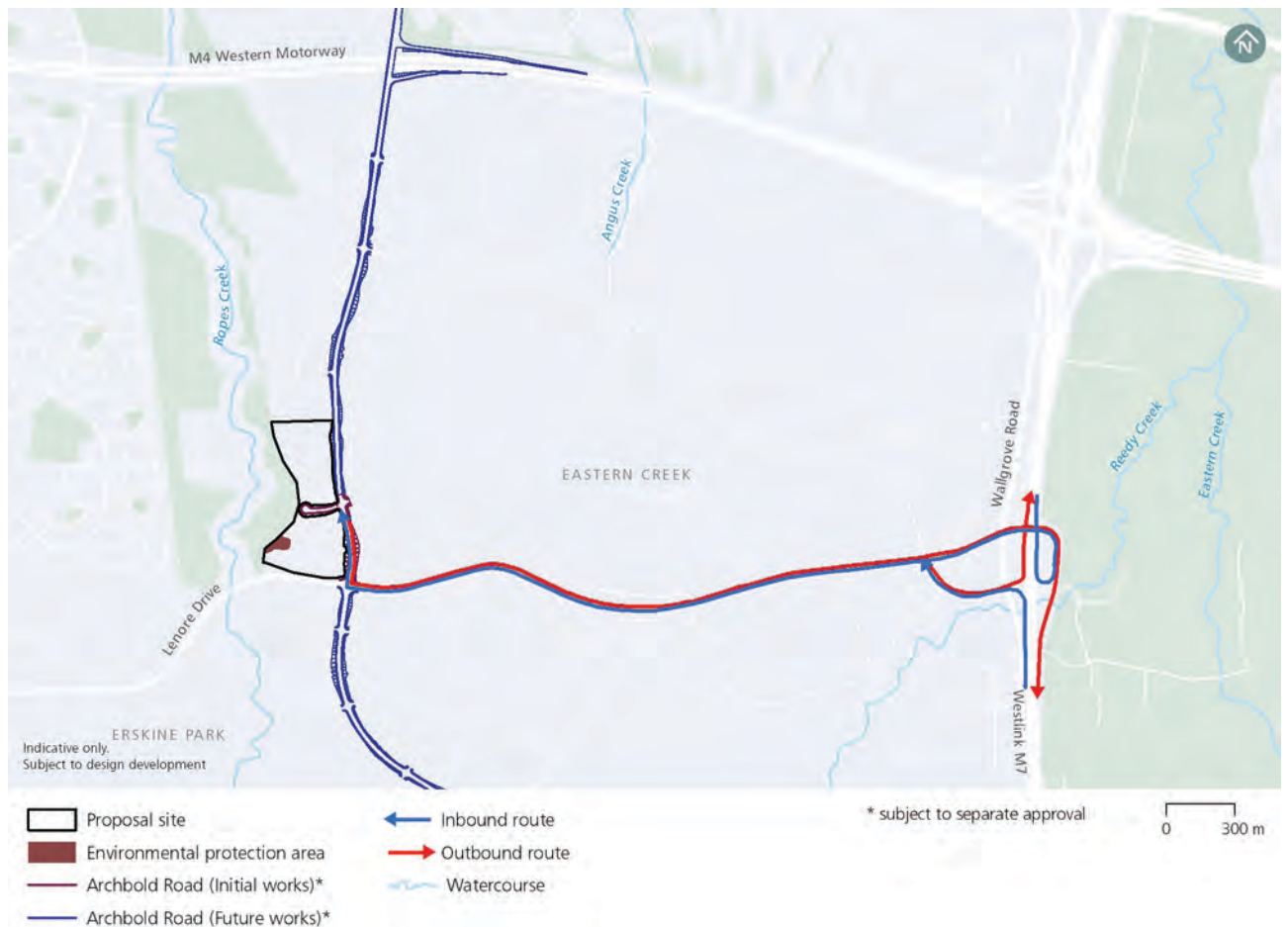


Figure 8-5: Proposed haulage routes

#### Construction

##### Road network performance

Overall, the introduction of construction traffic is anticipated to have a negligible impact on the operation of the surrounding road network.

Access and egress by the majority of construction vehicles would generally be during standard construction hours. The light vehicles modelled in the construction scenario account for the construction workers travelling to and from the proposal site as they would be arriving and exiting the site during peak periods thus representing the worst-case scenario.

During the peak construction year (2022) the forecast number of construction vehicles to and from the proposal site at each facility would be:

- **Light vehicles:** 60 vehicles (per facility) arriving in the hour before the start of shifts (6.00am to 7.00am) and 60 vehicles (per facility) leaving in the hour after the end of shifts (6.00pm to 7.00pm)
- **Heavy vehicles:** maximum of 10 heavy vehicles (per facility) per hour during standard construction hours (7.00 am to 6.00 pm).

The majority of plant and equipment would be stored at the proposal site within the laydown areas. If required, mobilisations of large plant and equipment would be carried out at evening or night-time outside of peak traffic times, subject to Transport for NSW standard requirements for out-of-hours work.

Modelling indicates that intersections used by construction vehicles would continue to perform at the same level of service with or without construction vehicles (refer to Table 8-13). Average intersection delays (measured in seconds per vehicle) would either not change or would temporarily increase by up to two seconds, which is considered to have a negligible impact on the road network. Intersection delays by two seconds would occur only at M7 Motorway northbound ramps / Wallgrove Road / Mini Link Road.

Modelled intersection performance at Old Wallgrove Road / Roberts Road, Old Wallgrove Road / Eastern Creek Drive and Old Wallgrove Road / Southridge Street intersections indicate that the level of service would improve slightly with construction traffic from the proposal. This is due to the reallocation of modelled signal phasing times at signalised intersections in response to additional traffic demand. However, intersection performance with construction traffic is expected to perform at a similar level as the scenario without construction traffic. Additional intersection performance indicators are provided in Appendix C (Traffic and Transport Assessment).

Table 8-13: Modelling peak hour intersection performance (2022) without and with the proposal – construction

Intersection	Peak hour	Level of service (without proposal)	Level of service (with proposal)
Old Wallgrove Road / Lenore Drive / Teloepa Place	Morning	C	C
	Evening	C	C
Old Wallgrove Road / Roberts Road	Morning	A	A
	Evening	A	A
Old Wallgrove Road / Eastern Creek Drive	Morning	A	A
	Evening	A	A
Old Wallgrove Road / Southridge Street	Morning	B	B
	Evening	B	B
Old Wallgrove Road / Mini Link Road	Morning	B	B
	Evening	B	B
M7 Motorway southbound ramps / Wallgrove Road / Old Wallgrove Road	Morning	C	C
	Evening	C	C
M7 Motorway northbound ramps / Wallgrove Road / Mini Link Road	Morning	C	C
	Evening	C	C

#### Parking and property access

There would be no impact on existing parking during construction of the proposal. Provision for parking during construction would be provided within the proposal site. There would also be no impact on property access during construction of the proposal.

#### Public and active transport network

Potential impacts to bus services would be negligible. No impacts are anticipated on the operation of bus stops. Wallgrove Road and Old Wallgrove Road / Lenore Drive are serviced by buses and form part of the proposed construction vehicle route. Negligible impacts on bus services are anticipated and would be limited to a potential temporary minor increase in travel time due to the additional construction vehicles on the road network.

Prior to construction of the first stage of the planned Archbold Road upgrade and extension, and installation of traffic signals at the Archbold Road / Lenore Drive intersection, heavy vehicles would be required to cross the shared user path on the northern side of Lenore Drive to access the proposal site. Although pedestrian and cyclist volumes on these shared user paths are low, mitigation and management measures to minimise these impacts would be applied as outlined in Section 8.2.4.

It is anticipated that the planned Archbold Road upgrade and extension between Lenore Drive and the proposal site access would be open to traffic by mid-2022. Following the opening of the planned Archbold Road upgrade and extension, no impacts to pedestrians and cyclists are anticipated given that footpaths and shared user paths in the vicinity of the proposal site would remain open during construction of the proposal. Impacts to pedestrian and cyclist safety are not anticipated given that the Archbold Road / Lenore Drive intersection would be signalised. Moreover, shared paths run along the length of the haulage route with minimal volumes of pedestrians and cyclists.

**Operation**

**Road network performance**

Overall, the introduction of operational traffic is anticipated to have a negligible impact on the operation of the surrounding road network. The operational traffic assessment considers the concurrent operation of the northern and southern precast facilities.

The hours that were modelled for the operation scenario represent the maximum number of vehicles on the road network and coincide with workers travelling to and from the proposal site, as well as heavy vehicle movements. Modelling the maximum number of vehicles on the road network represents the worst-case scenario. The forecast number of operation vehicles to and from the proposal site at each facility would be:

- **Light vehicles:** 60 vehicles (per facility) arriving in the hour before the start of shifts (indicatively 6.00 am to 7.00 am for day shifts and 6.00 pm to 7.00 pm for night shifts) and 60 vehicles (per facility) leaving in the hour after the end of shifts (indicatively 5.00 pm to 6.00 pm for day shifts and 5.00 am to 6.00 am for night shifts)
- **Heavy vehicles:** maximum of 12 heavy vehicles (per facility) per hour between 7.00 am to 6.00 pm
- **Heavy vehicles:** maximum of six heavy vehicles (per facility) per hour between 6.00 pm to 7.00 am.

Modelling indicates that the majority of intersections would continue to perform at the same level of service with or without operational vehicles associated with the proposal (refer to Table 8-13). The Old Wallgrove Road / Lenore Drive / Telopea Place intersection would experience a decrease in level of service in the morning peak hour from C to D, however this is associated with a two second increase in average delay, which is considered negligible.

Modelled intersection performance at Old Wallgrove Road / Roberts Road and Old Wallgrove Road / Eastern Creek Drive intersections indicate that the level of service would improve slightly with operational traffic from the proposal. This is due to the reallocation of modelled signal phasing times at signalised intersections in response to additional traffic demand. However, intersection performance with operation traffic is expected to perform at a similar level as the scenario without operation traffic. Additional intersection performance indicators are provided in Appendix C (Traffic and Transport Assessment).

Table 8-14: Modelling peak hour intersection performance (2026) without and with the proposal – operation

Intersection	Peak hour	Level of service (without proposal)	Level of service (with proposal)
Old Wallgrove Road / Lenore Drive / Telopea Place	Morning	C	D
	Evening	D	D
Old Wallgrove Road / Roberts Road	Morning	A	A
	Evening	B	B
Old Wallgrove Road / Eastern Creek Drive	Morning	A	A
	Evening	A	A
Old Wallgrove Road / Southridge Street	Morning	B	B
	Evening	B	B

Intersection	Peak hour	Level of service (without proposal)	Level of service (with proposal)
Old Wallgrove Road / Mini Link Road	Morning	B	B
	Evening	C	C
M7 Motorway southbound ramps / Wallgrove Road / Old Wallgrove Road	Morning	C	C
	Evening	C	C
M7 Motorway northbound ramps / Wallgrove Road / Mini Link Road	Morning	C	C
	Evening	D	D

#### Parking and property access

There would be no impact on existing parking during operation of the proposal. Provision for staff and visitor parking during operation would be provided within the proposal site.

There would also be no impact on property access during operation of the proposal.

#### Public and active transport network

Potential impacts to bus services would be minor and would be limited to a potential minor increase in travel time due to the additional operational vehicles on the road network. No impacts are anticipated on the operation of bus stops in the vicinity of the proposal site.

No impacts to pedestrians and cyclists are anticipated given that footpaths and shared user paths in the vicinity of the proposal site would not be affected during operation of the proposal. Impacts to pedestrian and cyclist safety are not anticipated given that the Archbold Road / Lenore Drive intersection would be signalised, shared user paths run along the majority of the haulage route and the minimal volumes of pedestrians and cyclists.

### 8.2.4 Management and mitigation measures

The Sydney Metro West Construction Traffic Management Framework would be applied to the construction and operation of the proposal. The framework provides an overall strategy and approach for construction traffic management, and an outline of the traffic management requirements and processes that would be applied, and interactions with relevant stakeholders. It establishes the traffic management processes and acceptable criteria to be considered and followed when managing impacts to the road network. Although the Construction Traffic Management Framework is typically applied to the construction phase of projects, it is proposed to also adopt this framework for the operational phase of the precast facilities considering their role in supporting construction of Sydney Metro West and their use by the tunnelling contractors.

The mitigation measures that would be implemented to address potential traffic, transport and access impacts are listed in Table 8-15.

Table 8-15: Management and mitigation measures – traffic, transport and access

Reference	Impact/issue	Mitigation measure
T1	Traffic incidents	In the event of a traffic-related incident, coordination would be carried out with Transport Coordination and/or other parts of Transport for NSW.
T2	Emergency vehicles access	Access to properties for emergency vehicles would be provided at all times.
T3	Road safety	All trucks would enter and exit the proposal site in a forward direction, where feasible and reasonable.
T4	Staff parking	All staff parking would be provided on-site and not on surrounding local streets.
T5	Road safety	The driver induction process would include safety awareness in relation to all road users, particularly pedestrians and cyclists at the proposal site access point at Archbold Road / Lenore Drive during construction.

### 8.3 Landscape and visual character

A landscape and visual impact assessment has been undertaken to assess the potential impact of the proposal on the surrounding landscape and visual character. This assessment is attached as Appendix D (Landscape and Visual Impact Assessment) of this REF. The methodology and results of this assessment are summarised in this section.

#### 8.3.1 Methodology

The landscape and visual amenity impact assessment involved:

- Undertaking visual inspections of the proposal site and surrounds, including photographs from key viewpoints (in April and June 2020)
- Identifying the existing landscape and visual conditions of the proposal site and surrounds
- Assessing the potential landscape impacts of the proposal during construction and operation
- Assessing the potential daytime and night-time visual impacts of the proposal during construction and operation
- Identifying mitigation measures to minimise impacts to landscape and visual amenity.

#### Landscape impact assessment

Landscape refers to the overall character and function of a place. It includes all elements within the public realm and the interrelationship between these elements and the people who use them.

To identify impacts to landscape character, the assessment identified the sensitivity of the landscape to change and the magnitude of change expected from the proposal, and then made an overall assessment of the level of impact expected.

The degree of sensitivity of the landscape to change was identified as either neighbourhood, local, regional, state or national. The magnitude of change to the landscape is identified as considerable reduction or improvement, noticeable reduction or improvement, and no perceived reduction or improvement.

Table 8-16 provides a description of landscape sensitivity and modification. To assess the landscape character impact of the proposal, the sensitivity of the landscape and likely magnitude of change are combined. The landscape impact matrix is provided in Table 8-17.

Table 8-16: Landscape sensitivity levels and magnitude of change

Landscape assessment	
Landscape sensitivity	
<b>National</b>	Landscape feature protected under national legislation or international policy. There are no nationally sensitive landscapes within this assessment.
<b>State</b>	Landscape feature that is heavily used and/or is iconic to the State. There are no state sensitive landscapes within this assessment.
<b>Regional</b>	Landscape feature that is heavily used and valued by residents of a major portion of the city or a non-metropolitan region. There are no regionally sensitive landscapes within this assessment.
<b>Local</b>	Landscape feature valued and experienced by concentrations of residents and/or local recreational users. Provides a considerable service to the community. For example, it provides a place for local gathering, recreation, sport, street use by cafes and/or shade and shelter in an exposed environment. Local examples include Ropes Creek or Peppertree Reserve, Erskine Park.
<b>Neighbourhood</b>	Landscape feature valued and appreciated primarily by a small number of residents, for example, street trees in a local street. Provides a minor service to the community. For example, it provides a seat or resting place, passive recreation and/or some shade and shelter in a local street.

Landscape assessment	
Landscape magnitude of change	
<b>Considerable reduction or improvement</b>	A substantial portion of the landscape is changed. This may include substantial changes to vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, activation and safety, and diversity of the public realm.
<b>Noticeable reduction or improvement</b>	A portion of the landscape is changed. This may include some alteration to vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, activation and safety, and diversity of the public realm.
<b>No perceived reduction or improvement</b>	Either the landscape quality is unchanged or if it is, it is largely mitigated by proposed public realm improvements. Does not alter or not noticeably alter the vegetation cover, the area of open space or public realm area, accessibility, permeability, legibility and wayfinding, comfort and amenity, activation and safety, and diversity of the public realm.

Table 8-17: Landscape impact level

Landscape modifications	Landscape sensitivity				
	National	State	Regional	Local	Neighbourhood
<b>Considerable reduction</b>	Very high adverse	Very high adverse	High adverse	Moderate adverse	Minor adverse
<b>Noticeable reduction</b>	Very high adverse	High adverse	Moderate adverse	Minor adverse	Negligible
<b>No perceived change</b>	Negligible	Negligible	Negligible	Negligible	Negligible
<b>Noticeable improvement</b>	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial	Negligible
<b>Considerable improvement</b>	Very high beneficial	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial

### Visual impact assessment

Construction and operational visual impacts were considered for both daytime and night-time.

The assessment of daytime visual impacts involved identifying existing visual conditions, views that are representative of these conditions, the sensitivity of the views and the magnitude of change expected during construction and operation of the proposal.

Table 8-18 provides a description of visual sensitivity and magnitude of change for daytime. An overall assessment was then made of the level of impact expected (based on the matrix in Table 8-19).

Table 8-18: Visual sensitivity and magnitude of change – daytime

Visual impact assessment	
Visual sensitivity	
<b>National</b>	Heavily experienced view to a national icon, for example the view to the Sydney Opera House from Circular Quay. There are no nationally sensitive views within this assessment.
<b>State</b>	Heavily experienced view to a feature or landscape that is iconic to the State, e.g. views to Old Government House from within Parramatta Park. There are no state sensitive views within this assessment.



Visual impact assessment	
<b>Regional</b>	Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, or an important view from an area of regional open space, e.g. view from George Maunder Lookout over Prospect Reservoir. There are no regional sensitive views within this assessment.
<b>Local</b>	High quality view experienced by concentrations of residents and/or local recreational users, local commercial areas and/or large numbers of road or rail users. Views with local visual features and/or landmarks.
<b>Neighbourhood</b>	Views where visual amenity is appreciated by a small number of residents rather than particularly valued by the wider community. Viewers whose interest is not specifically focused on views e.g. workers.
Visual magnitude of change	
<b>Considerable reduction or improvement</b>	A substantial part of the view is altered. The proposal is not compatible and/or contrasts substantially with the surrounding landscape.
<b>Noticeable reduction or improvement</b>	A small to moderate part of the view is altered. The proposal contrasts with the surrounding landscape.
<b>No perceived reduction or improvement</b>	Either the view is unchanged or if it is, the change in the view is generally unlikely to be perceived by viewers or unlikely to result in a change in the amenity of the view. The proposal does not contrast with the surrounding landscape.

Table 8-19: Visual impact levels – daytime

Magnitude of change	Visual sensitivity				
	National	State	Regional	Local	Neighbourhood
<b>Considerable reduction</b>	Very high adverse	Very high adverse	High adverse	Moderate adverse	Minor adverse
<b>Noticeable reduction</b>	Very high adverse	High adverse	Moderate adverse	Minor adverse	Negligible
<b>No perceived change</b>	Negligible	Negligible	Negligible	Negligible	Negligible
<b>Noticeable improvement</b>	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial	Negligible
<b>Considerable improvement</b>	Very high beneficial	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial

The visual magnitude of change at night are described, as relevant, in terms of:

- **Sky glow** - which is the brightening of the night sky
- **Glare** - which is the condition of vision in which there is discomfort or a reduction in ability to see
- **Light spill** - which is the light emitted by a lighting installation that falls outside of the design area.

Environmental zones defined in standard AS/NZS 4282:2019 – Control of the obtrusive effects of outdoor lighting describe the existing night-time visual conditions of the proposal site. These zones are typical night-time settings and reflect the predominant light level of the proposal site and surrounds. Table 8-20 provides a description of each environmental zone and visual magnitude of change at night. The proposal site has been assessed as A3 as it is in a setting of medium district brightness.

AS/NZS 4282:2019 identifies four main potential effects of lighting, which are, the effects on residents, transport system users, transport signalling systems and astronomical observations. Of relevance to this assessment is the effects of lighting on the visual amenity of residents and transport system users. The night-time visual impact matrix is provided in Table 8-21.

Table 8-20: Environmental zone sensitivity and modification level – night-time

Visual impact assessment		
Environmental zone sensitivity (Source AS/NZS 4282:2019)		
Sensitivity level	Description	Examples
Very high	A0: Intrinsically dark	<ul style="list-style-type: none"> <li>UNESCO Starlight Reserve</li> <li>Major optical observatories</li> </ul>
High	A1: Dark	<ul style="list-style-type: none"> <li>Relatively uninhabited rural areas</li> </ul>
Moderate	A2: Low district brightness	<ul style="list-style-type: none"> <li>Sparsely inhabited rural and semi-rural areas</li> </ul>
Low	A3: Medium district brightness	<ul style="list-style-type: none"> <li>Suburban areas in towns and cities</li> </ul>
Negligible	A4: High district brightness areas	<ul style="list-style-type: none"> <li>Town, city centres and other commercial areas</li> </ul>
	TV: High district brightness	<ul style="list-style-type: none"> <li>Residential areas abutting commercial areas</li> </ul>

Magnitude of change levels	
<b>Considerable reduction or improvement</b>	Substantial change to the level of sky glow, glare or light intrusion would be expected. The lighting of the proposal would contrast substantially with the surrounding landscape at night.
<b>Noticeable reduction or improvement</b>	Alteration to the level of sky glow, glare or light intrusion would be clearly visible. The lighting of the proposal would contrast with the surrounding landscape at night.
<b>No perceived reduction or improvement</b>	Either the level of sky glow, glare and light intrusion is unchanged or if it is altered, the change is generally unlikely to be perceived by viewers or compatible with the intended future use of the area.

Table 8-21: Visual impact levels – night-time

Magnitude of change	Visual sensitivity				
	Very high	High	Moderate	Low	Negligible
<b>Considerable reduction</b>	Very high adverse	Very high adverse	High adverse	Moderate adverse	Minor adverse
<b>Noticeable reduction</b>	Very high adverse	High adverse	Moderate adverse	Minor adverse	Negligible
<b>No perceived change</b>	Negligible	Negligible	Negligible	Negligible	Negligible
<b>Noticeable improvement</b>	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial	Negligible
<b>Considerable improvement</b>	Very high beneficial	Very high beneficial	High beneficial	Moderate beneficial	Minor beneficial

### 8.3.2 Existing environment

The existing visual environment of the proposal site and surrounds consists of a mix of urban, industrial, commercial, land uses and areas of vegetation. This existing broader visual environment consists of a range of industrial and commercial developments (to the north, east and south) and low-density residential development (to the west). The areas immediately to the north and east of the proposal site are undeveloped greenfield sites, including the area to the south across Lenore Drive. Further to the east is a recycling and recovery facility and a range of large-scale industrial uses, including warehouses and distribution centres with office premises (part of the Eastern Creek Industrial Precinct).

The landform surrounding the proposal site is gently undulating, consisting of a series of hills and valleys created by South Creek and its tributaries. A locally prominent ridgeline which runs north to south is located to the east of the proposal site. The landform falls from this ridge towards Ropes Creek to the western boundary of the proposal site. An area of Coastal Valley Grassy Woodlands extends into the proposal site. However, it does not include any identified valuable scenic areas. The riparian vegetation along the creek is relatively low-lying and provides a green buffer between the proposal site and the residential area of Erskine Park further west. This residential area includes mainly low density lots on landform which rises to another local highpoint, where Erskine Park High School and James Erskine Public School are located.

The planned Archbold Road Upgrade and Extension, on full completion, would be located immediately east of the proposal site, with the Western Access Road located between the northern and southern precast facilities (subject to separate approval). The landscaping of the proposal would be coordinated with any landscaping undertaken as part of the Archbold Road project.

The landscape and visual features of the proposal site and surrounding areas are shown in Figure 8-6.

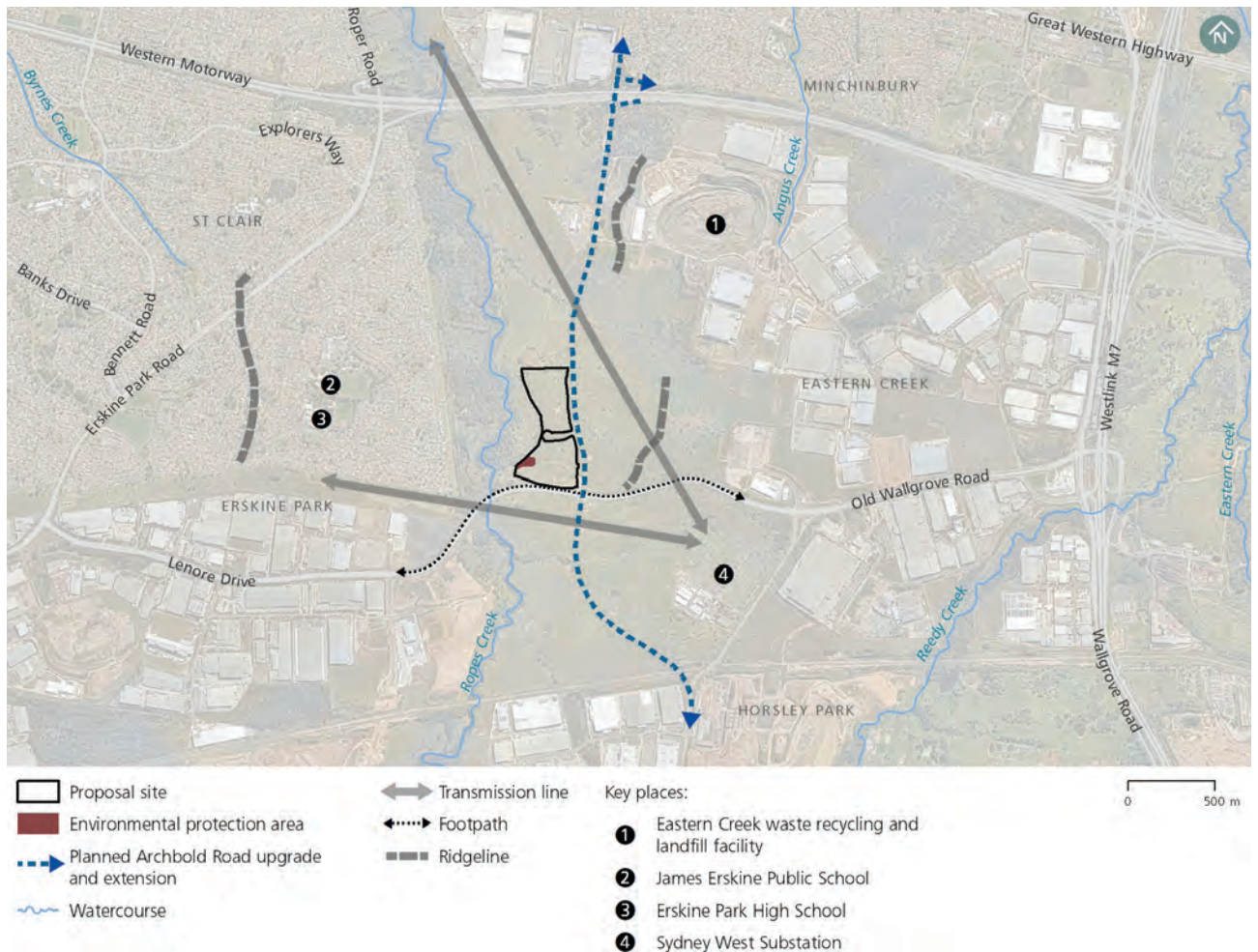


Figure 8-6: Landscape and visual features of the proposal site and surrounds

### 8.3.3 Potential impacts

#### Construction – Landscape character impacts

Overall, there would be a negligible landscape impact during construction.

The proposal site is not open to public use, however, there are some unauthorised recreational uses taking place. The site is located adjacent to the Ropes Creek corridor and is considered to have a ‘neighbourhood landscape sensitivity’. There are no landscapes or public realm areas within the proposal site area which would be impacted by construction of the proposal. The proposal site would be transformed from a predominantly open landscape to a working construction site. However, earthworks and vegetation removal would be relatively minor and the scale of the construction activities would be generally consistent with the adjacent working industrial areas to the east. This would result in a noticeable reduction in the quality and character of this landscape, which is of neighbourhood landscape sensitivity, resulting in a negligible landscape impact during construction. Notwithstanding this, potential impacts during construction would be temporary in nature.

#### Construction – Visual amenity impacts

Six representative viewpoints to assess visual amenity impacts from the proposal are shown on Figure 8-7 and include the following:

- Viewpoint 1: View south from the M4 Western Motorway
- Viewpoint 2: View south-west from Hanson Place
- Viewpoint 3: View north-west from future upgraded and extended Archbold Road / Lenore Drive intersection
- Viewpoint 4: View north-east from Lenore Drive at the Ropes Creek crossing
- Viewpoint 5: View east from Aquarius Crescent, Erskine Park
- Viewpoint 6: View east from Park on Sennar Road, Erskine Park.

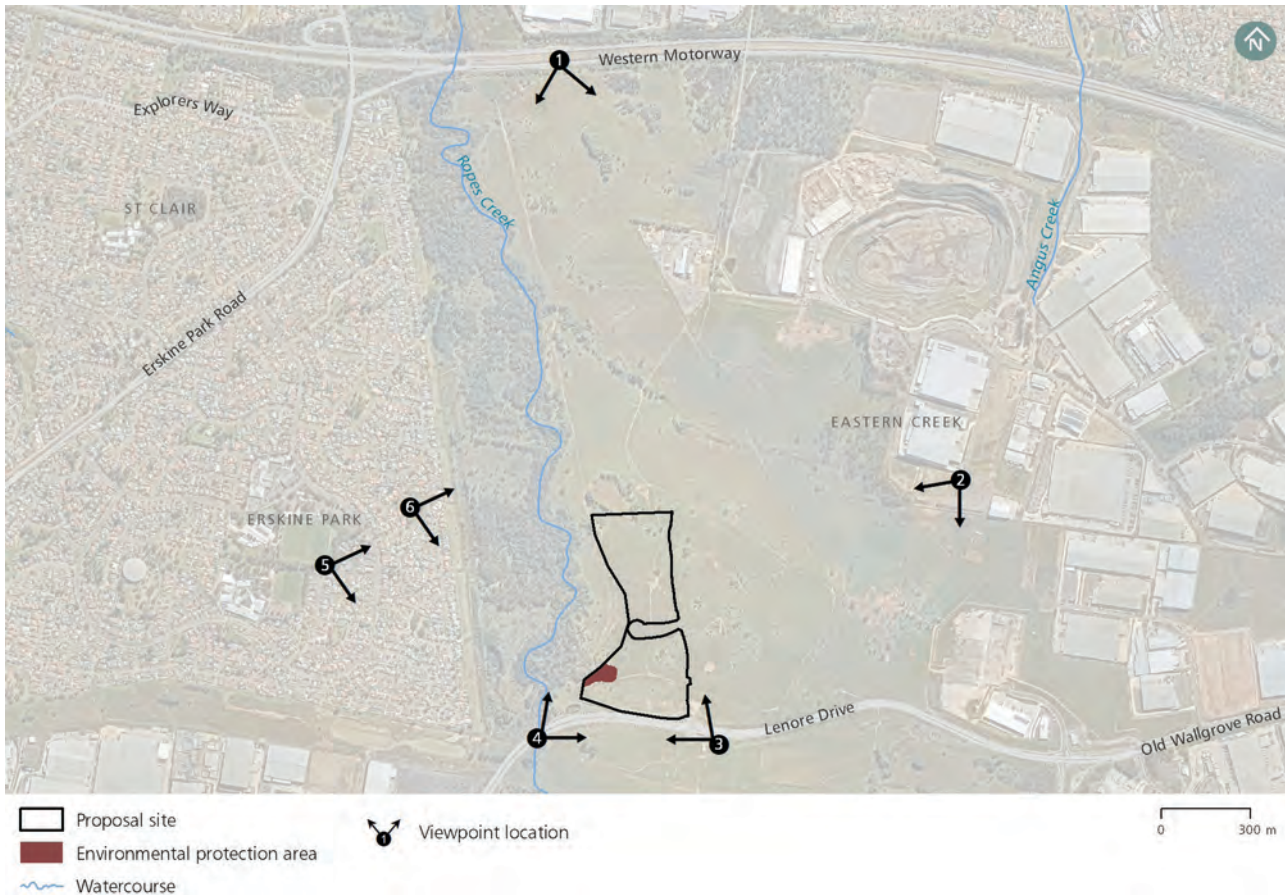


Figure 8-7: Representative viewpoints around the proposal site

Generally there would be negligible to minor adverse potential temporary visual impacts during construction. The proposal site has a relatively limited visual catchment due to the local landform and existing vegetation. An existing ridgeline blocks views from the industrial areas at the east which in turn limits broader views to the proposal site from further east.

Views from Erskine Park residential area west of the proposal site would mostly be limited by vegetation along Ropes Creek corridor. However, the proposal site would be visible in the background of views from the more elevated residential areas further west at Erskine Park. Views to the proposal site from the M4 Western Motorway, located about 1.5 kilometres to the north, would be limited by intervening vegetation, landform, and distance.

There is a view into the proposal site from the intersection of Lenore Drive and the planned Archbold Road upgrade and extension, where there is a break in the mounding present along Lenore Drive. Apart from this section of Lenore Drive, views from the south are limited, due to the lack of public access to the area.

During construction at night there would be a negligible temporary visual impact. Works would generally be scheduled during standard construction hours and any minor lighting associated with the proposal would be absorbed into the broader industrial setting, resulting in no perceived reduction in the amenity of views in the local area, which has a moderate sensitivity level.

The anticipated daytime visual impacts on representative viewpoints as a result of construction of the proposal are outlined below and summarised in Table 8-22.

#### **Viewpoint 1: View south from the M4 Western Motorway**

This view is experienced by road users traveling at speed along the M4 Western Motorway as shown in Figure 8-8. Due to the distance and visual compatibility of the construction work with the character of the emerging industrial precinct surrounding the proposal site, there would be no perceived change in the amenity of this view. This is a view of local sensitivity and there would be a temporary negligible visual impact during construction.



Figure 8-8: Viewpoint 1 – View south from the M4 Western Motorway

#### **Viewpoint 2: View south-west from Hanson Place**

Views from this location would generally be experienced by staff and visitors within the industrial area. As shown in Figure 8-9, there is limited visibility to the proposal site and a high visual absorption capacity for the temporary construction activity due to the existing industrial scale uses. Equipment used during construction would be filtered by patches of native trees along the ridgeline in the middle ground of view. This would result in a noticeable reduction in the amenity of this view, however given that the view is of neighbourhood visual sensitivity, this would result in a temporary negligible visual impact during construction.



Figure 8-9: Viewpoint 2 – View south-west from Hanson Place

**Viewpoint 3: View north-west from the future upgraded Archbold Road / Lenore Drive intersection**

Views from this location would be experienced by vehicles travelling at speed along Lenore Drive and users of the adjacent shared path along this road as shown in Figure 8-10. The view from the north-west from the future upgraded Archbold Road / Lenore Drive intersection is to a relatively open landscape with a vegetated backdrop which would be converted into a large construction site (refer to Figure 8-11). Due to the proximity and intensity of temporary construction activities, this would result in a noticeable reduction in the amenity of this view, which has local sensitivities, and therefore a temporary minor adverse visual impact.



Figure 8-10: Viewpoint 3 - Existing view north-west from future upgraded Archbold Road / Lenore Drive intersection



Figure 8-11: Viewpoint 3 - View north-west from future upgraded Archbold Road / Lenore Drive intersection, indicative extent of proposal site (shown by yellow shading)

**Viewpoint 4: View north-east from Lenore Drive at the Ropes Creek crossing**

Views from this location would be experienced from the users of the footpath, cyclists and vehicles travelling along Lenore Drive as shown in Figure 8-12. The existing vegetation along Lenore Drive would filter views into the proposal site, however, construction activities on the southern area of the proposal site would be seen in the centre of this view. The northern area of the proposal site would be screened by the existing vegetation alongside Ropes Creek which encloses this view. There would be a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a temporary minor adverse visual impact during construction.



Figure 8-12: Viewpoint 4 – View north-east from Lenore Drive at the Ropes Creek crossing





Figure 8-13: Viewpoint 4 - View north-east from Lenore Drive at the Ropes Creek crossing (indicative location of proposal site shown in yellow)

**Viewpoint 5: View east from Aquarius Crescent, Erskine Park**

This view would be experienced by a concentration of residents and visitors in the vicinity of the adjacent schools. The lower elements of the proposal site would be screened by vegetation along Ropes Creek as shown in Figure 8-14. Some construction plant and equipment (e.g. cranes and acoustic sheds) would rise above the vegetation along Ropes Creek and would be partially visible in the background of this view. This would result in a noticeable reduction in the amenity of this view, however given that the view is of neighbourhood visual sensitivity, this would result in a temporary negligible visual impact during construction.



Figure 8-14: Viewpoint 5 – View east from Aquarius Crescent, Erskine Park

**Viewpoint 6: View east from Park on Sennar Road, Erskine Park**

This view would be experienced by recreational users of the park and playground. Similar to Viewpoint 5, the lower elements of the proposal site would be screened by vegetation along Ropes Creek (Figure 8-15). Some construction plant and equipment (e.g. cranes and acoustic sheds) would rise above the vegetation along Ropes Creek and would be partially visible in the background of this view (Figure 8-16). This would result in a noticeable reduction in the amenity of this view, which is of local visual sensitivity, and a temporary minor adverse visual impact during construction.



Figure 8-15: Viewpoint 6 – Existing view east from park on Sennar Road, Erskine Park



Figure 8-16: Viewpoint 6 – View east from Park on Sennar Road, Erskine Park, indicative extent of the proposal site (shown by yellow shading)

Table 8-22: Summary of visual amenity impacts (construction)

Location	Sensitivity	Magnitude	Impact
<b>Daytime</b>			
<b>Viewpoint 1: View south from the M4 Western Motorway</b>	Local	No perceived change	Negligible
<b>Viewpoint 2: View south-west from Hanson Place</b>	Neighbourhood	Noticeable reduction	Negligible
<b>Viewpoint 3: View north-west from future from future upgraded Archbold Road / Lenore Drive intersection</b>	Local	Noticeable reduction	Minor adverse
<b>Viewpoint 4: View north-east from Lenore Drive at the Ropes Creek crossing</b>	Local	Noticeable reduction	Minor adverse
<b>Viewpoint 5: View east from Aquarius Crescent, Erskine Park</b>	Neighbourhood	Noticeable reduction	Negligible
<b>Viewpoint 6: View east from park on Sennar Road, Erskine Park</b>	Local	Noticeable reduction	Minor adverse
<b>Night-time</b>			
<b>Proposal site</b>	Low	No perceived change	Negligible

**Operation – Landscape character impacts**

During operation the proposal would result in a negligible landscape impact.

The proposal would be consistent with the industrial landscape character of the surrounding area – including planned industrial areas surrounding the proposal site and existing industrial areas further from the site. These areas include large scale warehouses, depots and storage facility buildings. Overall, there would be a noticeable reduction in the landscape character of the site, which is of neighbourhood landscape sensitivity, resulting in a negligible landscape impact during operation.

### **Operation – Visual amenity impacts**

Similar to construction, there would generally be negligible to minor adverse potential visual impacts during operation as the proposal site has a relatively limited visual catchment due to the local landform and existing vegetation.

During night-time, the operation of the proposal would have a minor adverse visual impact. Some lighting would be contained in the sheds, however, there would be additional light sources within the proposal site, at ground level, that would add to the brightness of the site. This additional lighting would be viewed in the context of lighting along Lenore Drive and along the future upgraded and extended Archbold Road.

There may be additional skyglow in views from the residential areas of Erskine Park, which could be visible above the proposal site. However, this additional lighting would be seen in the context of the surrounding industrial areas and brightly lit roads such as Lenore Drive. Therefore, it is unlikely that there would be a perceived change in the amenity of views from this location. Overall, there would be a noticeable reduction in the amenity of views at night during the operation of the proposal. As this is a location of low sensitivity, this would result in a minor adverse visual impact at night.

The anticipated daytime visual impacts on representative viewpoints as a result of operation of the proposal are outlined below and summarised in Table 8-23.

#### **Viewpoint 1: View south from the M4 Western Motorway**

Due to the distance and compatibility of the proposal with the desired future character of the surrounding area (zoned IN1 General Industrial) there would be no perceived change in the amenity of this view. During operation, taller elements of the proposal may be visible in the background, such as the upper parts of sheds, silos and gantry cranes. This is a view of local sensitivity and there would be a negligible visual impact as a result of the operation of the proposal.

#### **Viewpoint 2: View south-west from Hanson Place**

During operation, upper parts of stacked piles of precast segments and taller elements of the proposal may be visible from this view, however they would be partly screened by the intervening landform and filtered by existing trees. Due to the limited visibility of the proposal and the compatibility with the existing and intended future industrial uses in the surrounding area, there would be a minor reduction in the amenity of this view, which is of neighbourhood visual sensitivity, resulting in a negligible visual impact during operation.

#### **Viewpoint 3: View north-west from future upgraded and extended Archbold Road / Lenore Drive intersection**

During operation, vehicles accessing the site and features of the proposal site would be visible from this viewpoint. Due to the proximity of the proposal site, constant movement of machinery and vehicles, and obstruction of the vegetated background to this view, there would be a noticeable reduction in visual amenity, however this would be generally compatible with surrounding planned industrial uses (refer to Figure 8-11). This is a view of local visual sensitivity and this would result in a minor adverse visual impact during operation.

#### **Viewpoint 4: View north-east from Lenore Drive at the Ropes Creek crossing**

During operation, areas of the southern precast facility would be visible from this location, however much of the proposal site would be screened by existing vegetation along Ropes Creek. Due to the limited visibility and visual compatibility of the proposal with the intended future industrial use of the proposal site, there would be a noticeable reduction in the amenity of this view (refer to Figure 8-13). This view is of local visual sensitivity, and this would result in a negligible visual impact as a result of the operation of the proposal.

#### **Viewpoint 5: View east from Aquarius Crescent, Erskine Park**

During operation, the southern precast facility would be visible in the background of view, however activity at ground level and lower sections of the structures would be screened by the vegetation along Ropes Creek. Due to the limited visibility and compatibility of the proposal with the intended future industrial use of the proposal site, there would be a noticeable reduction in the amenity of this view. This view is of neighbourhood visual sensitivity, and this would result in a negligible visual impact during operation of the proposal.

### Viewpoint 6: View east from Park on Sennar Road, Erskine Park

During operation, activity at ground level and lower sections of structures would be screened by the vegetation along Ropes Creek. Elements of the southern precast facility (e.g. gantry cranes, upper parts of the shed) would be visible in the background of view through gaps in the vegetation along Ropes Creek. Due to the limited visibility and compatibility of the proposal with the intended future industrial use of the proposal site, there would be a noticeable reduction in the amenity of this view (refer to Figure 8-16). This view is of local visual sensitivity, and this would result in a minor adverse visual impact as a result of the operation of the proposal.

Table 8-23: Summary of visual amenity impacts (operation)

Location	Sensitivity	Magnitude	Impact
<b>Daytime</b>			
<b>Viewpoint 1: View south from the M4 Western Motorway</b>	Local	No perceived change	Negligible
<b>Viewpoint 2: View south-west from Hanson Place</b>	Neighbourhood	Noticeable reduction	Negligible
<b>Viewpoint 3: View north-west from future upgraded and extended Archbold Road / Lenore Drive intersection</b>	Local	Noticeable reduction	Minor adverse
<b>Viewpoint 4: View north-east from Lenore Drive at the Ropes Creek crossing</b>	Local	Noticeable reduction	Minor adverse
<b>Viewpoint 5: View east from Aquarius Crescent, Erskine Park</b>	Neighbourhood	Noticeable reduction	Negligible
<b>Viewpoint 6: View east from park on Sennar Road, Erskine Park</b>	Local	Noticeable reduction	Minor adverse
<b>Night-time</b>			
<b>Proposal site</b>	Low	Noticeable reduction	Minor adverse

### 8.3.4 Management and mitigation measures

Landscape and visual amenity impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework, which includes visual amenity management objectives to minimise impacts on landscape features and reduce visual impacts (including lighting).

The management and mitigation measures that would be implemented to address potential landscape and visual impacts are listed in Table 8-24.

Table 8-24: Management and mitigation measures – landscape and visual

No.	Impact	Environmental management and mitigation measures
<b>LV1</b>	Visual impacts – construction	Where feasible and reasonable, the elements within the construction site would be located to minimise visual impacts (for example storing materials and machinery behind fencing).
<b>LV2</b>	Landscape and visual impact – operation	Sheds would be finished in a colour which aims to minimise visual impacts, if visible from areas external to the site.
<b>LV3</b>	Lighting impacts during operation	Lighting of the sites would be orientated to minimise glare and light spill impacts on adjacent receivers in accordance with AS4282:2019.

## 8.4 Non-Aboriginal heritage

A non-Aboriginal heritage assessment was prepared to assess the potential impacts of the proposal to non-Aboriginal heritage. This assessment is attached as Appendix F (Statement of Heritage Impact) of this REF. The results of the assessment are summarised below.

Cumulative non-Aboriginal heritage impacts associated with nearby projects are discussed in Section 8.16 (Cumulative impacts).

### 8.4.1 Methodology

The non-Aboriginal heritage assessment involved:

- Identifying heritage items within and adjacent to the proposal site through a search of the following registers and databases in March 2020:
  - World Heritage List
  - Commonwealth Heritage List
  - National Heritage List
  - NSW State Heritage Register
  - Blacktown LEP
  - Section 170 heritage and conservation registers
  - NSW State Heritage Inventory database
  - National Trust Register
- Undertaking two proposal site inspections (on 8 April 2020 and 18 June 2020) to identify any potential unlisted heritage items and identify evidence of archaeological remains
- Describing the existing environment, historical context and identified heritage values within the proposal site
- Assessing the potential impacts of the proposal to the heritage significance, including:
  - Potential physical impacts, resulting in the demolition or alteration of fabric of heritage significance or significant archaeological remains
  - Potential visual impacts, resulting in changes to the setting or curtilage of heritage items or places, historic streetscapes and landscapes, visual amenity or views
  - Potential impacts from vibration and settlement
- Assessing the potential for archaeological deposits to remain within the proposal site and potential impacts associated with the proposal
- Identifying a management approach to minimise impacts to non-Aboriginal heritage items and identifying any approvals required for the proposed works.

The assessment of potential heritage impacts, and heritage and archaeological significance of the proposal site was completed in accordance with the following relevant guidelines:

- Statement of Heritage Impact (NSW Heritage Office, 2002) guideline, contained within the NSW Heritage Manual
- Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013 (Burra Charter) (ICOMOS (Australia), 2013)
- NSW Heritage Division's Assessing Significance for Historical Archaeological Sites and Relics (NSW Heritage Division, 2009).

## 8.4.2 Existing environment

### Historical context

The proposal site forms part of the Prospect area. European exploration in the Prospect area began in 1788, extending to Prospect Hill (about 10 kilometres east of the proposal site). Within early years of European settlement, Governor Arthur Phillip placed a farming settlement of about 12 families in the area encircling Prospect Hill in 1791.

The land on which the proposal site is located, formed part of 1100 acres of land granted to John Thomas Campbell in 1819. Campbell named the property 'Mount Philo' after the Philo Free trial of 1817. By 1820, most of the land within and around the proposal site had been cleared, and a number of further land grants made.

In 1832, land ownership was transferred to Charles Roberts, until 1856 when he sold the land to the Shepherd Brothers. They combined the land with their portion of the Erskine Park Estate to the west of Ropes Creek and opened Chatsworth Nursery.

The Shepherd Brothers nursery was one of the earliest commercial nurseries in Australia. They were instrumental in the development of landscape gardening and horticulture and promoted a wide range of exotic plants for use in Australian colonial gardens. The Shepherd Brothers sold the land during the 1890s economic depression.

In 1909, a portion of the land on which the proposal site is located was sold to Thomas Baker, a grazier. After he passed away in 1934, portions of the land were sold and amalgamated. In 1950, Burfield Pty Ltd (renamed Ray Fitzpatrick Pty Ltd) bought the land on which the proposal site is located.

The early land grants at the Prospect area led to an influx of free settlers living in the area. This brought the development of transport, infrastructure, and services. The Prospect area shifted from agricultural land to livestock rearing following the collapse of the cereal grain industry during the 1870s. Nevertheless, the land within and around the proposal site continued to be utilised for agricultural purposes throughout the remainder of the nineteenth and into the twentieth century. Development was limited to a number of rural properties, which included residential properties, outbuildings, barn structures, open paddocks and crop fields.

### Archaeological potential

The significance assessment for the archaeological potential of remains that may be present within the proposal site was undertaken against the NSW heritage significance criteria (NSW Heritage Division 2009).

The assessment of archaeological potential has been divided into the following historical phases:

- **Phase one** – early land use and grants (c1819 – mid-19th century)
- **Phase two** – horticultural and agricultural development, the Chatsworth Estate (mid-19th century – mid-20th century)
- **Phase three** – cattle grazing and current landscape (mid-20th century – present).

A shed and yard complex associated with twentieth century rural history and development of the local area was identified at the north-eastern portion of the proposal site (see Figure 8-17). The majority of the complex is located outside of the proposal site however the former fenced paddocks associated with the complex are partially located within the proposal site.

A small rubbish dump is located about 75 metres south of the shed and yard complex where further historic remains were identified. This rubbish dump contains a variety of metal and brick debris, including remains of a metal fridge as well as several fence posts and star pickets.

Potential archaeological remains associated with phases two and three may be present within the proposal site. Areas of historical archaeological potential relating to phases two and three are relevant to the shed and yard complex, while the rubbish dump only contains archaeological remains associated with phase three. However, these remains are not expected to reach the threshold for local significance as they also do not fulfil the NSW heritage significance criteria.

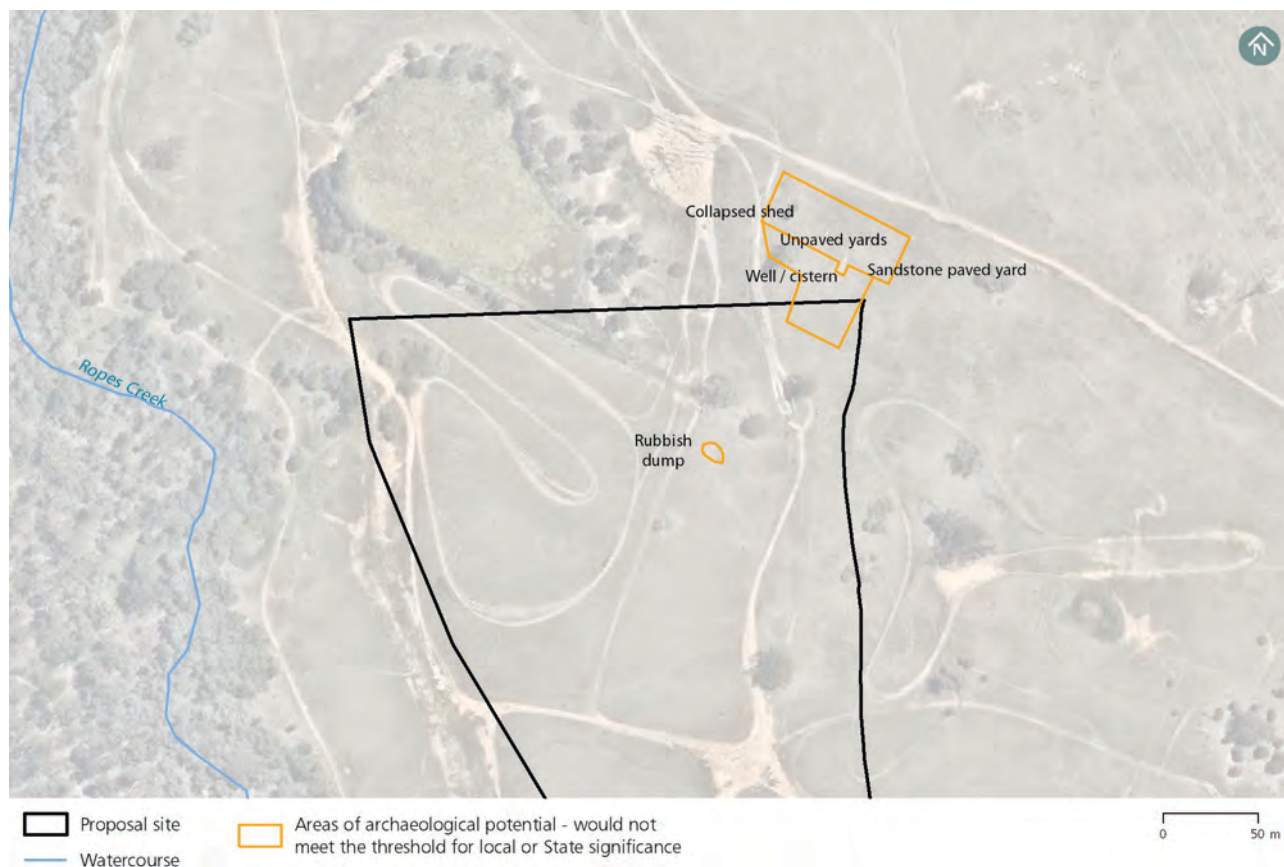


Figure 8-17: Areas of historical archaeological potential relating to phases two and three at the proposal site

A summary of the archaeological potential and significance is outlined in Table 8-25.

Table 8-25: Summary of archaeological potential and heritage significance

Phase	Potential remains	Significance	Potential
Phase one (c1819 – mid-19th century)	Evidence of early land grants and subdivisions, land clearance, agricultural use	N/A	Nil
Phase two (mid-19th century – mid-20th century)	Evidence of horticultural and agricultural activities, evidence of fence lines	N/A	Nil
	Shed and yard complex	Nil	High
Phase three (mid-20th century – present)	Shed feature, formalised and continued use at the shed and yard complex, rubbish dump, existing development	Nil	High

### 8.4.3 Potential impacts

#### Heritage impact assessment

There are no listed heritage items or potential heritage items identified within the proposal site and immediate surrounds. As such, there would be no physical or visual impacts to known heritage items as a result of the proposal and no impacts from vibration or settlement.

#### Archaeological impact assessment

There would be no archaeological impacts to items of non-Aboriginal significance as a result of the proposal.

The proposal site overlaps with the paddocks associated with the shed and yard complex in the north-eastern corner of the proposal site as well as a small rubbish dump (refer to Figure 8-17). However, as previously stated, these potential archaeological remains are not expected to reach the threshold for local significance.



The remainder of the proposal site has been assessed as having nil to low potential for archaeological remains. Potential archaeological remains which may be identified across the remainder of the proposal site are not expected to reach the threshold for local significance.

#### Statement of heritage impact

A statement of heritage impact has been prepared with reference to the NSW Heritage Division guidelines (NSW Office of Environment and Heritage, 2002) as outlined in Table 8-26.

Table 8-26: Statement of heritage impact for the proposal

Development	Discussion
<b>What aspects of the proposal respect or enhance the heritage significance of the study area?</b>	The proposal is in a location which avoids locally significant structural remains associated with the former Chatsworth Estate to the north. The proposal site does not have identified heritage significance. No heritage items have been identified as subject to visual impacts associated with the proposed development.
<b>What aspects of the proposal could have a detrimental impact on the heritage significance of the study area?</b>	The proposal would have a physical impact on potential archaeological remains within the north-eastern corner of the proposal site. However, these potential remains are not expected to reach the threshold for local significance. No listed heritage items or areas of archaeological potential which may reach the local significance threshold have been identified within the proposal site. Therefore, there would be no detrimental impacts to the heritage significance of the proposal site.
<b>Have more sympathetic options been considered and discounted?</b>	The proposal would not have a physical or visual impact on heritage listed items or significant remains, so consideration of more sympathetic options was not required.

#### 8.4.4 Management and mitigation measures

Non-Aboriginal heritage impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework. The Construction Environmental Management Framework includes heritage management objectives to minimise impacts on items or places of heritage value, avoid accidental impacts on heritage items, and maximise workers' awareness of non-Aboriginal heritage.

The Construction Environmental Management Framework also includes:

- Procedures for unexpected heritage finds
- Heritage monitoring requirements.

Table 8-27: Management and mitigation measures - Non-Aboriginal heritage

No.	Impact	Management and mitigation measures
<b>NAH1</b>	Unexpected finds	An Unexpected Finds Procedure, to be implemented in the event that potential non-Aboriginal heritage objects are exposed during construction, would be prepared that complies with the <i>Heritage Act 1977</i> .

As there would be no impacts to built non-Aboriginal heritage items and no archaeological items of non-Aboriginal heritage significance are expected to occur on the site, the potential impacts would be adequately managed through the Construction Environmental Management Framework and no further mitigation measures are required.

## 8.5 Aboriginal heritage

An Aboriginal Archaeological Survey Report was prepared to assess the potential impacts of the proposal to Aboriginal heritage. The assessment is attached as Appendix F (Archaeological Survey Report) of this REF. The methodology and results of the assessment are summarised below.

Cumulative Aboriginal heritage impacts associated with nearby projects are discussed in Section 8.16 (Cumulative impacts).

### 8.5.1 Methodology

The Aboriginal heritage assessment involved:

- Undertaking a desktop review of archaeological literature and databases to identify listed Aboriginal sites and places within the proposal site, including:
  - A search of the Aboriginal Heritage Information Management System (AHIMS) for listed Aboriginal sites, carried out on 27 March 2020
  - An assessment of the archaeological context of the proposal site, including previous archaeological work in the area
- Undertaking archaeological surveys on 8 April 2020 (Artefact) and 18 June 2020 (Artefact and Deerubbin Local Aboriginal Land Council)
- Developing a predictive model to assist in determining archaeological potential
- Assessing the significance of the archaeological potential in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (Office of Environment and Heritage 2011)
- Assessing the potential impacts of the proposal
- Identifying management and mitigation measures to manage impacts to Aboriginal items or areas of Aboriginal cultural sensitivity.

The assessment of Aboriginal heritage was undertaken in accordance with the requirements of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010a).

The archaeological survey was delineated into three survey units based on landform, breaks in the landscape and evidence of former disturbances as shown in Figure 8-18.

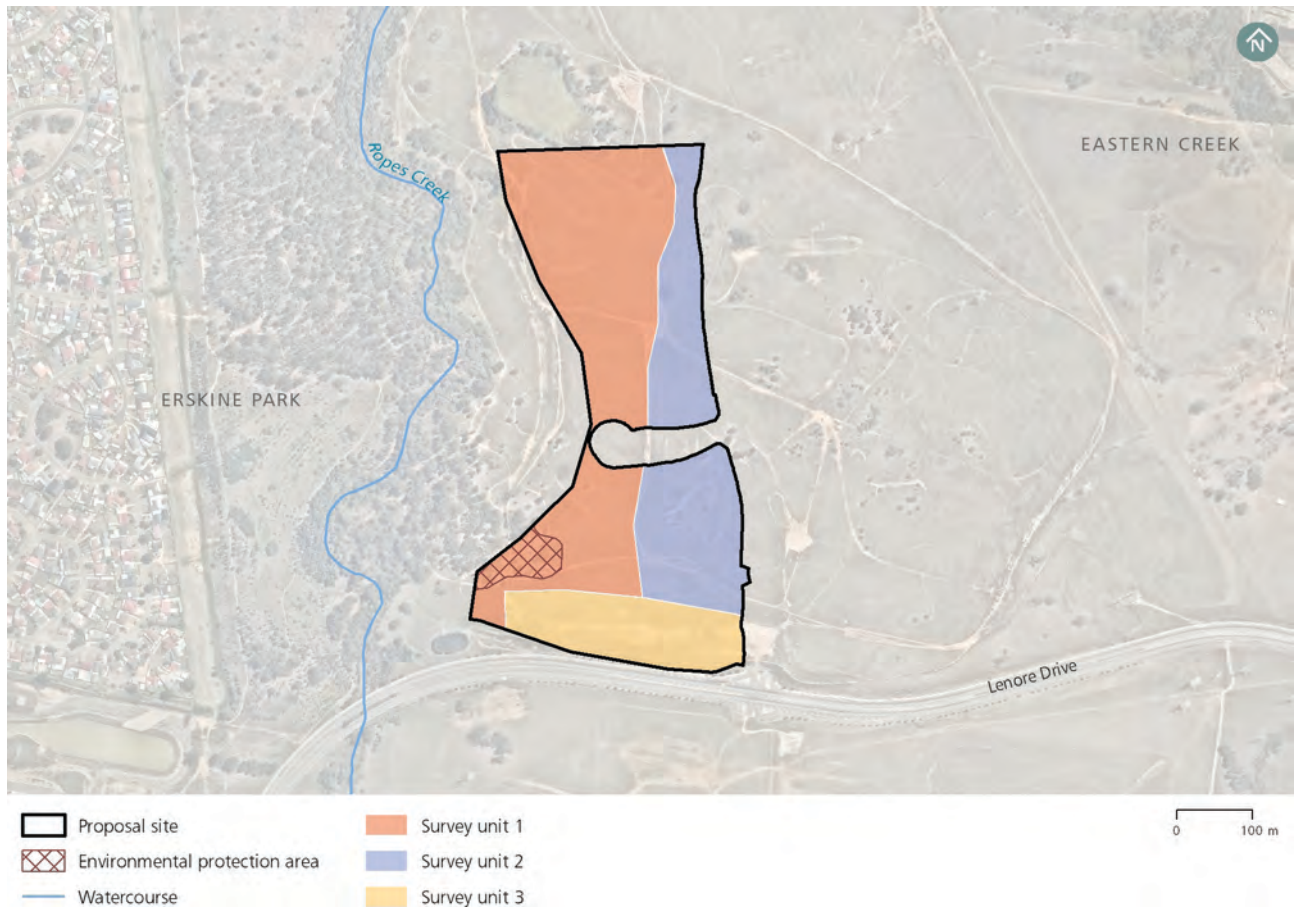


Figure 8-18: Survey units within the proposal site

Survey coverage has been undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010a).

## 8.5.2 Existing environment

### Aboriginal historical and archaeological context

The proposal site is located in the Cumberland Plain, which would have been a suitable location for Aboriginal occupation, surrounded by valuable natural features, close to water sources, near hills and cliffs, and close to raw materials (e.g. silcrete) suitable for the construction of stone tools.

The Cumberland Plain was home to a number of different Aboriginal groups. The predominant language group spoken on the Cumberland Plain is known as Darug. British rural settlement began in the western Cumberland Plain around 1791, and several Aboriginal groups remained in the area despite the tensions between Aboriginal people and colonisers.

The first parcels of land granted to an Aboriginal person were located about eight kilometres north of the proposal site, between Richmond Road and Plumpton Ridge along Bells Creek. This land was granted to Colebee and Nurragingy in 1819. Nurragingy inhabited the land until 1920 when it was resumed by the Aboriginal Protection Board. The area remains significant for its historical, archaeological and social values. Descendants of the Darug language group continue to live in Western Sydney along with Aboriginal people from other areas of NSW.

Ropes Creek is a major watercourse in the region and first order waterline with smaller tributaries that branch from Ropes Creek, including one first order tributary across the northern portion of the proposal site. Previous archaeological investigations have identified some particularly high concentrations of artefacts in raised areas adjacent to Ropes Creek. While the presence of artefacts is noted surrounding first order waterlines, their prevalence appears to decrease with increasing distance from Ropes Creek.

Silcrete has been identified as the predominant raw material found in proximity to the proposal site, including in Erskine Park (about 3.7 kilometres west of the proposal site) and Plumpton Ridge (about 8.2 kilometres northeast of the proposal site).

### Previously registered Aboriginal heritage sites

An extensive search of the AHIMS database was undertaken on 27 March 2020 (AHIMS search ID 491998). The search area was about 3.6 kilometres by 3.9 kilometres.

A total of 112 Aboriginal sites were identified in the AHIMS search area. The majority of the recorded site features are artefacts (107 in total).

A substantial number of sites are located within and in close proximity to the open grassland areas adjacent to Ropes Creek. Sites located to the north of the proposal site include a density of artefact sites associated with slope and crest landforms.

Nine sites have been previously recorded either within or in the immediate vicinity of the proposal site. Five sites are within the proposal site, two are partially within, and two are in close proximity. A preliminary assessment of the sites within close proximity to the proposal was undertaken to confirm if their site boundaries extend into the proposal site. Those sites which do not extend into the proposal site are not further considered in the assessment as they would not be subject to impacts.

### Aboriginal sites recorded during investigations

Recorded Aboriginal sites and additional sites identified during the archaeological survey within or partially within the proposal site are outlined in Table 8-28. This included seven previously recorded sites and three newly identified sites.

Table 8-28: Recorded Aboriginal sites and additional sites

Site name	Site type	Location	Description
<b>Previously recorded sites</b>			
<b>Blacktown Southwest 11 (AHIMS ID 45-5-0563)</b>	Artefact scatter	Within the proposal site	The coordinates of the registered site recorded on AHIMS did not match description of the landform within the site card (used to record Aboriginal sites in NSW). The registered site coordinates were approximately 45 m north of the drainage line identified within the site card, therefore it is assumed the site coordinates are incorrect. No Aboriginal objects were located within the registered site coordinates or assessed site location.
<b>Blacktown Southwest 7 (AHIMS ID 45-5-0559)</b>	Artefact scatter	Partially within the proposal site	The registered site has been partially destroyed by the installation of a Sydney Water pipeline for the St Mary's Wastewater System Augmentation project associated with a previous AHIP (AHIP C0000501) in 2014. Salvage excavation prior to the installation of the pipeline resulted in the recovery of 1,346 artefacts from a 25 m <sup>2</sup> salvage area. Following salvage excavation, these artefacts were reburied throughout the wider site extent of the proposal site.  The archaeological survey identified five new artefacts within the former AHIPC0000501 boundary, including three pink silcrete flakes, one red silcrete flake and an orange mudstone multi-platform core. High grasses obscured the remainder of the site extent.  Additional evidence of disturbance was noted with sandstone-based fill material spread across the wider extent of the registered site. Examination of exposures confirmed that visible soils within this portion of the project site were relatively intact. The site extent was modified to encompass the entirety of the localised rise associated with this landform.

Site name	Site type	Location	Description
<b>RCIF 2 (AHIMS ID 45-5-3159)</b>	Artefact scatter, Potential Archaeological Deposit (PAD)	Partially within the proposal site	<p>The original site recording noted an isolated mudstone flake located within an eroding creek gully with the likely presence of additional artefacts including sub-surface deposits. Salvage excavation of the registered site was undertaken as a condition of AHIP C0000501 in 2014 which recovered 463 artefacts from 25 m<sup>2</sup> of excavation. Artefacts recovered from the salvage excavation were reburied within the registered site extent. The archaeological survey undertaken for this assessment identified nine additional artefacts within the former AHIP boundary and the proposal site, which included two pink silcrete flakes, three yellow silcrete flakes and four red silcrete flakes.</p> <p>During the archaeological survey it was identified that the landscape to the east and west of the original recorded extent of the registered site was relatively intact, with limited evidence of disturbance, and was associated with the same drainage line as the original site recording. As a result, the registered site extent was reassessed and extended with areas of potential identified to the east and west (of the original registered site extent).</p>
<b>RCAS 4 (AHIMS ID 45-5-3162)</b>	Artefact scatter	Within the proposal site	<p>This registered site was previously recorded as an artefact scatter comprised of seven artefacts located within a vehicle track exposure. The registered site consisted of four red silcrete flakes, two grey silcrete flakes and one quartz flake.</p> <p>The registered site is heavily vegetated by thick grasses. No Aboriginal objects were identified during the archaeological survey within the registered site due to limited visibility.</p>
<b>RCAS 5 (AHIMS ID 45-5-3163)</b>	Artefact scatter	Within the proposal site	<p>This registered site was previously recorded as an artefact scatter eroded from the surrounds of a dam located along the original course of a tributary of Ropes Creek. The registered site was recorded as three red silcrete flakes scattered along an 8 m area. The coordinates of the registered site recorded on AHIMS did not match the description of the landform within the site card, therefore the site location was reassessed. The dam was heavily overgrown with grasses. No Aboriginal objects (either previously recorded or additional) were located.</p>
<b>AIF-06 (AHIMS ID 45-5-4599)</b>	Isolated find	Within the proposal site	<p>The registered site was comprised of a red silcrete flake. No evidence of surface disturbance since the original registered site recording has been identified, suggesting that the artefact may remain on the ground surface in this area. However, the artefact was not located during the archaeological survey due to lack of surface visibility.</p>
<b>AIF-05 (AHIMS ID 45-5-4605)</b>	Isolated find	Within the proposal site	<p>The registered site was comprised of a yellow silcrete distal flake. No evidence of surface disturbance since the original registered site recording has been identified, suggesting that the artefact may remain on the ground surface in this area. However, the artefact was not located during the archaeological survey due to lack of surface visibility.</p>
<b>Newly identified sites</b>			
<b>RCAS 09 (AHIMS ID 45-5-5355)</b>	Artefact scatter, PAD	Within the proposal site	<p>This registered site comprises eight silcrete artefacts and an area of PAD located within a wide exposure associated with intersecting vehicle tracks running parallel to Ropes Creek. Artefacts observed across the site are considered likely to have been subject to some level of post depositional movement through erosion caused by former vehicle use. The RCAS 09 site is considered to contain limited subsurface potential.</p>

Site name	Site type	Location	Description
<b>RCAS 10 (AHIMS ID 45-5-5354)</b>	Artefact scatter	Within the proposal site	This registered site comprises an artefact scatter located within a vehicle track exposure running perpendicular to Ropes Creek. A total of three silcrete artefacts were located within the site extent over a 15 m length of the vehicle track. Artefacts present included a single platform core, a complete flake and a proximal flake fragment.
<b>RCAS 11 (AHIMS ID 45-5-5353)</b>	Artefact scatter	Within the proposal site	This registered site comprises an artefact scatter within an exposure associated with an unauthorised trail bike track. A total of three artefacts were located within the site extent over a 10 m length of the trail bike track. Artefacts present included an indurated mudstone/tuff proximal flake fragment, a silcrete distal flake fragment and a silcrete proximal flake fragment. A large silcrete cobble was also identified within the wider site extent however, as it was partially buried, it could not be fully examined for evidence of knapping.

### Aboriginal archaeological significance assessment

A summary of archaeological significance for the above Aboriginal sites within the proposal site is presented in Table 8-29.

Table 8-29: Summary of archaeological significance

Site name and AHIMS ID	Research potential	Representative value	Rarity	Education potential	Overall archaeological significance
<b>Blacktown Southwest 11 (AHIMS ID 45-5-0563)</b>	Moderate	Low	Low	Low	Low
<b>Blacktown Southwest 7 (AHIMS ID 45-5-0559)</b>	Moderate-high	High	High	High	High
<b>RCIF 2, (AHIMS ID 45-5-3159)</b>	Moderate-high	High	High	High	High
<b>RCAS 4, (AHIMS ID 45-5-3162)</b>	Moderate	Low	Low	Low	Low
<b>RCAS 5, (AHIMS ID 45-5-3163)</b>	Moderate	Low	Low	Low	Low
<b>AIF-06, (AHIMS ID 45-5-4599)</b>	Low	Low	Low	Low	Low
<b>AIF-05, (AHIMS ID 45-5-4605)</b>	Low	Low	Low	Low	Low
<b>RCAS 09 (AHIMS ID 45-5-5355)</b>	Moderate	Moderate	Low	Low	Moderate
<b>RCAS 10 (AHIMS ID 45-5-5354)</b>	Low	Low	Low	Low	Low
<b>RCAS 11 (AHIMS ID 45-5-5353)</b>	Low	Low	Low	Low	Low

### Aboriginal cultural significance

No specific areas of cultural significance were identified during the site survey which was undertaken with a representative of Deerubbin Local Aboriginal Land Council. Further assessment of the cultural significance of proposal site would be undertaken during preparation of the ACHAR for the proposal.

### 8.5.3 Potential impacts

#### Construction

Test excavation would be undertaken, in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010a), in order to determine whether subsurface Aboriginal objects are present within the expanded site extent of RCIF 2 (AHIMS ID 45-5-3159), Blacktown Southwest 11 (AHIMS ID 45-5-0559), and the area of PAD identified within Ropes Creek Artefact Scatter 09 (AHIMS ID pending). Test excavation would confirm the extent of subsurface artefacts, their association with other sites in the area and their significance. An AHIP would be required as the Aboriginal objects identified within the proposal site are not currently subject to an AHIP.

Earthworks undertaken during construction activities would result in partial to total removal of Aboriginal sites identified within the proposal site. A portion of RCIF 2 (AHIMS ID 45-5-3159) would be preserved as it extends across the environmental protection area in the south-west of the proposal site which would not be directly impacted by the proposal. Blacktown Southwest 7 (AHIMS ID 45-5-0559) extends past the proposal site boundary and a portion of this registered site would also remain intact.

A summary of impacts on identified Aboriginal sites is outlined in Table 8-30.

Table 8-30: Summary of impacts on identified Aboriginal sites

Site name and AHIMS ID	Type of harm	Degree of harm	Consequence of harm
Blacktown Southwest 11, (AHIMS ID 45-5-0563)	Direct	Total	Total loss of value
Blacktown Southwest 7, (AHIMS ID 45-5-0559)	Direct	Partial	Partial loss of value
RCIF 2, (AHIMS ID 45-5-3159)	Direct	Partial	Partial loss of value
RCAS 4, (AHIMS ID 45-5-3162)	Direct	Total	Total loss of value
RCAS 5, (AHIMS ID 45-5-3163)	Direct	Total	Total loss of value
AIF-06, (AHIMS ID 45-5-4599)	Direct	Total	Total loss of value
AIF-05, (AHIMS ID 45-5-4605)	Direct	Total	Total loss of value
RCAS 09 (AHIMS ID 45-5-5355)	Direct	Total	Total loss of value
RCAS 10 (AHIMS ID 45-5-5354)	Direct	Total	Total loss of value
RCAS 11 (AHIMS ID 45-5-5353)	Direct	Total	Total loss of value

Aboriginal site AIF-06 (AHIMS ID 45-5-4599) is also within the boundary of the planned Archbold Road upgrade and extension. Sydney Metro would liaise with other relevant parts of Transport for NSW regarding overlapping impacts to Aboriginal site AIF-06 (AHIMS ID 45-5-4599) and coordinating further assessment and management. Sydney Metro and other relevant parts of Transport for NSW would coordinate any future ACHAR and AHIP application(s).

#### Operation

There is not expected to be additional impacts on Aboriginal heritage significance during operation of the proposal as earthworks would be restricted to the construction phase.

### 8.5.4 Management and mitigation measures

Aboriginal heritage impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework. The Construction Environmental Management Framework includes heritage management objectives to minimise impacts on items or places of heritage value, avoid accidental impacts on heritage items, and maximise workers' awareness of Aboriginal heritage.

The Construction Environmental Management Framework also includes:

- Procedures for undertaking any recordings of heritage items prior to works commencing
- Procedures for unexpected heritage finds
- Heritage monitoring requirements.

The management and mitigation measures that would be implemented to address potential Aboriginal heritage impacts are listed in Table 8-31.

Table 8-31: Management and mitigation measures - Aboriginal heritage

No.	Impact	Management and mitigation measures
AH1	Test excavation	<p>Archaeological test excavation would be limited to the proposal site and undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010a) to confirm the geographic extent of RCIF 2 (AHIMS ID 45-5-3159), Blacktown Southwest 11 (AHIMS ID 45-5-0559) and the area of PAD identified within Ropes Creek Artefact Scatter 09 (AHIMS ID 45-5-5355).</p> <p>Test excavation would be limited to areas subject to potential impacts by the proposal, and outside the area already salvaged and subject to impacts by the St Mary's Wastewater System Augmentation project. Archaeological test excavation would be undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010a).</p>
AH2	Consultation	As part of the preparation of the test excavation methodology and ACHAR, comprehensive Aboriginal stakeholder consultation would be carried out in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010b) and the National Parks and Wildlife Regulation 2019.
AH3	Aboriginal heritage	An AHIP would be submitted to the NSW DPC for those portions of the proposal site subject to impacts once test excavation is completed. The AHIP application would be supported by an ACHAR and test excavation report.
AH4	Overlapping impact	Sydney Metro would liaise with Transport for NSW regarding overlapping impacts to Aboriginal site AIF-06 (AHIMS ID 45-5-4599) and coordinating further assessment and management.
AH5	Unexpected finds	In the event that suspected Aboriginal ancestral remains are exposed during construction, the requirements of Section 3.6 of the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010) would be implemented.



## 8.6 Land use, property and socio-economic

This section assesses the potential land use, property and socio-economic impacts of the proposal.

### 8.6.1 Methodology

The land use, property and socio-economic impact assessment involved:

- Describing the existing environment with reference to existing land uses and planning controls, based on a review of aerial photography and land use zones specified by applicable environmental planning instruments including the WSEA SEPP
- Describing the existing social environment using population and demographic data for the Rooty Hill – Eastern Creek Statistical Area 2 (SA2) from the Australian Bureau of Statistics and identifying the existing regional, district and local social infrastructure
- Reviewing relevant strategy and policy documentation to identify future land use priorities and developments
- Assessing the potential impacts of construction and operation of the proposal on existing community, social environment, property and land use in and around the proposal site
- Identifying a management approach to avoid or manage potential impacts to land use, property, community values and commercial values of the proposal site and surrounds.

### 8.6.2 Existing environment

#### Land use

The proposal would be located at Eastern Creek within the Blacktown City Council LGA between Lenore Drive/ Old Wallgrove Road to the south, M4 Western Motorway further north, Ropes Creek to the west and the planned Archbold Road upgrade and extension to the east (subject to separate approval by other parts of Transport for NSW). The proposal site is under the ownership of Sydney Metro as noted in Chapter 5 (Description of the proposal).

The proposal site is a relatively cleared greenfield site which has been historically used for agricultural/farming purposes. More recently, the proposal site has been subject to uses such as unauthorised off-roading and illegal depositing of waste. There is no public access to the proposal site.

The proposal site is zoned IN1 General Industrial under the WSEA SEPP as outlined in Figure 4-2.

Land to the immediate north and east is undeveloped land, zoned for industrial use under the WSEA SEPP and owned by the Office of Strategic Lands (refer to Chapter 1 (Introduction) for more details). Other land uses surrounding the proposal site include:

- The Minchinbury industrial area and Dagara Badu Reserve are located across the M4 Western Motorway about 1.7 kilometres to the north of the proposal site
- Lenore Drive is located to the immediate south with undeveloped greenfield land (zoned RE1 public recreation under the Blacktown LEP 2015) located further south and the TransGrid Sydney West electrical substation located even further south-east
- The wider Eastern Creek Industrial Precinct is located to the east. About 800 metres to the north-east is an asphalt and bitumen paving plant and recycling facility
- Ropes Creek is located to the west and is surrounded by existing riparian vegetation, with Erskine Park residential area located further west which is classified as low density development. These are the closest residential properties and are located about 375 metres away.

Development within the WSEA is prescribed by the WSEA SEPP as noted in Chapter 4 (Statutory and planning considerations). Subject to surrounding future development, the proposal site would be located within an industrial area (zoned IN1 General Industrial under the WSEA SEPP) and integrated within the broader development of the WSEA. The WSEA provides businesses in the region with land for industry and employment, for a range of uses such as transport, logistics, warehousing and office space. The Blacktown LSPS further supports the growth and use of the surrounding sites for industrial purposes as outlined in Chapter 2 (Need for the proposal).

## Community profile

The proposal site is located within the Rooty Hill – Eastern Creek SA2 (Australian Bureau of Statistics, 2016). The key demographics from the census of 2016 for this statistical area were:

- A total population of 15,532 with an average household size of 3.33 people
- A median age of 34, with the largest age group between 35 to 39 years old (7.6 per cent)
- An unemployment rate of seven per cent which is slightly higher compared to Greater Sydney (six per cent)
- A median weekly household income of \$1,747 which is comparable to Greater Sydney (\$1,745)
- A demographic composition comprised of skilled professionals, clerical and administrative workers, and machinery operators and drivers. In combination, these three occupations accounted for about 47 per cent of the total employed resident population
- The three main industry sectors included health care and social assistance (15 per cent), retail trade (10.8 per cent) and manufacturing (9.5 per cent). In combination, these three industries employed 35.3 per cent of the total resident population within the statistical area.

## Community values

As noted in Chapter 2 (Need for the proposal), the Community Strategic Plan – Our Blacktown 2036 (Blacktown City Council, 2017) reflects Blacktown City's growing population and the changing needs of the community. The Community Strategic Plan has been prepared based on extensive community engagement and provides insight into issues important to the community.

Key community priorities identified include community aspirations for a vibrant inclusive community, a clean sustainable and healthy environment, a smart and prosperous economy, a growing city supported by accessible infrastructure, a sporting and active city, and a leading city.

## Social infrastructure

There is no existing social infrastructure within the immediate vicinity of the proposal site. A greenfield area (zoned RE1 Public Recreation) is located to the west of the proposal site, however this area is not publicly accessible. Social infrastructure within the Erskine Park residential area to the west of the proposal site includes:

- Peppertree Reserve (about 800 metres from the proposal)
- Erskine Park Community Centre and Hall (about one kilometre from the proposal)
- Iglesia Ni Cristo Church (about one kilometre from the proposal)
- James Erskine Public School (about one kilometre from the proposal)
- Erskine Park High School (about one kilometre from the proposal)
- Phoenix Reserve (about one kilometre from the proposal).

### 8.6.3 Potential impacts

#### Construction

As identified in Chapter 5 (Description of the proposal), the proposal site has recently been acquired by Sydney Metro. No additional acquisition of property would be required for the proposal.

The proposal provides for a positive socio-economic impact by stimulating the local economy through the creation of temporary employment during construction. A workforce of about 60 staff per facility (during peak construction period) would be employed during the construction of the proposal.

The construction of the proposal would be unlikely to cause any negative social or economic impacts to surrounding social infrastructure due to the distance to the proposal site. The proposal has the potential to cause temporary minor disruptions to the surrounding locality. These would mostly be due to minor traffic delays, noise and air emissions, and visual amenity.

Potential temporary impacts and corresponding management and mitigation measures related to noise and vibration, traffic, transport and access, landscape and visual, and air quality are discussed in Section 8.1 (Noise and vibration), Section 8.2 (Traffic and transport), Section 8.3 (Landscape and visual character) and Section 8.13 (Air quality) respectively.

## Operation

The proposal would be located on land zoned IN1 General Industrial under the WSEA SEPP. The proposal would be consistent with the objectives of this land use zoning as outlined in Chapter 2 (Need for the proposal).

The proposal would alter currently unused land for a use that is consistent with the zoning provisions and the planned surrounding land uses, while minimising impacts to surrounding industrial and residential receivers. The proposal would not preclude the establishment of the immediately surrounding industrial area and the ongoing use of the Ropes Creek and Eastern Creek Precinct, and, as the first development of the land for industrial use, may provide a catalyst for the development of the surrounding industrial zoned land.

The proposal has the potential to have a positive socio-economic impact by stimulating the local economy through the creation of employment during operation of the precast facilities. About 120 personnel (60 for each precast facility) would be working on the proposal site at any one time. Operation of the proposal would also potentially provide indirect employment through demand for industries that provide resources or waste management services.

Management and mitigation measures regarding potential impacts to adjacent land uses during the operation of the proposal, such as noise and vibration, traffic and transport, landscape and visual and air quality are discussed in Section 8.1 (Noise and vibration), Section 8.2 (Traffic and transport), Section 8.3 (Landscape and visual character) and Section 8.13 (Air quality) respectively.

### 8.6.4 Management and mitigation measures

Management and mitigation measures regarding potential impacts to adjacent land uses during construction and operation, such as noise and vibration, traffic, transport and access, landscape and visual and air quality are discussed in Section 8.1 (Noise and vibration), Section 8.2 (Traffic and transport), Section 8.3 (Landscape and visual character) and Section 8.13 (Air quality) respectively. These measures would minimise the potential social impacts of the proposal.

Given the minor impact of the proposal on existing land uses and the surrounding social infrastructure, no specific management and mitigation measures are required during construction or operation of the proposal. However, ongoing engagement with the community and affected stakeholders regarding the proposal would be carried out (refer to Chapter 6 (Stakeholder and community consultation)).

## 8.7 Flooding

A hydrology and flooding assessment has been prepared for the proposal. This assessment is attached as Appendix G (Hydrology and Flooding Technical Paper) of this REF. The methodology and results of this assessment are summarised in this section.

Cumulative hydrology and flooding impacts associated with multiple works being completed near the proposal site (or based on other criteria) are discussed in Section 8.16 (Cumulative impacts).

### 8.7.1 Methodology

The hydrology and flooding assessment involved:

- Undertaking a desktop review of available flood study reports from Blacktown City Council and other sources to characterise existing flooding conditions at the proposal site and the surrounding area. Parameters considered include:
  - The topography in the vicinity of the sites and presence of flow paths and watercourses, using aerial laser survey data
  - Flood depths and levels
  - Flood hazard
  - Flood hydraulic categories including floodway and flood storage
- Undertaking flood modelling to determine flooding conditions where adequate existing flood information was not available. Flood modelling was estimated using hydrologic modelling in XP-RAFTS and hydraulic modelling in TUFLOW software
- Assessing the potential hydrology and flooding impacts associated with the proposal during construction and operation
- Identifying management and mitigation measures to address potential impacts associated with hydrology and flooding.

### 8.7.2 Existing environment

#### Hydrologic context

Ropes Creek is located to the west of the proposal site, flowing from south to north. As seen in Figure 8-19, two main overland flow paths in the north and south of the proposal site originate at the east of the proposal site on land with moderate slope. A minor, shallow flow path is also present in the central section of the proposal site.

The flow path at the north drains in a north-westerly direction into a large dam which straddles the northern boundary of the proposal site, which then discharges to Ropes Creek at the north of the proposal site. There is a second, smaller dam on the northern flow path located about 300 metres upstream of the first dam and situated outside of the proposal site.

The southern flow path drains in a westerly direction through the southern portion of the proposal site, about 100 metres north of Lenore Drive, and discharges to Ropes Creek at the south-western boundary of the proposal site. There is an existing dam on the southern flow path, located within the proposal site.

The riparian corridor along Ropes Creek is moderately to densely vegetated. There is little to no existing riparian vegetation along the flow paths within the proposal site.

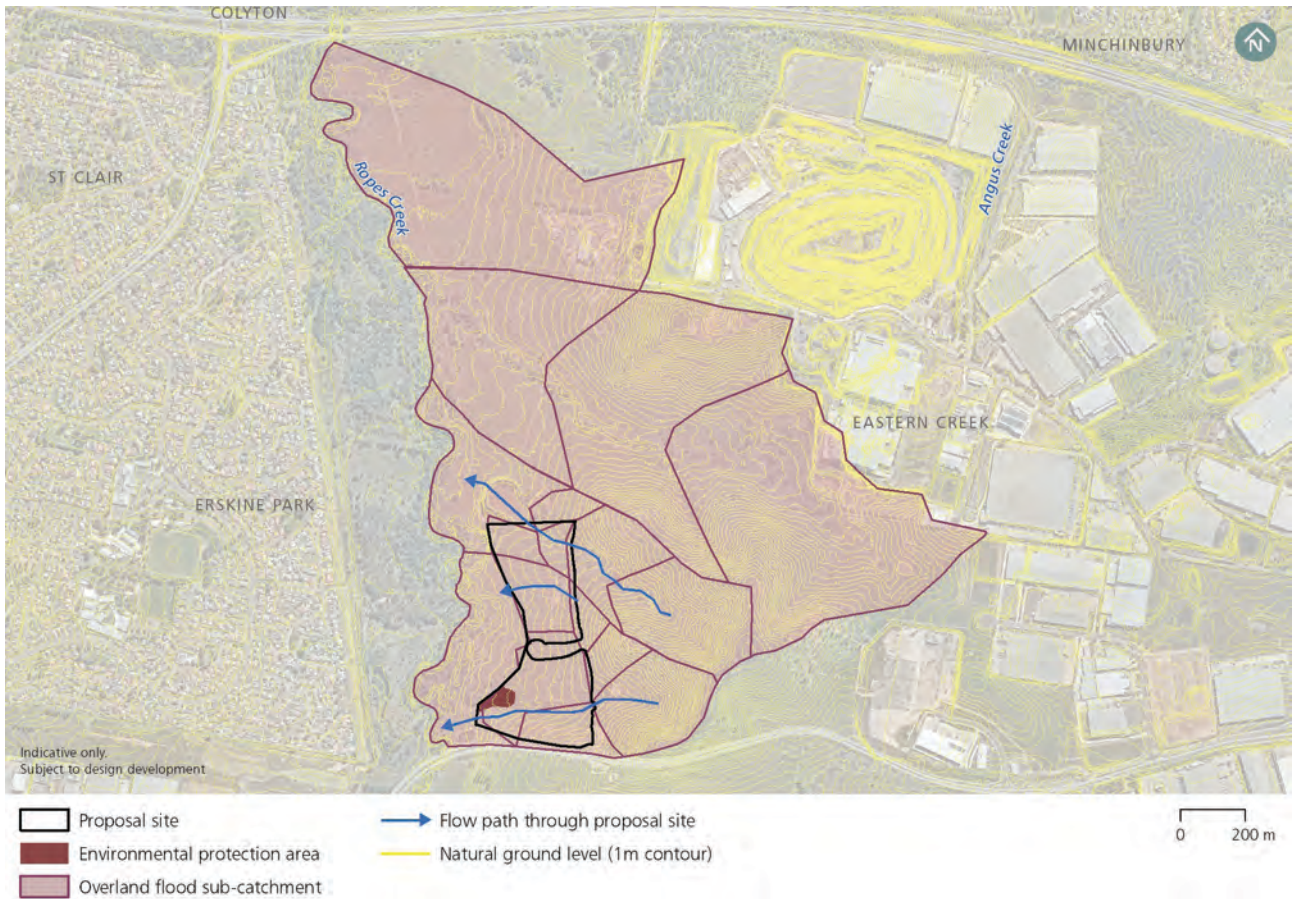


Figure 8-19: Terrain and hydrologic sub-catchments at the proposal site and surrounds

**Flooding**

**Ropes Creek mainstream flooding**

The South Creek Flood Study (Worley Parsons, 2015) provides an assessment of the flooding conditions in Ropes Creek at the proposal site, including flood levels, depths, hazards and hydraulic categories.

The existing case mainstream flooding conditions at the proposal site include:

- The majority of the proposal site is not affected by Ropes Creek flooding in the probable maximum flood (PMF), with exception of an encroachment of 15 metres at the south-western corner. The maximum depth is about 0.1 metres at the south-western corner.
- The entire proposal site is not affected by events up to and including the one per cent Annual Exceedance Probability (AEP), and therefore does not encroach on the Ropes Creek floodway area. The north-western section of the proposal site approaches the fringe of the one per cent AEP flood extent, however this area is not included within the proposal site.

**Overland flow flooding**

The existing dams, including the dam at the northern boundary of the proposal site, were assumed full in the hydrologic modelling. Peak flows at key locations are summarised in Table 8-32 (refer to Appendix J (Hydrology and Flooding Technical Paper) for further detail).

Table 8-32: Existing peak flows and critical storm duration at selected locations in the proposal site

Location	Total catchment area	0.5 Exceedances per Year	1% AEP
Upstream of southern precast facility	10.8 ha	0.52 m <sup>3</sup> /s 6 hours critical duration	3.7 m <sup>3</sup> /s 15 minutes critical duration
Discharge point of southern precast facility	31.9 ha	1.21 m <sup>3</sup> /s 6 hours critical duration	8.25 m <sup>3</sup> /s 45 minutes critical duration

Location	Total catchment area	0.5 Exceedances per Year	1% AEP
<b>Main flow path upstream of northern precast facility</b>	16.9 ha	0.72 m <sup>3</sup> /s	4.44 m <sup>3</sup> /s
		6 hours critical duration	45 minutes critical duration
<b>Discharge point of northern precast facility</b>	37.5 ha	1.37 m <sup>3</sup> /s	7.95 m <sup>3</sup> /s
		6 hours critical duration	45 minutes critical duration

The one per cent AEP flood event was analysed to define the overland flooding conditions around the proposal site. The coincident flood event in Ropes Creek was assumed to be the five per cent AEP event, in line with Australian Rainfall and Runoff 2019 guidelines.

Figure 8-20 shows the overland flood depths at the proposal site and surrounds, the main northern and southern overland flow paths, the minor central overland flow path, and the Ropes Creek one per cent AEP flood extent as defined in the South Creek Flood Study (Worley Parsons, 2015).

Overland flow depths in the northern flow path are typically around 0.4 - 0.6 metres in the existing case. Depths of water in the existing dam are over 0.6 metres. However, these are anticipated to be deeper, as the model topography shows the dam water surface rather than the actual bed level of the dam.

Flow depths in the southern flow path are typically 0.4 - 0.7 metres deep in the main flow path. There are some shallow overflows from the main flow path up to 0.1 metres deep.

The minor central flow path exhibits shallow dispersed flow (less than 0.05 metres depth), with some deeper ponding within an access track which is in cut below the surrounding ground level.

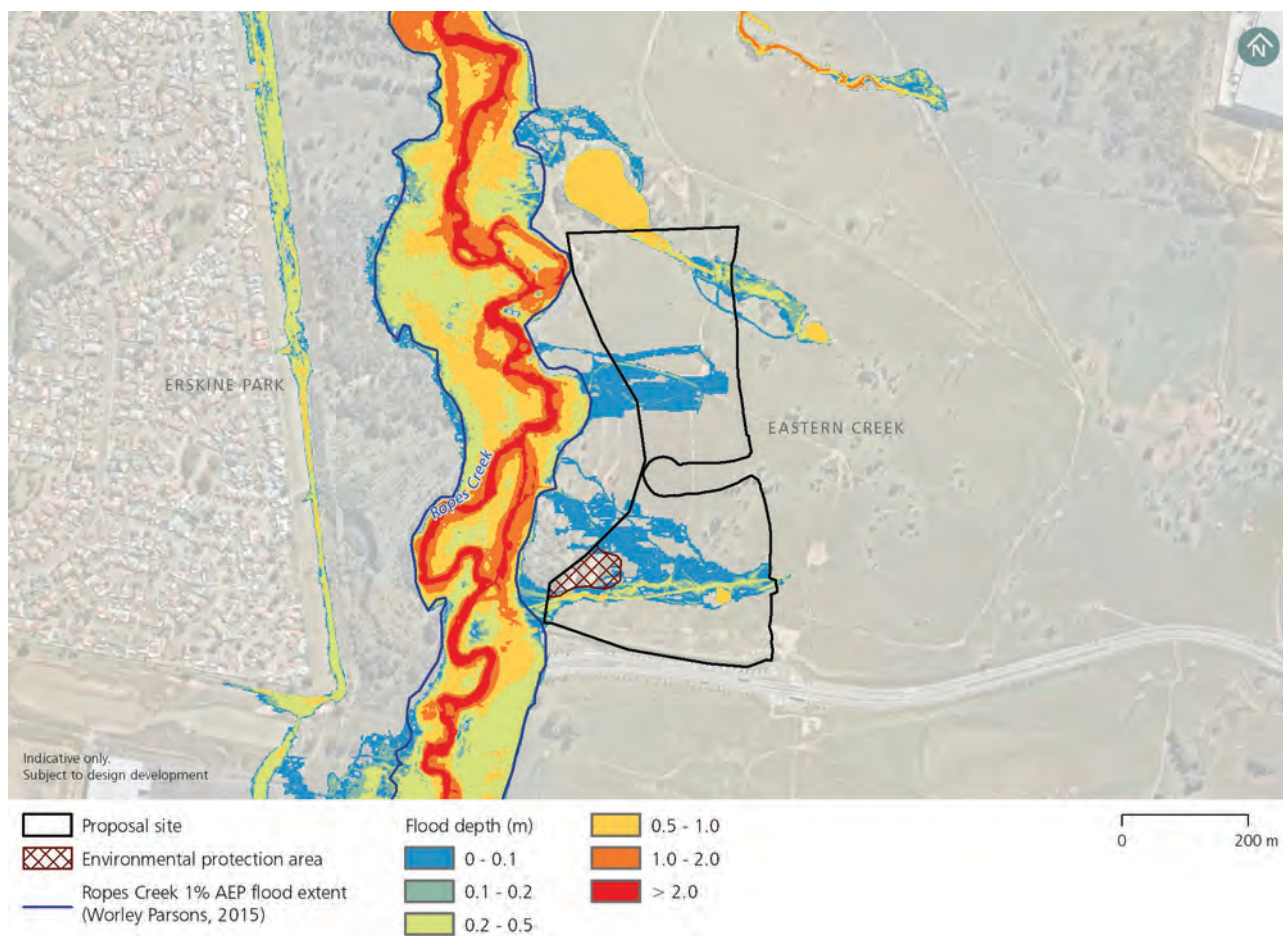


Figure 8-20: Overland flood depths at the proposal site and surrounds (Ropes Creek one per cent AEP event)

### 8.7.3 Potential impacts

#### Construction

There would be no flood impacts in events up to and including the one per cent AEP event as the entire site is above the one per cent AEP flood level and any filled embankments would be outside of the flood extent. Potential impacts in the PMF would be negligible due to the minor encroachment in the south-western corner, subject to the implementation of the mitigation measures included in Section 8.7.4. There would be no flooding impacts in other portions of the proposal site as these are above the PMF level and any filled embankments would be outside the PMF flood extent.

The proposal may impact on peak flow rates and volumes into Ropes Creek as a result of increased impervious areas on the proposal site from its currently undeveloped condition. The potential increase in peak flows has been quantified in the hydrologic modelling undertaken for the proposal. A comparison of the existing and developed case peak flows (for both construction and operation) is presented in Table 8-33. The developed case is representative of worst-case impacts during both construction and operation (i.e. after the hardstand areas have been established).

While the increase in flow rates as a result of the proposal are considered to be minimal in comparison with the existing flow rates at Ropes Creek, the potential impacts of the proposal combined with other external developments (without mitigation) may increase downstream flooding. Potential impacts due to the increase in mainstream peak flood flows would be appropriately managed as outlined in Section 8.7.4. Mitigation measures, such as on-site stormwater detention/flood detention facilities would be required in any case for the 0.5 exceedance per year event and potentially other flood events.

Table 8-33: Comparison of existing and developed (no mitigation) case peak flows and critical storm duration at selected locations<sup>1</sup>

Location	Scenario	0.5 Exceedances per Year	1% AEP
Discharge point of the southern precast site (including diverted external flows)	Existing	1.21 m <sup>3</sup> /s 6 hours critical duration	8.25 m <sup>3</sup> /s 45 minutes critical duration
	Developed	1.64 m <sup>3</sup> /s 15 minutes critical duration	8.75 m <sup>3</sup> /s 45 minutes critical duration
Discharge point of the northern precast site (including diverted external flows)	Existing	1.37 m <sup>3</sup> /s 6 hours critical duration	7.95 m <sup>3</sup> /s 45 minutes critical duration
	Developed	1.44 m <sup>3</sup> /s 20 minutes critical duration	7.57 m <sup>3</sup> /s 45 minutes critical duration

<sup>1</sup> The flows at the selected locations includes the proposal site runoff combined with diverted external flows. Flow reporting locations upstream of the proposal site have been omitted due to additional catchment areas diverted to the reporting locations by Archbold Road drainage.

The proposal site is entirely outside of the one per cent AEP flood extent. The filled sections of the proposal site would not interact with the one per cent AEP flow in Ropes Creek and therefore, changes to creek geomorphology due to obstruction of creek flows are not anticipated.

Design coordination of drainage arrangements for the proposal and the planned Archbold Road upgrade and extension would be undertaken to mitigate potential impacts on the drainage of the overland flows and road drainage discharge points. Flows discharged from the proposed Archbold Road drainage structures would be conveyed in the natural overland flow paths through the proposal site. Potential cumulative impacts from the planned Archbold Road upgrade and extension are outlined in Section 8.16 (Cumulative impacts).

#### Operation

The potential hydrologic and flooding impacts of the proposal in the operational phase are expected to be similar to the potential construction phase impacts.

It is anticipated that there would be a minor increase in flood depths and negligible increase in flow velocities in Ropes Creek near the proposal site during operation. Any impacts on flooding in Ropes Creek, resulting from the minor encroachment of the proposal into the PMF floodway, are not expected to increase substantially as a result of climate change.

Runoff rates from the proposal site and external catchments would potentially increase by a minor increment during the operational phase of the proposal as a result of climate change. This would be managed appropriately through the management and mitigation measures in Section 8.7.4, so that there is no net impact downstream of the proposal site.

### 8.7.4 Management and mitigation measures

Hydrology and flooding impacts would be managed in accordance with the Construction Environmental Management Framework. In relation to hydrology and flooding, the Construction Environmental Management Framework identifies that Stormwater and Flooding Management Plans would be prepared where required. These plans would identify the appropriate design standard for flood mitigation based on the duration of construction, proposed works and flood risks.

The management and mitigation measures that would be implemented to address potential hydrology and flooding impacts are listed in Table 8-34.

Table 8-34: Management and mitigation measures – hydrology and flooding

No.	Impact	Management and mitigation measures
F1	Potential increase in mainstream peak flood flows	Detailed design of the proposal site would include provision of appropriate on-site stormwater detention/flood detention facilities to cater for events up to and including the 1% AEP event.
F2	Potential geomorphic impacts due to changed flow regime in low flows and frequent flood events	Detailed design of the proposal site would include the provision of appropriate on-site stormwater detention/flood detention facilities. Outlet sizing would be designed to satisfactorily mitigate potential increases in peak flows in frequent events.
F3	Potential impacts on overland flooding and drainage conditions	Detailed design of the proposal site would include the provision of appropriate flow diversion channels or culverts for management of external flows.
F4	Potential impacts on overland flooding and drainage conditions	Detailed design would integrate with the planned Archbold Road upgrade and extension cross drainage and road drainage outlets.
F5	Potential impacts on overland flooding and drainage conditions	Detailed design would provide appropriate scour protection works at channel/culvert discharge points to Ropes Creek.
F6	Potential impacts on the proposal resulting from flooding	Detailed design would provide filling to a height of at least 0.5m above Ropes Creek 1% AEP flood level.

Mitigation measures in other chapters that are relevant to the management of potential impacts include:

- Section 8.8 (Soils and surface water quality), specifically measures which address management of surface water quality.



## 8.8 Soils and surface water quality

This section assesses the potential impact of the proposal on surface water.

### 8.8.1 Methodology

The surface water assessment involved:

- Undertaking a desktop review of publicly available data to characterise existing surface water (baseline) conditions at the proposal site including climate, catchment history, topography, hydrology, the soil landscape and environmental values
- Reviewing relevant legislation, plans, policies and guidelines for water management within the Blacktown City Council LGA and NSW
- Conducting a site inspection on 8 April 2020. The site inspection included a visual evaluation of the existing water quality and aquatic habitat condition at assessment sites.
- Identifying the types of surface water impacts which may occur due to the proposal
- Identifying mitigation measures to address potential surface water impacts.

The surface water assessment used a study area (known as the 'surface water study area') boundary that includes the proposal site and a 500-metre buffer around the proposal site, as shown in Figure 8-21. The surface water study area includes the area directly affected by the proposal (the proposal site) and any additional areas potentially affected by the proposal either directly or indirectly.

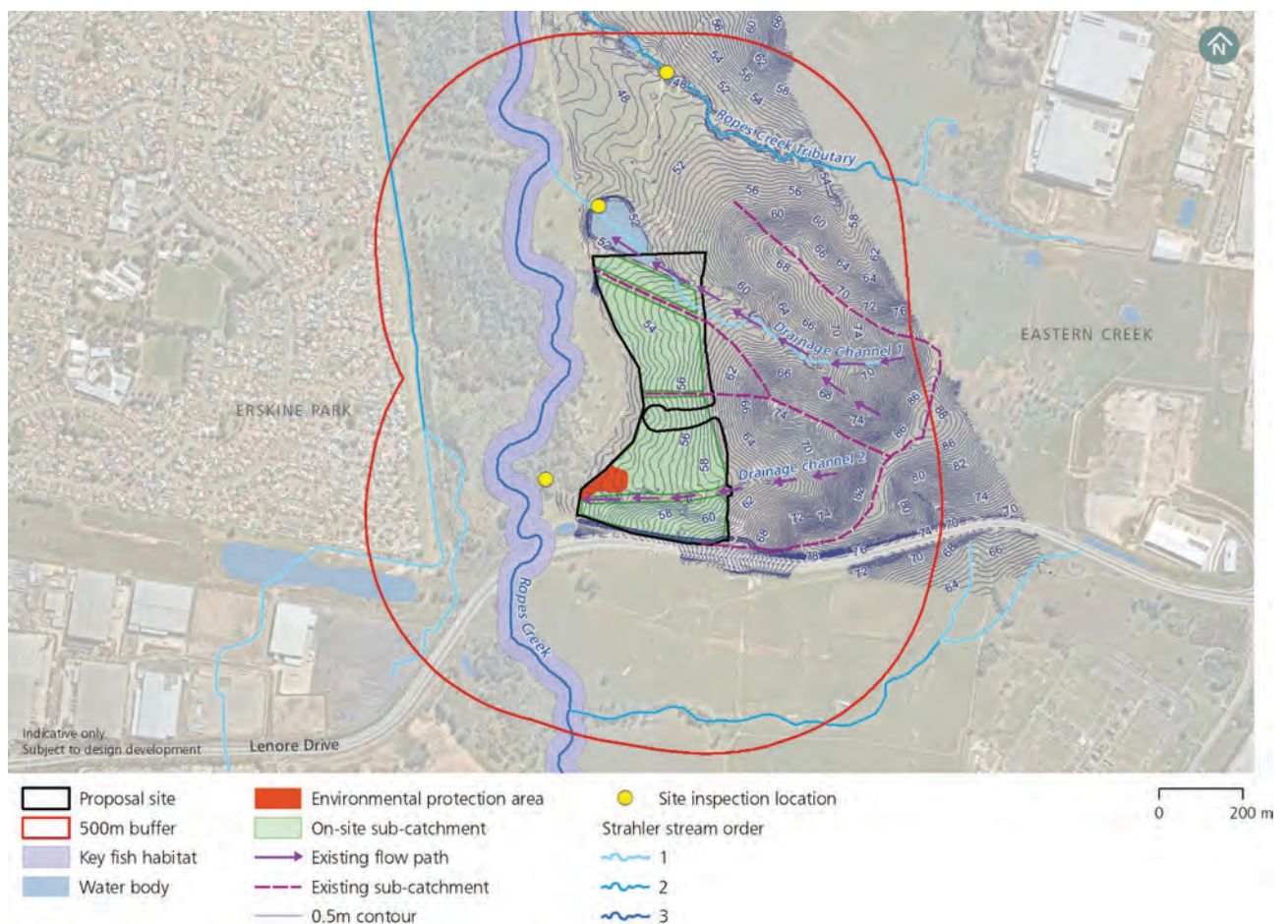


Figure 8-21: Surface water study area

## 8.8.2 Existing environment

### Soils and geology

Based on the Penrith 1:100,000 surface geology mapping sheet (Clark & Jones, 1991) the eastern portion of the proposal site is underlain by Bringelly Shale of the Wianamatta Group and the western portion of the proposal site is underlain by Quaternary alluvium (adjacent to Ropes Creek).

A review of the Penrith 1:100,000 soil landscape mapping sheet (Chapman and Murphy, 1989) identifies that the eastern portion of the proposal site generally overlies residual soils belonging to the Blacktown Soil Landscape. The area west of the proposal site, adjacent to Ropes Creek, generally overlies alluvial soils belonging to the South Creek Soil Landscape. The Blacktown landscape comprises of gently undulating rises; local relief between 10 and 30 metres with slopes usually less than five per cent; broad rounded crests and ridges with gently inclined slopes; cleared eucalypt woodland and tall open forest. The soil group is constrained by moderately reactive plastic subsoils, low soil fertility, localised salinity and poor soil drainage.

A land capability assessment conducted by WSP Parsons Brinckerhoff (2016) for the contamination study area found the presence of moderate to highly sodic and saline soils, with slight dispersivity potential, indicating that the contamination study area contains soils which may be classified as prone to erosion.

### Acid sulfate soils

Acid sulfate soils are the common name given to naturally occurring sediments and soils containing iron sulfides (principally iron sulfide or iron disulfide or their precursors). Exposure of the sulfide in these soils to oxygen as a result of drainage or excavation leads to the generation of sulfuric acid. Areas of acid sulfate soils are typically found in low-lying and flat locations that are often swampy or prone to flooding.

The Australian Soil Resource Information System's (ASRIS, 2013) online acid sulfate soils risk map indicates the proposal site is mapped within an area considered to have an extremely low probability of acid sulfate soils occurrence, indicating that there is no known or expected occurrence of acid sulfate soils within the construction footprint. Acid sulfate soils are not considered further due to the extremely low probability of occurrence and very low risk.

### Catchments and watercourses

The proposal site is located within the South Creek sub-catchment of the Hawkesbury-Nepean surface water catchment. The South Creek sub-catchment encompasses most of the Cumberland Plain of Western Sydney and has been extensively modified and disturbed due to land clearing and urbanisation resulting in significant degradation of water quality, habitat and geomorphology. The proposal site is not located within the Sydney drinking water catchment (as defined by the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011) and therefore the water quality provisions of this SEPP do not apply to the proposal.

The catchment is gently undulating, with local relief between 10 and 30 metres. Slopes are generally less than five per cent but occasionally up to 10 per cent. Elevation on the proposal site ranges from 75 metres Australian Height Datum near Ropes Creek to 60 metres Australian Height Datum in the eastern portion of the proposal site. The slope dips in a western direction towards Ropes Creek.

The watercourses located within the surface water study area include:

- Ropes Creek, located west of the proposal site
- An unnamed tributary of Ropes Creek in the northern extent of the surface water study area
- A natural drainage line (Drainage Channel 1) connected to a large farm dam. A portion of the drainage line and dam is situated within the proposal site at the northern extent
- A natural drainage line (Drainage Channel 2) that traverses the southern portion of the proposal site, originating from the eastern boundary of the proposal site.

Ropes Creek is a third order Strahler stream that is perennial in nature and forms a tributary of South Creek. Records taken from WaterNSW water level gauge at Ropes Creek (WaterNSW, 2020), located about 7.5 kilometres downstream of the proposal site, indicate that mean monthly water level varied between 0 to 0.66 metres in depth between January 2014 and March 2020, with fluctuations corresponding largely with rainfall events.

The proposal site is located in the Blacktown soil landscape which is susceptible to localised seasonal waterlogging, localised water erosion hazard and localised surface movement potential (DPIE, 2020). Existing erosion was identified during the site inspection in the southern part of the proposal site along the drainage line and tracks (refer to Figure 8-22 and Figure 8-23). The soil groups that comprise the proposal site are characterised as very slow filtration. As such, runoff potential would be high to very high.



Figure 8-22: Ropes Creek facing upstream



Figure 8-23: Ropes Creek facing downstream

### Water quality

A review of available existing water quality data indicates that the southern portion of Ropes Creek is generally in poor condition and representative of a heavily urbanised system. In general, Blacktown City Council has reported the southern portion of Ropes Creek to have poor water quality, according to the Waterway Health Report Cards for 2017 – 2018 (Blacktown City Council, 2018) and 2018 – 2019 (Blacktown City Council, 2019). Both reports state that water quality indicators remain within guideline limits 70 per cent of the time, and that results remained consistent to previous years with high nutrient levels.

The NSW Water Quality and River Flow Objectives (DECCW, 2006) provide a number of environmental values for NSW's surface water. The Hawkesbury-Nepean catchment is also subject to water quality objectives outlined in the Healthy Rivers Commission guidelines. The Healthy Rivers Commission guidelines classifies the region in which the proposal site is located as 'Predominantly Urban' and assigns the following environmental/regional values for the waterways within the surface water study area:

- Protection of aquatic ecosystems
- Visual amenity
- Secondary contact recreation.

Water quality objectives that provide guideline levels to help manage water quality have been developed for each catchment in NSW (Department of Environment and Conservation, 2006). These objectives include community-based values, long term goals, and their associated national criteria drawn from ANZECC/ARMCANZ (2000) guidelines. The objectives aim to improve poor water quality and maintain existing good water quality (Department of Environment and Conservation, 2006). The relevant water quality objectives, trigger values and/or criteria for the Hawkesbury-Nepean Catchment and the environmental/ regional values assigned to the surface water study area are provided in Table 8-35.

In modified environments such as the South Creek sub-catchment there is the potential for the current water quality to not meet the existing guidelines and trigger values for protecting nominated environmental values.

### Sensitive receiving environments

Ropes Creek is located about 150 metres west of the proposal site and has been identified as the only 'sensitive receiving environment' within the surface water study area due to its classification as a key fish habitat (DPI, undated). However, a field assessment determined Ropes Creek to be 'Type 3 – Minimally sensitive key fish habitat' (DPI, 2013) based on aquatic habitat quality and water quality identified in the field. Further, the ecological assessment (refer to Section 8.11 (Biodiversity)) determined that Ropes Creek is considered to be in moderately to highly degraded condition and unsuitable for the presence of threatened fish.

### 8.8.3 Potential impacts

#### Construction

##### Saline soils

Any potential salinity impacts would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Excavation and earthworks during construction of the proposal, if not managed appropriately, may cause salinity impacts where there is disturbance of saline soils, often associated with changes to the surface water system. Salinity impacts may include locally severe salt scalding across landscape elements, damage to buildings and infrastructure, fluvial and sheet erosion, high instream salinity, localised waterlogging, flood hazard, and a potential decline in water quality.

##### Soil erosion

With the implementation of erosion and sediment control and other mitigation measures, the risks to degradation of surface water quality during construction would be low.

The proposal would incorporate erosion and sediment control measures such as sediment basins and diversion drains so that external 'clean' runoff does not enter and mix with site runoff, and internal 'dirty' runoff is conveyed to the proposed sediment basin for treatment. The location and sizing of the sediment basins would be determined during detailed design.

Construction activities have potential for the following temporary impacts on surface water:

- Potential to temporarily increase the risk of erosion and sedimentation resulting in the mobilisation of soils into stormwater runoff and nearby watercourses (including Ropes Creek) as a result of vegetation clearing, drainage and surface works
- Potential increased sedimentation in the waterways resulting in increased turbidity, reducing dissolved oxygen levels and increasing the concentration of nutrients and heavy metals as a result of earthworks and excess spoil
- Potential mobilisation of contamination by stormwater runoff and subsequent transportation to downstream watercourses, potentially increasing contaminant concentrations in the receiving environment. Potential contamination risk is assessed in Section 8.10 (Soils and contamination)
- Potential increase in pH of the downstream water quality and harming aquatic life as a result of concrete dust, concrete slurries or concrete washout water
- Potential for contaminants being transported downstream to receiving waters as a result of accidental spills or leaks from the maintenance or on-site re-fuelling of construction plant and equipment machinery, or from vehicle/truck incidents travelling to and from the proposal site. Potential contamination risk is assessed in Section 8.10 (Contamination).

Table 8-35 outlines the water quality objectives relevant to the proposal (refer to Section 8.8.2) and the potential impacts as a result of the proposal in relation to the objectives.

Table 8-35: Assessment of the proposal against the relevant water quality objectives

Water quality objective	Indicator	Guideline value	Impact of the proposal
<b>Protection of aquatic ecosystems</b>			
<b>Maintaining or improving the ecological condition of waterbodies and riparian zones over the long term</b>	Total phosphorus	25µg/L	Wastewater from the proposal would be treated and standard erosion and sediment control measures would be implemented for all surface works areas to minimise pollutant loading to the downstream waterways during construction (refer to Section 8.8.4). Wastewater would be treated to comply with the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines and runoff from the proposal would be designed to meet the standards outlined in the Blue Book (Landcom, 2004).  With the implementation of these management measures, pollutant loading to the receiving waterways would be low and possibly of better quality where existing water quality does not meet the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines.  Therefore, the proposal would not impact aquatic ecosystems of receiving waterways.
	Total nitrogen	350µg/L	
	Chlorophyll-a	3µg/L	
	Turbidity	6-50NTU	
	Salinity (electrical conductivity)	125-2200µS/cm	
	Dissolved oxygen	85-110% saturation	
	pH	6.5-8.5	
Toxicants	As per Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) (2018) toxicant default guideline values (95% level of protection for slightly to moderately disturbed ecosystems and 99% level of protection for toxicants that bioaccumulate).		
<b>Visual amenity</b>			
<b>Aesthetic qualities of waters</b>	Visual clarity and colour	Natural visual clarity should not be reduced by more than 20%.  Natural hue of water should not be changed by more than 10 points on the Munsell Scale.  The natural reflectance of the water should not be changed by more than 50%.	Wastewater from the proposal would be treated and standard erosion and sediment control measures implemented for all surface works areas to minimise pollutant loading to the downstream waterways during construction (refer to Section 8.8.4). Wastewater would be treated to comply with the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines and runoff from the proposal would be designed to meet the standards outlined in the Blue Book (Landcom, 2004).  Spill kits would be in place as well as measures so that oils and petrochemicals do not impact on the visual nature of the waterway (refer to Section 8.10 Contamination).  With the implementation of these management measures, pollutant loading to the receiving waterways would be low and possibly of better quality where existing water quality does not meet the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines.  Therefore, the proposal would not reduce the aesthetic quality of the receiving waterways.
	Surface films and debris	Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour.  Waters should be free from floating debris and litter.  No quantitative value is specified.	
	Nuisance organisms	Macrophytes, phytoplankton scums, filamentous algal mats, blue-green algae, sewage fungus and leeches should not be present in unsightly amounts.  No quantitative value is specified.	

Water quality objective	Indicator	Guideline value	Impact of the proposal
<b>Secondary contact recreation</b>			
<b>Maintaining or improving water quality of activities such as boating and wading, where there is a low probability of water being swallowed</b>	Faecal coliforms, enterococci, algae and blue-green algae	As per the National Health and Medical Research Council (NHMRC) 2008 Guidelines for managing risks in recreational water.	Wastewater from the proposal would be treated and standard erosion and sediment control measures would be implemented for all surface works areas to minimise pollutant loading to the downstream waterways (refer to Section 8.8.4). Wastewater would be treated to comply with the ANZECC/ARMCANZ (2000), ANZG (2018) and NHMRC (2008) guidelines and runoff from the proposal would be designed to meet the standards outlined in the Blue Book (Landcom, 2004).  With the implementation of these management measures, pollutant loading to the receiving waterways would be low and possibly of better quality where existing water quality does not meet the NHMRC (2008) guidelines.  Therefore, the proposal would not reduce the ability of downstream waterways to be used as secondary contact recreation.
	Nuisance organisms	As per the visual amenity guidelines ANZECC/ARMCANZ (2000).  Large numbers of midges and aquatic worms are undesirable.	
	Chemical contaminants	Waters containing chemicals that are either toxic or irritating to the skin or mucous membranes are unsuitable of recreation.  Toxic substances should not exceed values in Table 9.3 of NHMRC (2008) guidelines.	

### Operation

Overall, surface water would be captured on-site and managed so that any runoff leaving the site would not pollute nearby land or waterways. The implementation of mitigation measures would ensure the water quality objectives outlined in Table 8-35 are met during the operation of the proposal.

With the implementation of mitigation measures, the risks to degradation of surface water quality during operation of the proposal would be low. The proposal would involve the establishment of new permanent impervious surfaces, therefore the potential for erosion and sediment transport would be reduced.

If not managed properly, potential water quality impacts associated with operation of the proposal may include:

- Potential increased sedimentation in the waterways resulting in increased turbidity, reducing dissolved oxygen levels and increasing the concentration of nutrients and heavy metals as a result of stormwater runoff containing pollutants from vehicles and machinery being discharged to nearby watercourses
- Potential contaminants being mobilised and transported downstream to receiving waters due to an accidental spill. Potential contamination risk is assessed in Section 8.10 (Contamination)
- Potential increase in pH of the downstream water quality and harming aquatic life due to concrete works
- Potential changes to current hydrological regimes from site discharge.

#### 8.8.4 Management and mitigation measures

Surface water impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework, which includes objectives to minimise the impacts to surface water. The Construction Environmental Management Framework aims to minimise surface water pollution through erosion and sediment control, maintain existing water quality of surrounding water courses, and prioritise the use of non-potable water sources where feasible and reasonable. The Construction Environmental Management Framework specifically requires the preparation of a Soil and Water Management Plan and progressive erosion and sediment control plans that would be updated as needed to reflect the site conditions.

Specific mitigation measures that would be implemented to minimise potential impacts to surface water quality are listed in Table 8-36.

Table 8-36: Mitigation measures - surface water quality

No.	Impact	Environmental management and mitigation measures
<b>SW1</b>	Soil salinity	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or it would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Erosion controls would be implemented in accordance with Blue Book (Landcom, 2004).
<b>SW2</b>	Potential erosion and sedimentation	Erosion and sediment measures would be implemented in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2D (DECCW, 2008), commonly referred to as the 'Blue Book'. Additionally, any water collected from the proposal site would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts.  Temporary sediment basins would be designed in accordance with Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction (DECC, 2008).
<b>SW3</b>	Wastewater discharge	Prior to discharge, wastewater would be treated to a level that is compliant with the ANZECC/ARMCANZ (2000) and ANZG (2018) default guidelines for 95 per cent species protection.  For the purposes of this management measure, during operation wastewater is defined as process water from operation of the precast facility and does not include surface runoff or stormwater.

Mitigation measures in other chapters that are relevant to the management of potential impacts include:

- Section 8.10 (Contamination), specifically measures which address the disturbance of contaminated land and measures to minimise the likelihood and potential impact of accidental spills or leaks.

## 8.9 Groundwater

This section assesses the potential impact of the proposal on groundwater.

### 8.9.1 Methodology

The groundwater assessment involved:

- Undertaking a desktop review of publicly available data to characterise existing groundwater conditions at the proposal site including climate, geology, soils, topography and groundwater conditions, including groundwater dependent ecosystems (GDEs), and salinity conditions
- Identifying the types of groundwater impacts which may occur due to the proposal
- Outlining baseline, construction and operational phase groundwater monitoring requirements
- Identifying a management approach to address potential groundwater impacts.

The groundwater assessment used a study area (known as the ‘groundwater study area’) which includes a boundary of a one kilometre radius around the proposal site, as shown on Figure 8-24. The groundwater study area boundary was selected to include:

- A reasonable quantity of existing groundwater bores to increase the amount of bore data available for investigation of existing groundwater conditions
- Potential groundwater level impacts of the proposal.

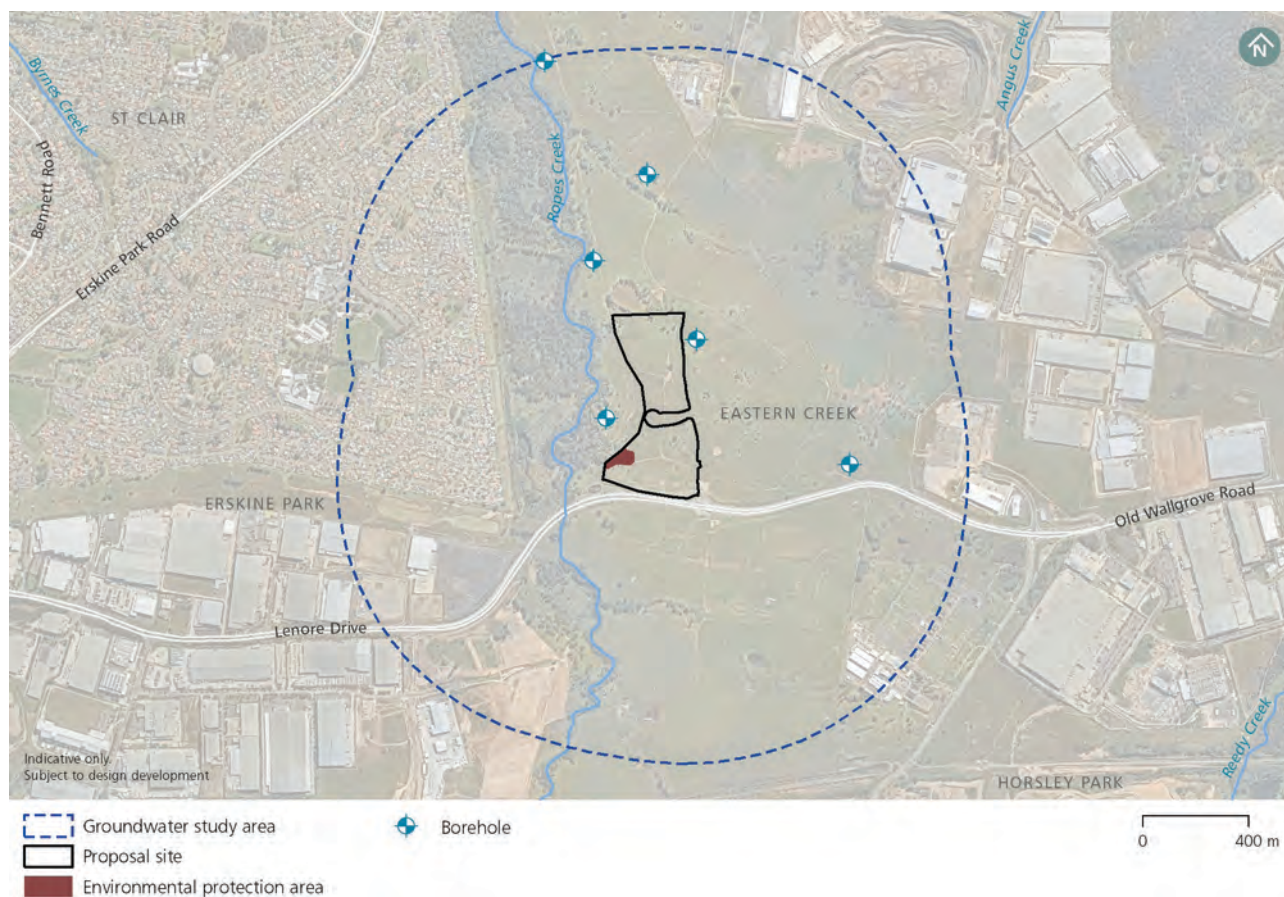


Figure 8-24: Groundwater study area

### 8.9.2 Existing environment

WSP Parsons Brinckerhoff (2016) undertook hydrogeological field investigations in and around the groundwater study area in 2016. There have been no significant changes in the proposal site or surrounds that would impact on the applicability of these investigations and results to this assessment. Groundwater levels measured in six bores across the groundwater study area ranged between one metre below ground level and over 5.5 metres below ground level (refer to Figure 8-24). The groundwater table is typically in Bringelly Shale. Any perched groundwater table in the clayey residual soils, if present, is intermittent and/or localised.



The recorded groundwater levels indicated a westerly and north-westerly direction of flow. Groundwater is likely to move relatively slowly through the shale due to a low hydraulic gradient, resulting in a high residence time. The permeability of overlying residual soils is also expected to be relatively low.

The groundwater on the proposal site is generally near neutral pH, oxygenated, moderate to high conductivity and moderately saline. The conductivity is indicative of the salinity potential in the landscape. The Salinity Potential in Western Sydney 2002 map (Department of Infrastructure, Planning and Natural Resources, 2003) maps the entire proposal site as having 'moderate salinity potential'. West of the proposal site, in the general area of Ropes Creek, is mapped as 'high salinity potential'. The distance from the proposal site to the mapped 'high salinity potential' area typical ranges from 40 metres to 80 metres. However, in a small area in the north-west, it occurs immediately west of the proposal site.

It is possible that groundwater at the proposal site is contaminated from historical and surrounding site use. Refer to Section 8.10 (Contamination) for details on potential existing groundwater contamination.

### Groundwater Dependent Ecosystems

There are no mapped aquatic GDEs in the groundwater study area. Refer to Section 8.11 (Biodiversity) for further details.

## 8.9.3 Potential impacts

### Construction

#### Groundwater level changes

Overall, the proposal is unlikely to intercept the water table or result in any changes to groundwater levels. Excavation would involve a maximum depth of about two metres and is anticipated to generally occur in areas of relatively higher elevation with deeper depths to groundwater. As a result, there is not anticipated to be any adverse environmental impact or drawdown at existing licenced bores.

Other potential groundwater impacts during construction include:

- Construction of hardstand areas and modifications to ground conditions during earthworks have the potential to increase runoff and reduce groundwater recharge, however any potential change would be negligible considering the relative size of the proposal site
- Earthworks and imported fill would likely temporarily increase soil permeability and groundwater recharge in filled areas during bulk earthworks. However, this contribution would be negligible given that:
  - Surface water would be directed away from earthworks and other construction areas
  - Underlying in-situ soils and bedrock are of low permeability
  - Filled areas would ultimately be compacted and sealed.

#### Groundwater quality

With the implementation of the environmental management approach outlined in Section 8.9.4 the risks to groundwater quality would be low. The following construction activities have the potential to lead to altered groundwater quality or contamination:

- Excavation of saline soils and bedrock, and re-use as fill could result in the release of additional salts in groundwater
- Accidental spills or leakages of hazardous materials (such as fuels, lubricants and hydraulic oils) have the potential to result in groundwater contamination through runoff and subsequent recharge.

### Operation

#### Groundwater level changes

Operation of the proposal is not likely to cause groundwater level drawdown as there would be no long-term penetration of aquifers.

Reduced groundwater recharge due to increased areas of hardstand associated with the proposal is possible. However, the total increase in impermeable areas (hardstand) is about 15.5 hectares, representing about three per cent of the total size of the about 500-hectare regional surface water catchment. Accordingly, the estimated net reduction in regional groundwater recharge is expected to be negligible and groundwater baseflow to creeks is not expected to change appreciably.

### Impacts to groundwater quality

With the implementation of the environmental management approach outlined in Section 8.9.4, the risks to groundwater quality would be low. Potential groundwater quality impacts during operation would include migration to groundwater of any accidental leaks or spills of fuels, oils and other hazardous materials used or stored at the proposal site during operation.

#### 8.9.4 Management and mitigation measures

Potential groundwater impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework, which includes the following objectives for groundwater management:

- Reduce the potential for drawdown of surrounding groundwater resources
- Prevent the pollution of groundwater through appropriate controls
- Reduce the potential impacts on groundwater dependent ecosystems.

As the potential groundwater impacts of the proposal are low, no specific mitigation measures are proposed.

Mitigation measures in other chapters that are relevant to the management of potential groundwater impacts include:

- Section 8.8 (Soils and surface water quality), specifically measures which address treated water discharge
- Section 8.10 (Contamination) specifically measures which address the management of potential contamination in groundwater including spill management.

## 8.10 Contamination

A preliminary contaminated site investigation assessment has been undertaken to assess the potential risk for contamination and the potential contamination impacts to construction and operation of the proposal. This assessment is attached as Appendix H (Preliminary Site Contamination Investigation) of this REF. The methodology and results of this assessment are summarised in this section.

### 8.10.1 Methodology

The contamination assessment involved the following:

- Undertaking a desktop review of available information sources and observations from site inspections to understand the existing environment and potential risk for contamination within the contamination study area
- Undertaking a site walkover inspection, conducted on 8 April 2020 by an experienced contamination specialist
- Undertaking a high-level prioritisation exercise including identification of areas of environmental interest (with respect to contamination) and assessment of potential impacts to construction and operation from contamination (with no mitigation measures) to environmental and human receptors in the context of proposed construction activities
- Identifying appropriate mitigation and management measures, or where further investigation or contaminated land remediation may be required.

#### Risk prioritisation

A high-level risk prioritisation exercise was carried out to assess the potential impact from construction to expose contamination to human and/or ecological receptors. The prioritisation exercise considered source-pathway-receptor relationships in accordance with a conceptual site model as defined by the National Environment Protection (Assessment of Site Contamination) Measure 1999, as revised 2013 (NEPM, 2013). The prioritisation exercise considered the severity and extent of contamination sources (refer to Table 8-37), and the potential pathways from contamination sources to human and ecological receptors (refer to Table 8-38) for each media, that is soil, groundwater and vapour.

Table 8-37: Contamination severity and extent categories

Contamination severity and extent category	Description
SE1	Low potential for contamination to be present in the media of concern at concentrations above the relevant assessment criteria and is limited in spatial extent
SE2	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and is limited in spatial extent
SE3	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and potentially spatially widespread
SE4	Known contamination present in the media of concern at concentrations above the relevant assessment criteria and limited in spatial extent
SE5	Known contamination present in the media of concern at concentrations above the relevant assessment criteria and spatially widespread

Table 8-38: Contamination pathways and receptor categories

Pathways and receptors category	Description
PR1	Media of concern is unlikely to coincide with or otherwise impact on the proposal and/or there is no or an unlikely exposure pathway for human or ecological receptors during construction and/or operation
PR2	Media of concern may intersect the proposal and exposure pathway for human or ecological receptors that could be present and complete during construction and/or operation

Pathways and receptors category	Description
PR3	Media of concern would intersect the construction and exposure pathway for human or ecological receptors that could be present and complete during construction and/or operation

To provide the overall potential contamination risk for the proposal, a matrix was used to combine the consideration of contamination severity and extent with contamination pathways and receptors as provided in Table 8-39.

Table 8-39: Potential contamination risk categories

Pathways and receptors	Contamination severity and extent					
	SE1	SE2	SE3	SE4	SE5	
PR1	Very low	Low	Low	Moderate	Moderate	
PR2	Low	Moderate	Moderate	High	High	
PR3	Moderate	Moderate	High	High	Very high	

### Contamination study area

The contamination study area for the preliminary contaminated site investigation was defined as the proposal site and surrounding land within a one-kilometre buffer.

The extent of the contamination study area is shown in Figure 8-25.

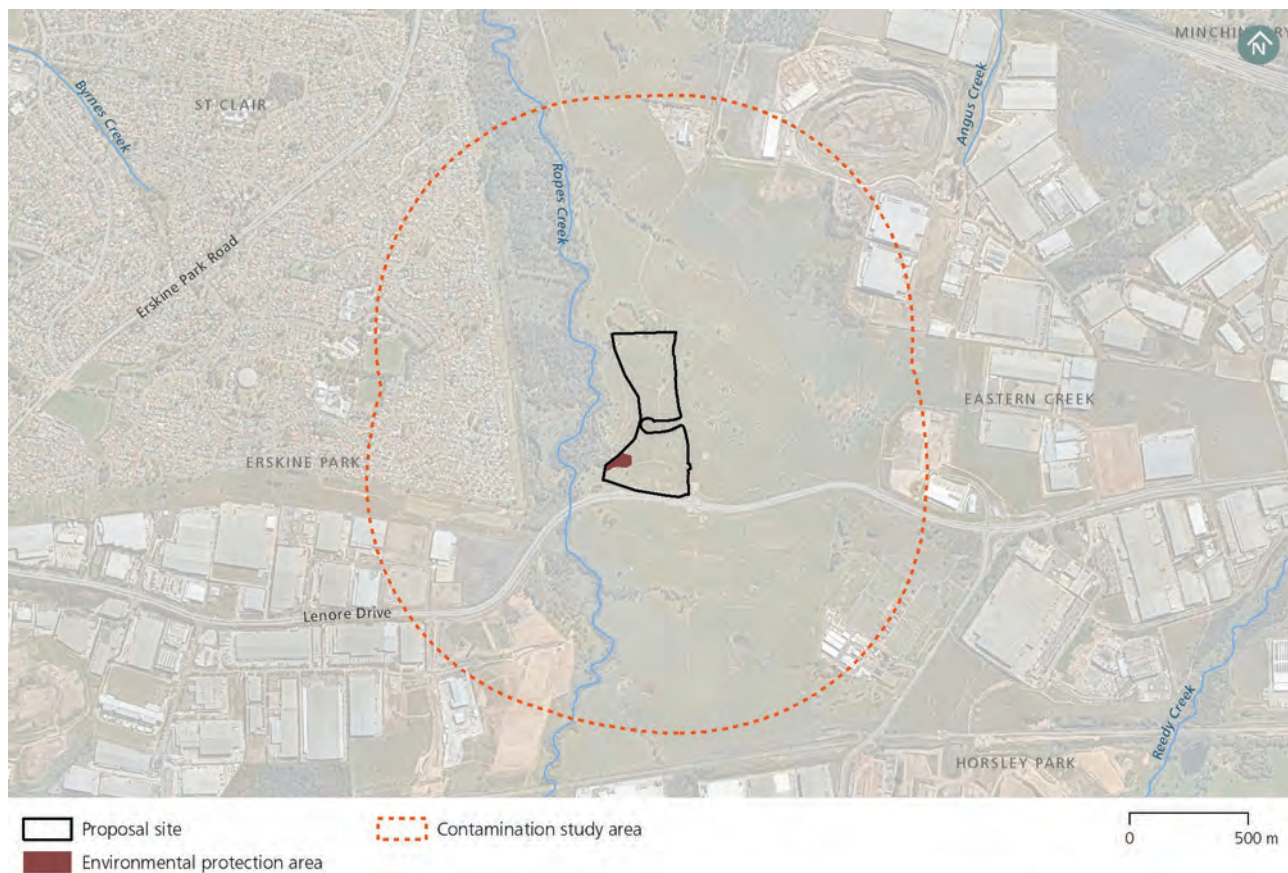


Figure 8-25: Contamination study area

## 8.10.2 Existing environment

### Site history

Land uses in the area surrounding the proposal site since the 1950's include agricultural, residential and industrial premises. Historical aerial photography shows that the proposal site has previously been used for agricultural purposes and has included a large dam, drainage lines, and a small dam possibly constructed within the southern drainage line. More recently, increased tracks throughout the proposal site indicate there has been unauthorised off-roading.

Review of the historic aerial imagery and topographic maps has identified a number of potential sources of contamination in the contamination study area, including:

- The degradation and potentially inappropriate demolition of structures within the contamination study area containing hazardous building materials
- Sediments within the dam partially located in the northern portion of the proposal site (potential contaminant sink)
- Previous general agricultural use including localised contamination associated with chemical use / storage and waste disposal and more diffuse contamination associated with pesticide / herbicide use
- Substation operations (about 700 metres south-east from the proposal site) including transformer oils and the use / storage of aqueous film forming foam
- Potential use of overburden (material of unknown quality) to the north and east of the proposal site.

Further detail on the site history as relevant to the contamination assessment is provided in Appendix H (Preliminary Site Contamination Investigation).

### Database searches

A search of the NSW EPA Contaminated Sites Record of Notices (under section 58 of the CLM Act) and the list of contaminated sites notified to the NSW EPA (under section 60 of the CLM Act) in May 2020 indicated that there was one site registered with the NSW EPA within one kilometre of the proposal site that was either regulated, formerly regulated or had been notified. The site is Fulton Hogan Industries, located about 700 metres east of the proposal site on Honeycomb Drive, Eastern Creek. The site contains land that has been notified to the EPA as being potentially contaminated however regulation under the CLM Act is not required.

A search of the NSW EPA POEO Act public register indicated there are three sites within one kilometre of the proposal site that have current environment protection licenses:

- NSW Electricity Networks Operations Pty Ltd, located about 700 metres south-east of the proposal site at 200 Old Wallgrove Road, Eastern Creek, with a current environment protection licence held by Transgrid for the activity 'waste storage hazardous, restricted solid, liquid, clinical and related waste and asbestos waste'
- Dial-a-Dump Pty Ltd, located about one kilometre north-east of the proposal site on Honeycomb Drive, Eastern Creek, with several current environment protection licences held by Genesis Recycling Facility for the activities 'waste disposal by application to land', 'waste storage – other types of waste', 'composting', and 'recovery of general waste'
- Fulton Hogan Industries, located about 700 metres east of the proposal site on Honeycomb Drive, Eastern Creek Pty Ltd, with a current environment protection licence held by Fulton Hogan Industries Pty Ltd for the activities 'recovery of general waste' and 'waste storage – other types of waste'.

### Site inspection

Based on the observations made during the site inspection, there were potential contamination sources identified on the proposal site as shown in Figure 8-26. These included potential filling of the earthen embankment adjacent to Lenore Drive, the bund of the stormwater retention pond located partially within the northern area of the proposal site and isolated occurrences of fly tipped (illegal dumping) waste materials.

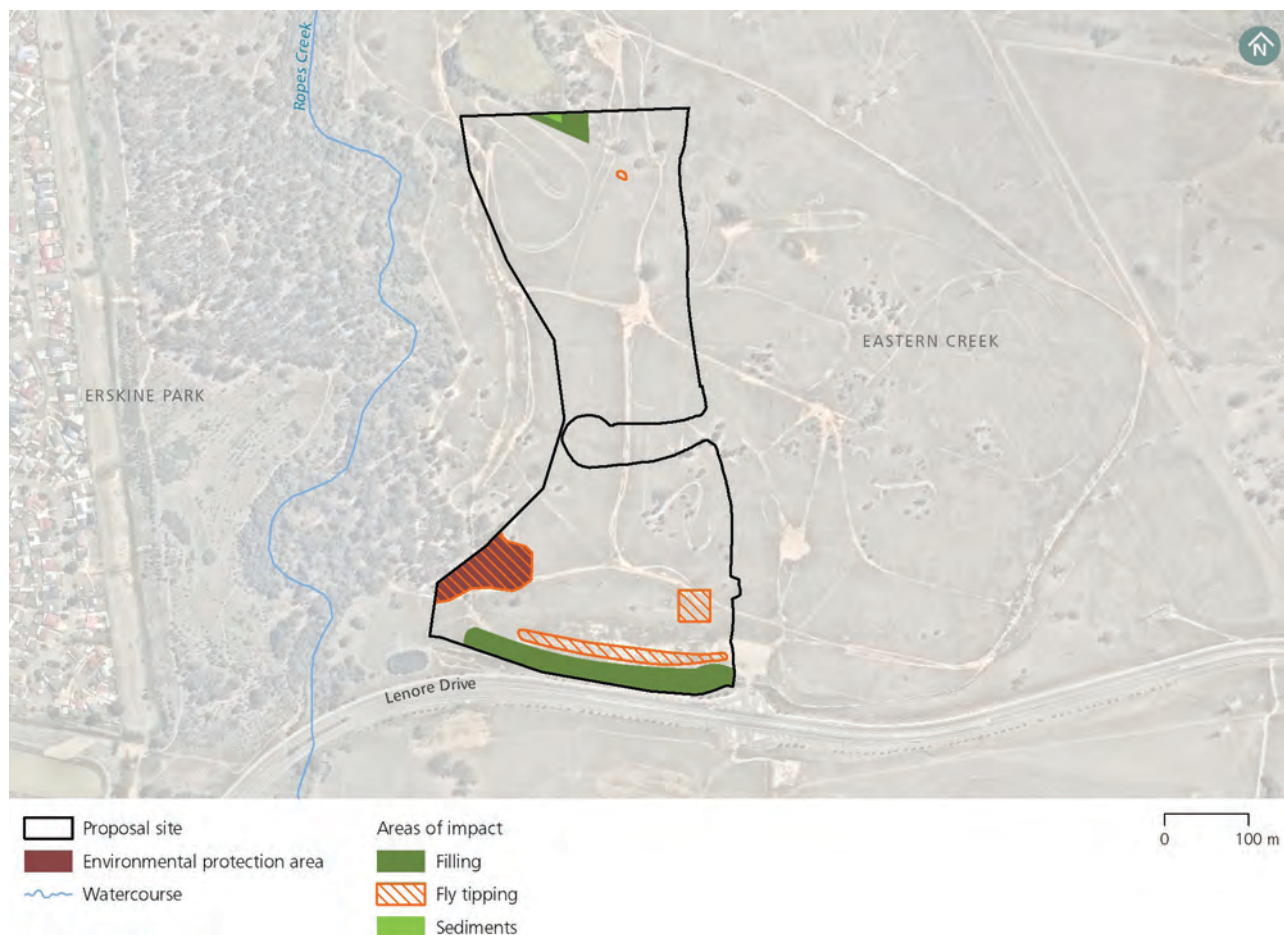


Figure 8-26: Key areas of potential contamination within the proposal site

### 8.10.3 Potential impacts

#### Contaminated land

Although there is a moderate potential contamination risk in certain areas across the proposal site during construction, with further investigation and appropriate management of these potential contamination risks the overall risk is considered low. Mitigation measures to manage construction risks and impacts associated with contamination are described in Section 8.10.4.

Contamination risks and impacts during construction can be broadly divided into two categories:

- Those that already exist on the proposal site from previous activity
- Those that may be introduced or created from construction and operation of the proposal.

The exposure of any contaminated materials during construction may increase the potential for contaminant mobilisation and may create additional exposure pathways to sensitive receivers (including environmental receptors), surface water bodies and groundwater bodies.

If earthworks during construction of the proposal intersect identified areas of potential contamination without appropriate management and/or remediation the following impacts could occur:

- Contaminant exposure risk to construction personnel through direct contact, ingestion and inhalation
- Site contamination could be mobilised into stormwater such that it affects sensitive receiving ecological environments (within the proposal site and in surrounding areas due to migration)
- Cross contamination associated with the incorrect handling or disposal of spoil/unexpected finds
- Contamination of otherwise clean spoil and areas of the site
- Direct contact with and discharge of potentially contaminated groundwater during any dewatering activities.

Potential sources of contamination identified as having moderate potential contamination risk include:

- Filling (material of unknown quality) used for the embankment adjacent to Lenore Drive and the bund of the stormwater retention pond
- Historical and current land use including inappropriate chemical storage and use, and miscellaneous waste disposal
- Sediments within onsite dams/stormwater retention pond.

An overview of the potential contamination risk is provided within Table 8-40.

Table 8-40: Potential contamination risk

Areas of interest	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to proposal footprint and scope				Potential contamination risk without mitigation
	Media and CoPCs	Contamination status	Rating	Relative location	Potential for contamination to be intersected	Potential exposure pathways	Rating	
<b>Filling (material of unknown quality) – earthen embankment adjacent to Lenore Drive (southern precast site) and the bund of the stormwater retention pond (northern precast site).</b>	Soils (to the depth of filling). Heavy metals, hydrocarbons (TRH, BTEX, PAH), pesticides, phenols, asbestos.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Within the northern and southern precast sites.	Soils would be exposed during construction. Contaminated deeper soils (if present) may remain below the site during operation.	Without the identified mitigation measures: <ul style="list-style-type: none"> <li>Construction workers and site users could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust</li> <li>Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos.</li> </ul>	PR3	Moderate
	Groundwater. Heavy metals, nutrients, hydrocarbons (TRH, BTEX, PAH).	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent. Any groundwater contamination from fill areas would be limited to the northern and southern extents of the proposal site.	SE2					
<b>Historical/current land use (including agricultural land use) – inappropriate chemical storage and use, miscellaneous waste disposal etc.</b>	Surface soil. Heavy metals, hydrocarbons (TRH, BTEX, PAH), pesticides, herbicides, asbestos.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Within the northern and southern precast sites.	Soils would be exposed during construction. No residual contaminated surface soils likely to be present during operation.	Without the identified mitigation measures: <ul style="list-style-type: none"> <li>Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust</li> <li>Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos.</li> </ul>	PR3	Moderate
<b>Former and existing structures – hazardous building materials within or from buildings / structures (including transmission towers) within the contamination study area, demolition wastes.</b>	Surface soil. Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Min. of 100m north, east and south of the proposal site (not located within the proposal site).	Surficial contamination (if present) from adjoining structures unlikely to migrate and be exposed during construction or operation.	Contamination unlikely to be exposed during construction and/or operation and therefore unlikely to impact upon human and environmental receptors.	PR1	Low
<b>Sediments within on-site dams / stormwater retention pond (potential contaminant sink).</b>	Sediments. Heavy metals, hydrocarbons (TRH, PAH), pesticides, microbiological, nutrients.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Within the northern precast site.	Sediments would be exposed during construction. No sediments likely to be present during operation.	Without the identified mitigation measures: <ul style="list-style-type: none"> <li>Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated sediments.</li> </ul>	PR3	Moderate



Areas of interest	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to proposal footprint and scope				Potential contamination risk without mitigation
	Media and CoPCs	Contamination status	Rating	Relative location	Potential for contamination to be intersected	Potential exposure pathways	Rating	
<b>Fly tipping (illegal dumping) of wastes.</b>	Wastes and surface soils. Heavy metals, hydrocarbons (TRH, BTEX, PAH), pesticides, phenols, asbestos.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Within the northern and southern precast sites.	Wastes and soils would be exposed during construction. No residual fly tipped wastes likely to be present during operation.	Without the identified mitigation measures: Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely potential asbestos.	PR3	Moderate
<b>Waste management facility – offsite migration of chemicals (via infiltration into underlying groundwater or surface water discharge).</b>	Surface water and groundwater. Heavy metals, hydrocarbons (TRH, BTEX, PAH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organic contaminants, PFAS.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	About 1 km north-east of the proposal site (not within the proposal site).	Contaminated groundwater (if present) from the landfill is unlikely to be present beneath the proposal site because of the spatial separation, the quarry void is not filled and current void would act as a groundwater sink – groundwater would flow towards and not away from the void, cross gradient locations and geological conditions. Groundwater is unlikely to be exposed during operation. Surface water could be intersected during construction (potentially during dewatering on on-site stormwater retention pond).	Contamination unlikely to be exposed during construction and/or operation and therefore unlikely to impact upon human and environmental receptors	PR1	Low
	Landfill gas. Methane, hydrogen sulphide, carbon dioxide.	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent.	SE1		Landfill gas only likely to be an issue following completion of landfilling activities.			
<b>Historical commercial / industrial use within locality – inappropriate chemical storage and use, industrial operations, waste disposal and management etc.</b>	Surface soil. Heavy metals, hydrocarbons (TRH, BTEX, PAH).	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	Minimum of 300m north-east of the proposal site (not within the proposal site).	Surficial contamination (if present) from adjoining source sites unlikely to migrate and be exposed during construction or operation.	Contamination unlikely to be exposed during construction and/or operation and therefore unlikely to impact upon human and environmental receptors.	PR1	Low
	Groundwater. Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC.	Contamination possibly present at concentrations above the relevant assessment criteria and widespread.	SE3		Contaminated groundwater (if present) from these land uses is unlikely to be present beneath the proposal site because of the spatial separation and geological conditions. Groundwater is unlikely to be exposed during operation. Contaminated groundwater (if present) may remain below the proposal site during operation.			
<b>Substation – transformer oils and potential firefighting activities.</b>	Surface soils. Polychlorinated biphenyls (PCB) and PFAS.	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent.	SE2	About 700m south-east of the proposal site (not within the proposal site).	Surficial contamination (if present) from adjoining source site unlikely to migrate and be exposed during construction or operation.	Contamination unlikely to be exposed during construction and/or operation and therefore unlikely to impact upon human and environmental receptors.	PR1	Low
	Groundwater. PFAS.	Contamination possibly present at concentrations above the relevant assessment criteria and widespread.	SE3		Contaminated groundwater (if present) from the substation are unlikely to be exposed during construction or operation (site is likely to be cross-gradient with groundwater flows for the substation).			

*This page has intentionally been left blank*

**Accidental spills**

Due to the implementation of site management controls, the likelihood of a major spill incident occurring is negligible. Major spills could potentially impact the quality and chemistry of the soil landscape or geology. They may also migrate off-site to affect adjacent properties and waterbodies such as Ropes Creek.

The more likely risk would be localised small spills occurring due to poor practices. The corresponding activities taking place within the proposal site with the greatest risk of accidental spillage would include:

- Ground excavation work
- Spoil excavation, transfer and management
- Waste removal off-site (e.g. haulage)
- Material delivery to site (e.g. haulage)
- Loading and unloading.

With the implementation of site management controls, the impact of accidental spills or leaks would be low within the proposal site.

**Other potential operational impacts**

All water would be captured on site during operation of the precast facilities. Captured water would be managed to ensure that any discharge leaving the site would not adversely pollute nearby land or waterways.

**8.10.4 Management and mitigation measures**

Potential contamination impacts would be managed in accordance with Sydney Metro’s Construction Environmental Management Framework, which includes objectives to minimise the impacts of contamination. The Construction Environmental Management Framework includes a requirement to prepare a Soil and Water Management Plan which would include management measures for contaminated material (soils, water and building materials) and a contingency plan in the case of unanticipated discovery of contaminated material.

The management and mitigation measures that would be implemented to address potential soils and contamination impacts are listed in Table 8-41.

**Table 8-41: Management and mitigation measures – soils and contamination**

No.	Impact	Management and mitigation measures
<b>C1</b>	Management of low risk contamination	For areas that have been identified as having moderate contamination impact potential, a further review of data would be performed. Should the additional data review confirm that contamination is likely to have a very low or low impact potential, the areas would then be managed in accordance with the Soil and Water Management Plan for the proposal. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal.
<b>C2</b>	Detailed Site Investigation	Where data from the additional data review (mitigation measure C1) is insufficient to understand the impact of contamination, a Detailed Site Investigation would be carried out in accordance with the NEPM (2013) and other guidelines made or endorsed by the NSW EPA.  The areas requiring Detailed Site Investigation would be confirmed following the additional data review (C1), however on the basis of the PSCI, it is anticipated that a Detailed Site Investigation would be required to characterise fill materials, and sediment from dam / retention pond for on-site reuse and/or off-site disposal. Fly tipped wastes and deposited wastes (from former land use) would need to be characterised for off-site disposal.

No.	Impact	Management and mitigation measures
C3	Remediation	<p>Where data from additional data review (mitigation measure C1) or the Detailed Site Investigation (mitigation measure C2) confirms that contamination would have a moderate to very high risk, a Remedial Action Plan (RAP) would be developed for the area of the construction footprint.</p> <p>The RAP would detail the remediation works required to mitigate impacts from contamination throughout and following completion of construction. The RAP would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice.</p> <p>Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land.</p> <p>The requirements for a RAP and remediation would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2).</p>
C4	Site Audit Statement	<p>Where contamination is highly complex, such as significant groundwater contamination; contamination associated with vapour; contamination that requires specialised remediation techniques; or contamination that requires ongoing active management during and beyond construction, an accredited Site Auditor would review and approve the RAP and would develop a Site Audit Statement and Site Audit Report upon completion of remediation.</p> <p>The requirement for a Site Audit Statement would be confirmed following preparation of the RAP (mitigation measure C3).</p>
C5	Residual contamination following construction	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.
C6	Accidental leaks or spills – operation	The operational environmental management plan (OEMP) for the proposal would include an Emergency Response Plan (or equivalent) which would specify the procedure to be followed in the event of a spill, including the notification requirements and use of absorbent material to contain the spill.
C7	Contaminated soil – operation	Where contaminated soils are to remain on-site, an appropriate OEMP would be prepared and implemented. The OEMP would include relevant ongoing management requirements developed in accordance with the NEPM (2013) and relevant guidelines made or approved by the NSW EPA. Measures may include but are not limited to, including procedures for excavation works, inspections and audits.
C8	Contaminated groundwater	<p>Potential impacts from existing groundwater contamination (if present) during operation of the proposal would be managed through management and mitigation measures such as:</p> <ul style="list-style-type: none"> <li>• Emplacement of appropriate topographic / drainage controls to minimise seepage and ponding of water across the site</li> <li>• Drainage from sealed areas would be directed to stormwater drains (e.g. pipes, swales) via gross pollutant traps and sediment basins (if necessary) to mitigate potential impacts from sediments or wastes on receiving environments.</li> </ul>

Mitigation measures in other chapters that are relevant to the management of potential impacts include:

- Section 8.8 (Soils and surface water quality), specifically measures which address soil erosion and sediment control, and treated water discharge.

## 8.11 Biodiversity

A Biodiversity Assessment Report was prepared for the proposal. This assessment is attached as Appendix I (Biodiversity Assessment Report) of this REF. The methodology and results of this assessment are summarised below.

Potential cumulative biodiversity impacts associated with multiple projects are discussed in Section 8.16 (Cumulative impacts).

### 8.11.1 Methodology

The biodiversity assessment involved:

- Describing the existing environment and landscape features, and identifying threatened species, populations and communities listed under the BC Act and the Commonwealth EPBC Act that may be potentially affected by the proposal. Database searches in March/April 2020 included:
  - BioNet - the website for the Atlas of NSW Wildlife and Threatened Biodiversity Data Collection - 24 March 2020
  - NSW Department of Primary Industries (DPI) Fisheries Spatial Data Portal - 22 April 2020
  - Department of Agriculture, Water and Environment's Protected Matters Search Tool - 23 March 2020
  - BioNet Vegetation Classification Database - 15 April 2020
  - Bureau of Meteorology's Atlas of GDE - 21 April 2020
  - Department of Agriculture, Water and Environment's directory of important wetlands - 21 April 2020
  - NSW DPIE's SEPP (Coastal Management) 2018 maps - 21 April 2020
- Undertaking field surveys (carried out on 9 and 16 April 2020) which involved vegetation surveys, targeted vegetation surveys, targeted fauna surveys and aquatic surveys
- Identifying and assessing likely impacts to biodiversity
- Identifying a management approach and mitigation measures for avoiding, managing or reducing impacts on biodiversity values associated with the proposal site.

### 8.11.2 Existing environment

#### Environmental context and landscape features

The ecological study area for the purpose of the biodiversity assessment is defined as the proposal site with an approximate 50 metre buffer. The ecological study area is shown in Figure 8-27.

The ecological study area is in a highly disturbed landscape that is extensively cleared and modified. Remaining intact vegetation is generally concentrated along waterways and consists of small fragmented bushland remnants and isolated trees. The riparian vegetation and grassy woodland around Ropes Creek forms one of the largest contiguous areas of native vegetation surrounding the ecological study area.

Waterways within the ecological study area include two artificial dams, the largest being located on a mapped unnamed first order stream in the north of the ecological study area and the other on an unmapped drainage line in the south. The proposal site only includes the southern section of the large dam at its northern boundary. These drainage lines are likely naturally formed, however have been highly influenced over time by clearing of woodland vegetation and increasing run-off. Both drainage lines are highly ephemeral, only draining water from the immediate surrounds into Ropes Creek to the west of the ecological study area.

There are no wetlands of significance within the ecological study area or immediate surrounds listed under the State Environmental Protection Policy (Coastal Management 2018) or wetlands under the Directory of Important Wetlands (Department of Agriculture, Water and Environment, 2020). Vegetation surrounding Ropes Creek in the west of the ecological study area has been mapped by the Department of Planning, Industry and Environment as Cumberland Plains Priority Conservation Lands, and has also been identified as a biodiversity corridor of regional significance under the Biodiversity Investment Opportunities Map (NSW Government, 2020).

There are no Areas of Outstanding Biodiversity Value (listed in the BC Act as special areas with irreplaceable biodiversity values important to NSW) within or near the proposal site.

### Plant Community Types

Three Plant Community Types (PCTs) were identified in the ecological study area, including:

- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)
- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)
- *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071).

These PCTs (Figure 8-27) are mostly in poor condition, existing as regenerating canopy over exotic dominated grasses. The remainder of the vegetated areas are classed as exotic grassland.

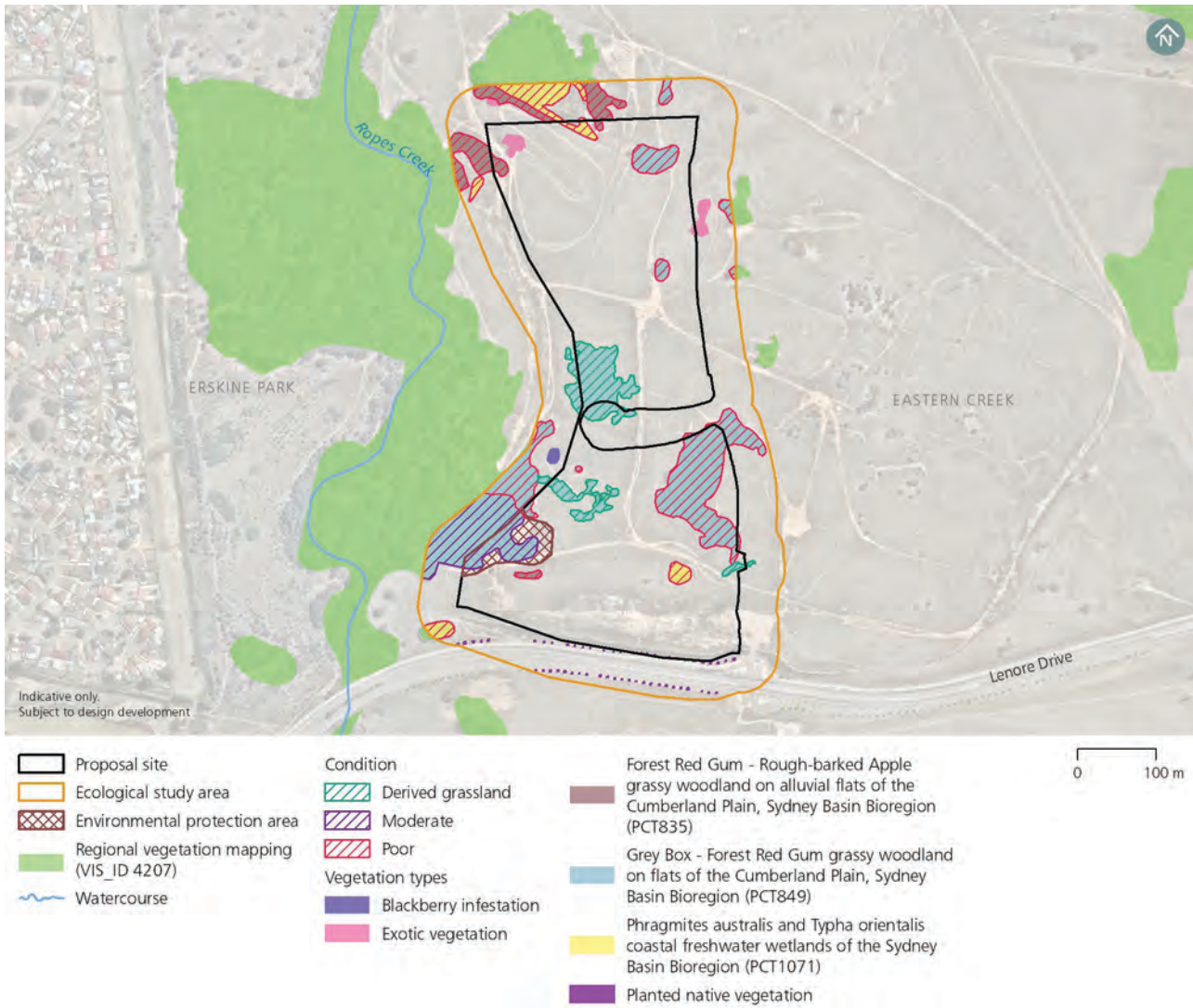


Figure 8-27: Plant Community Types

### Threatened Ecological Communities (BC Act)

Three threatened ecological communities (TECs) listed under the BC Act were identified in the ecological study area and include:

- Cumberland Plain Woodland in the Sydney Basin Bioregion (listed as critically endangered under the BC Act)
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (listed as endangered under the BC Act)
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (listed as endangered under the BC Act).

The distribution of TECs is mapped in Figure 8-28. A subset of these TECs within the study area also meet the definition of the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest TEC listed under the EPBC Act. This is further considered in relation to matters of national environmental significance below.

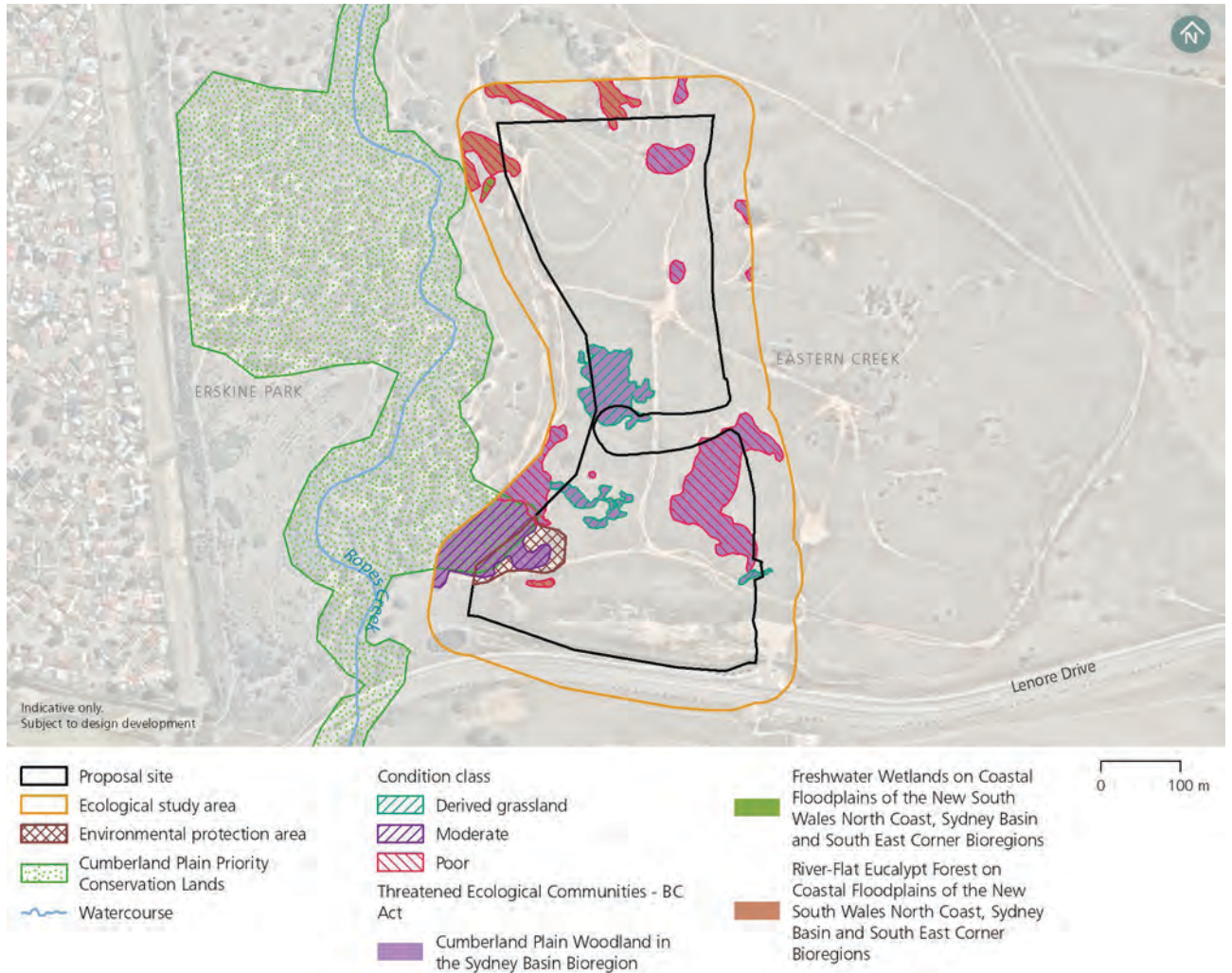


Figure 8-28: Threatened Ecological Communities

**Groundwater Dependent Ecosystems (GDEs)**

There are no aquatic GDEs in the ecological study area or immediate surrounds. In addition, the ecological study area is not located within a floodplain alluvial groundwater source. A small area of ponded water in an offshoot of Ropes Creek within the north-west of the ecological study area (outside of the proposal site) may qualify as a GDE, however these wetlands are man-made and exist due to damming of a small catchment of rain and ponding of stormwater next to Lenore Drive. These wetlands do not occur naturally and are due to agricultural activities (e.g. dams) and stormwater management works (e.g. sediment basin).

**Threatened species and populations**

**Grevillea juniperina subsp. Juniperina**

One threatened plant species was recorded in the ecological study area during the field survey. This was identified as *Grevillea juniperina* subsp. *Juniperina* (see Figure 8-29 and Figure 8-30). Four plants were identified growing from the southern bank of the large dam in the north of the ecological study area and outside the proposal site. Over 30 plants were also identified to the west of the ecological study area on the edge of Ropes Creek. These individuals are part of the Ropes Creek population. However, no other threatened flora species are considered likely to occur in the ecological study area based on the results of the targeted survey and lack of suitable habitat.



Figure 8-29: *Grevillea juniperina* subsp. *Juniperina*  
(Location: Along the northern dam bank of the ecological study area and outside the proposal site. View facing west along the southern bank of the large dam)



Figure 8-30: *Grevillea juniperina* subsp. *Juniperina*  
(Location: Along the northern dam bank of the ecological study area and outside the proposal site (close-up of Figure 8-29))

#### Cumberland Plain Land Snail

Live Cumberland Plain Land Snails were found in leaf litter and under rubbish in moderate condition woodland in the west of the ecological study area and outside the proposal site. This is expected to be the most suitable habitat for this species and would be avoided by the proposal as it is outside of the proposal site. The species is considered to be moderately likely to use habitats in the ecological study area.

#### Green and Golden Bell Frog

The dense cover of *Typha orientalis* in the dams and small offshoot drain from Ropes Creek are suitable for a range of common frog species and may also be suitable for the threatened Green and Golden Bell Frog. The larger northern dam has been identified as the best quality habitat in the ecological study area for the Green and Golden Bell Frog. Ropes Creek may provide a movement corridor for this species to occur in the habitats within the ecological study area and outside the proposal site however, there have been only three records of this species in the locality since 2000. The most recent record was in 2012 about eight kilometres north of the proposal site on Ropes Creek. This species is highly mobile and may disperse as far as 10 kilometres using the Ropes Creek corridor. Overall the species is considered to be moderately likely to use habitats in the ecological study area.

#### Threatened aquatic species

Ropes Creek is mapped as 'Key Fish Habitat' by the NSW DPI, however no suitable habitat for threatened fish is present in the ecological study area and outside the proposal site. There is a lack of permanent flow, weed proliferation, and evidence of physical disturbance in the ecological study area. As such, the aquatic habitats are considered to be in moderately to highly degraded condition. The drainage lines and dams do not have characteristics suitable for any of the threatened aquatic species known or predicted to occur in the locality.

#### Other threatened fauna

The ecological study area also provides suitable habitat for other threatened species that have been previously recorded in the locality, including insectivorous bats, woodland birds, nectarivorous birds the Grey-headed Flying Fox and large predatory birds.

Fauna species that are either known to occur in adjacent habitat and/or are considered at least moderately likely to occur in the proposal site based on the presence of suitable habitat are listed in Table 8-42.



Table 8-42: Other threatened fauna

Threatened fauna species	BC Act status	EPBC Act status
Grey-headed Flying-fox ( <i>Pteropus poliocephalus</i> )	Vulnerable	Vulnerable
Little Bent-winged Bat ( <i>Miniopterus australis</i> )	Vulnerable	Not listed
Large Bent-winged Bat ( <i>Miniopterus orianae oceanensis</i> )	Vulnerable	Not listed
Southern Myotis ( <i>Myotis macropus</i> )	Vulnerable	Not listed
Eastern False Pipistrelle ( <i>Falsistrellus tasmaniensis</i> )	Vulnerable	Not listed
Eastern Coastal Free-tailed Bat ( <i>Micronomus norfolkensis</i> )	Vulnerable	Not listed
Greater Broad-nosed Bat ( <i>Scoteanax rueppellii</i> )	Vulnerable	Not listed
Yellow-bellied Sheathtail-bat ( <i>Saccolaimus flaviventris</i> )	Vulnerable	Not listed
Dusky Woodswallow ( <i>Artamus cyanopterus cyanopterus</i> )	Vulnerable	Not listed
Varied Sittella ( <i>Daphoenositta chrysoptera</i> )	Vulnerable	Not listed
Little Lorikeet ( <i>Glossopsitta pusilla</i> )	Vulnerable	Not listed
Swift Parrot ( <i>Lathamus discolor</i> )	Endangered	Critically endangered
Little Eagle ( <i>Hieraaetus morphnoides</i> )	Vulnerable	Not listed
Square-tailed Kite ( <i>Lophoictinia isura</i> )	Vulnerable	Not listed
Powerful Owl ( <i>Ninox strenua</i> )	Vulnerable	Not listed
Masked Owl ( <i>Tyto novaehollandiae</i> )	Vulnerable	Not listed

The recorded threatened species are mapped in Figure 8-31.

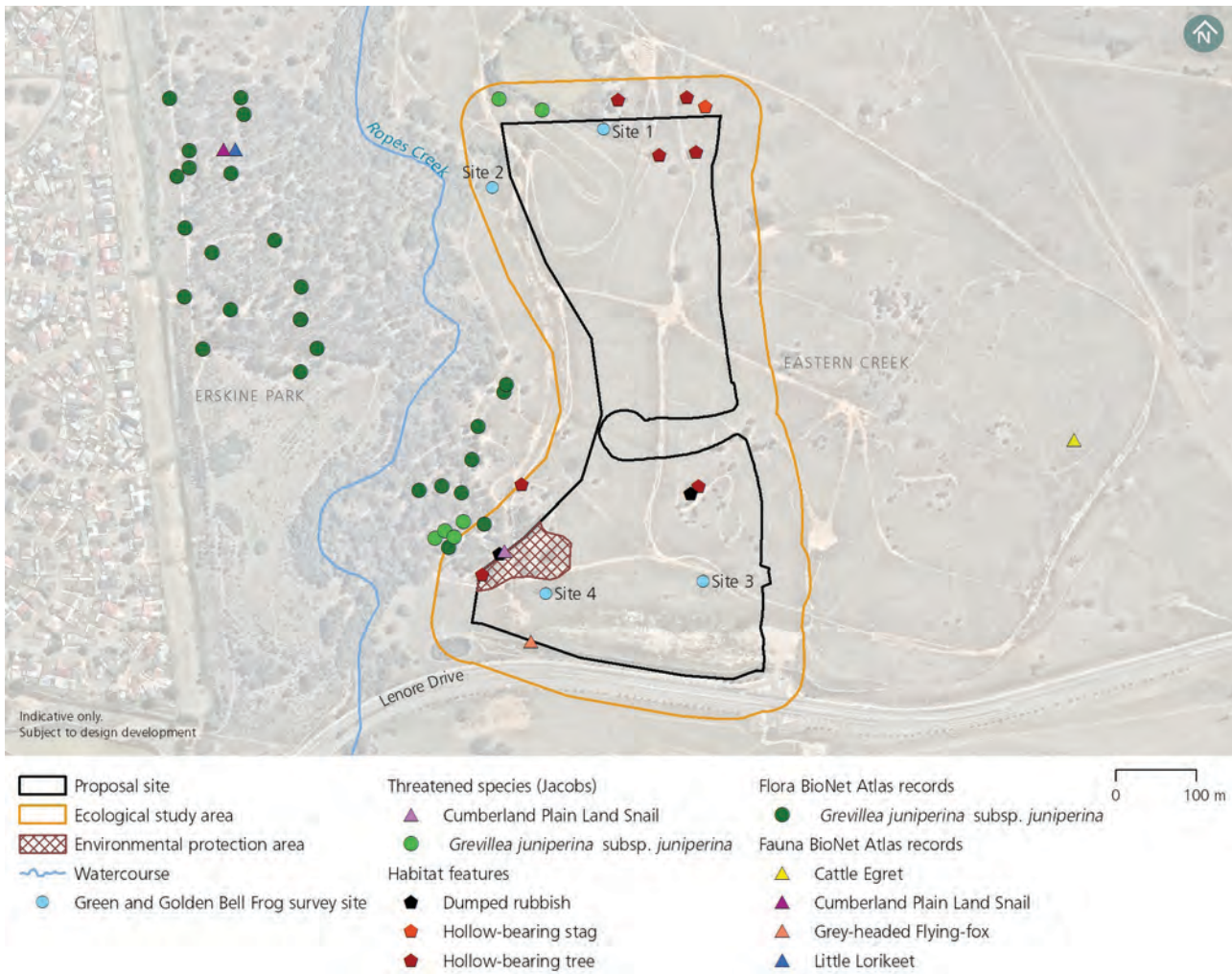


Figure 8-31: Recorded threatened species in the ecological study area

**Wildlife connectivity corridors**

Habitats within the ecological study area retain some form of functional north-south connectivity along the Ropes Creek riparian corridor, which is mapped as a biodiversity corridor of regional significance as identified by the BIO Map (NSW Government, 2020) (see Figure 8-32).

The roadways and urban areas within and surrounding the ecological study area do not totally prevent fauna movement between habitat fragments. The permeability of landscapes for different fauna species varies and habitat connectivity for more mobile species (e.g. birds, flying-foxes, insectivorous bats, insects, plants) remains. The connectivity for sedentary species and smaller species such as the Cumberland Plain Land Snail, frogs and reptiles is likely to be minimal.

Depending on the mobility of the species, some may be able to maintain connectivity to other riparian corridors to the east (Eastern Creek, Prospect Nature Reserve and Western Sydney Parklands) and to the west (South Creek). There is likely to be some movement of species and genetic material between the ecological study area and these adjacent habitats. Functional connectivity for many species would exist between the ecological study area and habitats to the east and west despite the level of fragmentation that has occurred across the landscape.

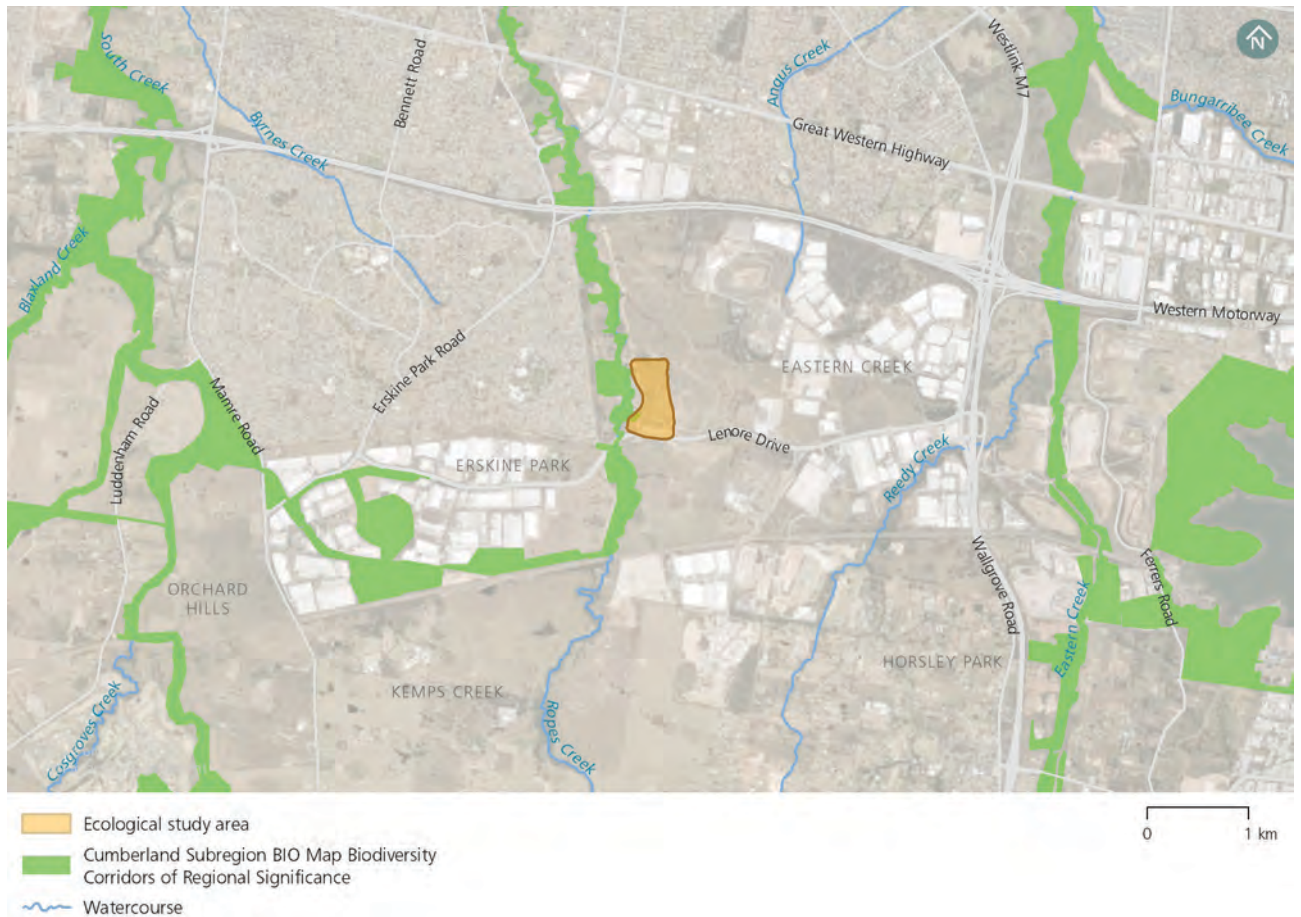


Figure 8-32: Wildlife connectivity corridors in the ecological study area

### Matters of National Environmental Significance

The Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest was identified as the only TEC in the ecological study area listed under the EPBC Act (listed as critically endangered under the EPBC Act). The only vegetation that meets the critically endangered ecological communities (CEEC) condition criteria is the moderate condition vegetation that is contiguous with the Ropes Creek riparian corridor (to the west of the proposal site). There is about 0.1 hectares of the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest community within the ecological study area and <0.001 hectares within the proposal site (refer to Figure 8-33).

Three threatened animal species listed under the EPBC Act are considered moderately likely to use the habitats in the ecological study area for foraging, including the Green and Golden Bell Frog (listed as endangered under the EPBC Act), the Swift Parrot (listed as critically endangered under the EPBC Act) and the Grey-headed Flying-fox (listed as vulnerable under the EPBC Act). As outlined above, there are few recent records of the Green and Golden Bell Frog in the locality and no known populations. The Grey-headed Flying-fox and Swift Parrot are considered moderately likely to occur in the ecological study area on occasion. As detailed in Section 8.11.3, direct impacts to habitat for threatened fauna species would result in a minor reduction in extent of suitable foraging habitat for the Green and Golden Bell Frog (0.11 hectares), Swift Parrot (1.2 hectares) and Grey-headed Flying-fox (1.2 hectares).

No threatened plants listed under the EPBC Act are considered to have a moderate or higher likelihood of occurring.

Two migratory bird species listed under the EPBC Act - the Fork-tailed Swift and White-throated Needletail - are considered moderately likely to fly over the ecological study area however would not use it as habitat. While there is potential that some migratory species of bird use the ecological study area and locality, the ecological study area would not be classed as an 'important habitat' as a nationally significant proportion of the population would not be supported.

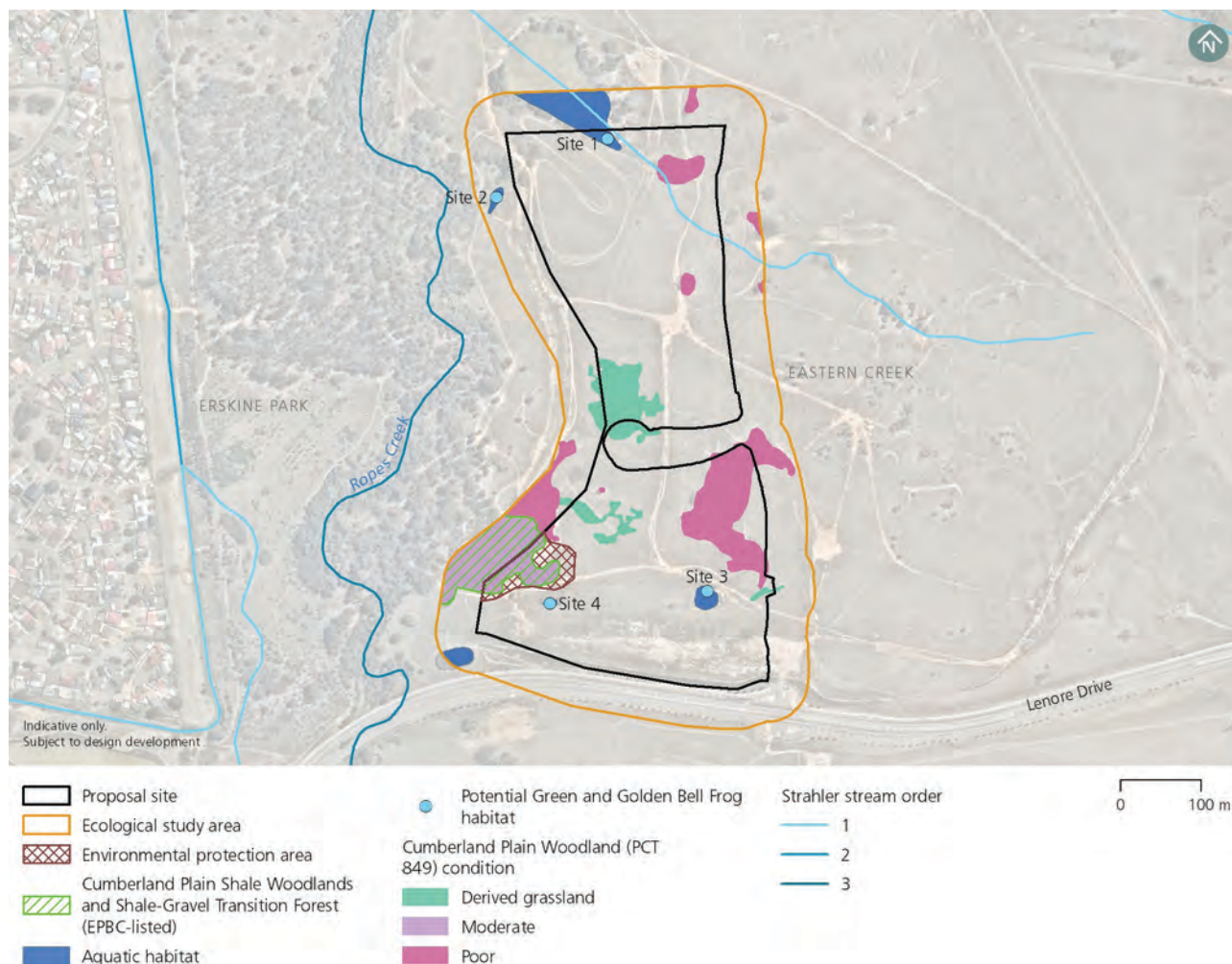


Figure 8-33: Matters of National Environmental Significance

### 8.11.3 Potential impacts

The proposal site layout has been designed to minimise impacts to biodiversity, including through the establishment of an environmental protection area to avoid vegetation clearing in the south-west of the proposal site.

The ecological study area is in a highly disturbed landscape that is extensively cleared and modified. Remaining intact vegetation is generally concentrated along waterways and consists of small fragmented bushland remnants and isolated trees. The generally isolated vegetation within the proposal site is typically of poor quality. One area of moderate quality vegetation exists in the south-west area of the proposal site which would be mostly retained within the environmental protection area.

#### Construction

##### Loss of native vegetation and habitat

The proposal would require the removal of about 1.92 hectares of native vegetation, a subset of which includes the following TECs:

- 1.74 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)
- 0.07 hectares of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)
- <0.001 hectares of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 hectares of the associated BC Act listed Cumberland Plain Woodland community.

One threatened flora species, *Grevillea juniperina* subsp. *Juniperina* was identified in the ecological study area (outside the proposal site). No individual plants of this species would directly impacted by the proposal, however 0.06 hectares of potential habitat would be removed.

**Loss of fauna habitat**

The native vegetation to be removed provides habitat (or potential habitat) for the species mentioned in Section 8.11.2.

Table 8-43 provides an overview of potential direct impacts of the proposal to potential habitat of threatened fauna species. Assessments of significance against both the BC Act and EPBC Act concluded that a significant impact to any threatened species is considered unlikely.

Table 8-43: Potential impacts to fauna habitat

Species	BC Act status	EPBC act status	Potential impact
<b>Cumberland Plain Land Snail</b> <i>(Meridolum corneovirens)</i>	Endangered	Not listed	<0.001 ha of habitat would be removed. The impact to habitat would be the edge of a large high-quality habitat and the proposal would not result in fragmentation or isolation of high-quality habitat.
<b>Green and Golden Bell Frog</b> <i>(Litoria aurea)</i>	Endangered	Endangered	Up to 0.11 ha of potential non-breeding habitat would be removed. This would represent a small proportion of similar quality habitat present in the broader locality.
<b>Grey-headed Flying-fox</b> <i>(Pteropus poliocephalus)</i>	Vulnerable	Vulnerable	Up to 1.2 ha of suitable foraging habitat would be removed. Breeding camps and other important habitat would not be impacted.
<b>Insectivorous bats (cave-roosting)</b>			
<b>Little Bent-winged Bat</b> <i>(Miniopterus australis)</i>	Vulnerable	Not listed	Up to 1.92 ha of foraging habitat would be removed. However, much of this area is considered poor quality habitat. The amount of habitat removal is relatively small in comparison to the amount of higher quality habitat available in the broader locality.
<b>Large Bent-winged Bat</b> <i>(Miniopterus orianae oceanensis)</i>	Vulnerable	Not listed	
<b>Southern Myotis</b> <i>(Myotis macropus)</i>	Vulnerable	Not listed	
<b>Insectivorous bats (hollow-roosting)</b>			
<b>Eastern False Pipistrelle</b> <i>(Falsistrellus tasmaniensis)</i>	Vulnerable	Not listed	Up to 1.92 ha of foraging habitat and four hollow-bearing trees would be removed. However, much of this area is considered poor quality habitat. The amount of habitat removal is relatively small in comparison to the amount of higher quality habitat available in the broader locality.
<b>Eastern Coastal Free-tailed Bat</b> <i>(Micronomus norfolkensis)</i>	Vulnerable	Not listed	
<b>Greater Broad-nosed Bat</b> <i>(Scoteanax rueppellii)</i>	Vulnerable	Not listed	
<b>Yellow-bellied Sheathtail-bat</b> <i>(Saccolaimus flaviventris)</i>	Vulnerable	Not listed	
<b>Woodland birds</b>			
<b>Dusky Woodswallow</b> <i>(Artamus cyanopterus cyanopterus)</i>	Vulnerable	Not listed	Up to 1.2 ha of foraging habitat would be removed. However, much of this area is considered poor quality habitat. The amount of habitat removal is relatively small when the amount of available habitat in the broader locality is considered.
<b>Varied Sittella</b> <i>(Daphoenositta chrysoptera)</i>	Vulnerable	Not listed	

Species	BC Act status	EPBC act status	Potential impact
<b>Nectarivorous birds</b>			
<b>Little Lorikeet (<i>Glossopsitta pusilla</i>)</b>	Vulnerable	Not listed	Up to 1.2 ha of foraging habitat and four hollow-bearing trees would be removed. However, much of this area is considered poor quality habitat. The amount of habitat removal is relatively small when the amount of available habitat in the broader locality is considered.
<b>Swift Parrot (<i>Lathamus discolor</i>)</b>	Endangered	Critically endangered	
<b>Large predatory birds</b>			
<b>Little Eagle (<i>Hieraetus morphnoides</i>)</b>	Vulnerable	Not listed	Up to 1.2 ha of foraging habitat would be removed. However, no high-quality habitat is present within the ecological study area for these species and these species may only visit the ecological study area on occasion to hunt. The amount of habitat removal is small when the amount of available habitat in the broader locality is considered.
<b>Square-tailed Kite (<i>Lophoictinia isura</i>)</b>	Vulnerable	Not listed	
<b>Powerful Owl (<i>Ninox strenua</i>)</b>	Vulnerable	Not listed	
<b>Masked Owl (<i>Tyto novaehollandiae</i>)</b>	Vulnerable	Not listed	

### Assessments of significance

Assessments of significance have been undertaken for threatened species under the BC Act and Matters of National Environmental Significance under the EPBC Act.

An assessment of significance under the BC Act has been conducted for threatened species that have been identified within the ecological study area or that are considered to have a moderate or high likelihood of occurring in the proposal site due to the presence of suitable habitat. The conclusions of the assessments indicate that a significant impact is considered unlikely on any threatened species or threatened ecological communities listed under the BC Act. Further details of the assessment of significance under the BC Act are provided in Appendix I (Biodiversity Assessment Report) of this REF.

The findings of EPBC Act assessments of significance are summarised in Table 8-44. A significant impact is considered unlikely for any Matter of National Environmental Significance and a referral of the proposal for a controlled activity determination under the EPBC Act in relation to biodiversity matters would not be required. Further details of the assessment of significance under the EPBC Act are provided in Appendix I (Biodiversity Assessment Report) of this REF.

Table 8-44: Assessment of significance – EPBC Act

Threatened species or ecological community	Impacts on important population?	Likely significant impact?	Summary of assessment
<b>Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</b>	Not applicable	No	Based on the estimated construction proposal site, the project may result in the direct clearing of about <0.001 hectares of the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community.
<b>Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)</b>	Yes	No	There would be a potential minor reduction in extent of suitable foraging habitat, however breeding camps or other important habitat would not be impacted. The proposal is unlikely to reduce the population size of the species or decrease its reproductive success, and would not contribute to the key threats to this species.
<b>Green and Golden Bell Frog (<i>Litoria aurea</i>)</b>	Yes	No	This species has not been identified in the ecological study area and no individuals are expected to be directly impacted. The potential habitat impacted by the proposal is likely to represent foraging and shelter for individuals dispersing across the landscape and is a small proportion of similar quality habitat present in the broader locality. The proposal would not directly impact on a known breeding site or any habitat critical to the survival of this species.
<b>Swift Parrot (<i>Lathamus discolor</i>)</b>	Not applicable	No	The proposal would result in a small reduction in extent of potential foraging habitat and loss of potential roosting habitat, however no priority foraging habitat would be impacted. The proposal is unlikely to reduce the population size of the species, decrease its reproductive success or interfere with its recovery.

### Habitat fragmentation

Overall, potential impacts associated with habitat fragmentation are expected to be negligible.

The proposal site is located within a highly disturbed landscape where most habitat has been cleared. The proposal would not break apart continuous habitats into separate smaller ‘fragments’. Functional connectivity for many species would remain in the ecological study area. The proposal could however result in an increase in isolation of habitats as all the vegetation on the site would be removed, which would increase the physical distance between habitat fragments. Local division of some wildlife populations, isolation of key habitat resources, loss of genetic interchange, and loss of population viability for some species may be caused as a result of the proposal.

### Aquatic impacts

There would be no direct impacts to sensitive or key fish habitats associated with the proposal. Potential indirect impacts to aquatic habitat would be of low magnitude and standard mitigation measures would be implemented to manage impacts to surrounding habitats as identified in Section 8.11.4.

### Fauna injury or mortality

Fauna injury or death may potentially occur during construction when undertaking vegetation clearing. The extent of this impact would be proportionate to the removal of vegetation. Less mobile species or those that are nocturnal and nest or roost in trees during the day may find it difficult to rapidly move away from the clearing when disturbed. Mitigation measures designed to reduce potential injury and mortality of fauna are provided in Section 8.11.4.

### Other indirect impacts

The potential for indirect impacts on biodiversity values is considered low given that much of the ecological study area is highly fragmented, subject to strong edge effects, and surrounded by existing roads and barriers. Potential indirect biodiversity impacts are outlined in Table 8-45.

Table 8-45: Potential indirect biodiversity impacts

Potential indirect impact	Relevance to the proposal
<b>Edge effects</b>	The proposal would be in an area that is currently subject to a high level of edge effects (changes to ecosystem functioning that occur as a result of sudden and artificial edges, e.g. increased light) from the existing roadways, previous agricultural land use practices and urban development. The proposal is unlikely to cause further impacts from edge effects. No new edge habitats would be created as the ecological study area does not possess large core areas of undisturbed habitat. This impact would be of low magnitude.
<b>Weeds, pathogens and pests</b>	<p>Weeds would be managed during construction in accordance with mitigation measures outlined in Section 8.11.4. Without mitigation, an increase in weeds would be likely to occur during construction. The ecological study area contains substantial weed growth and no undisturbed weed free habitat exists.</p> <p>While the presence of pathogens has not been identified within the ecological study area, the potential for pathogens to occur would be treated as a risk during construction. Pathogens would be managed within the proposal site in accordance with the <i>Biosecurity Act 2015</i>.</p> <p>Construction activities may also have the potential to disperse pest species out of the proposal site across the surrounding landscape (particularly dewatering the dams) however the magnitude of this impact would be low. Management and mitigation measures designed to minimise these impacts are outlined in Section 8.11.4.</p>
<b>Noise and vibration</b>	<p>There would be temporary noise and vibration impacts during construction and operation within the proposal site and immediate surrounds due to vegetation clearing, ground disturbance, machinery and vehicle movements, and general human presence. The predicted noise and vibration impacts arising from the proposal on other sensitive receivers are assessed in Section 8.1 (Noise and vibration) of the REF.</p> <p>The predicted temporary noise and vibration impacts would potentially disturb fauna and may disrupt foraging, reproductive, or movement behaviours in proximity to the proposal site. Some species may be more sensitive to noise emissions than others (e.g. woodland birds). However, the impacts from noise emissions are likely to be localised to the construction areas and are not considered likely to have a significant, long-term, impact on wildlife populations outside the proposal site and immediate surrounds.</p>
<b>Dust</b>	Dust has the potential to be generated temporarily during periods of substantial earthworks, vegetation clearing, vehicle movements for construction and during adverse weather conditions. However, deposition of dust on foliage is likely to be highly localised, intermittent, and temporary and is therefore not considered likely to be a major impact of the proposal. Dust would be managed through the implementation of measures outlined in Section 8.13 (Air quality).
<b>Contamination</b>	Localised release of contaminants (i.e. hydraulic fluids, oils, drilling fluids, etc.) into the surrounding environment (including drainage lines) may accidentally occur. The most likely result of contaminant discharge would be the localised contamination of soil and potential direct physical trauma to flora and fauna that encounter contaminants. Management and mitigation measures to minimise potential contamination impacts are outlined in Section 8.10 (Contamination).



## Operation

The proposal is generally not expected to result in different impacts (from construction) during operation. Key impacts of the proposal would occur during construction and have been assessed above. Management and mitigation measures to reduce these impacts are included in Section 8.11.4.

During operation, there is a chance of fauna mortality through vehicle collision. The impact on threatened species however is expected to be minimal. Based on evidence from other roadways in the locality most vehicle strike impacts can be expected to occur to common mammals such as birds, possums and exotic animals, including foxes.

The proposal would operate 24 hours per day, seven days per week. As such, the proposal site and immediate surrounds would be subject to continuous artificial lighting, essentially creating permanent 'daylight' conditions. Ecological light pollution may potentially affect nocturnal fauna by interrupting their life cycle. Some species (e.g. light tolerant microchiropteran bats) may benefit from the lighting due to increased food availability (insects attracted to lights) around these areas. Due to the frequency and sustained nature of the lighting, it is unlikely that animals would habituate to the light disturbance and a long-term impact around the area of lighting is likely. This impact would be of low magnitude and mitigation measures are not considered necessary.

### 8.11.4 Management and mitigation measures

Biodiversity impacts would be managed in accordance with Sydney Metro's Construction Environmental Management Framework. The Construction Environmental Framework includes biodiversity management objectives to maximise workers' awareness of biodiversity values and avoid or minimise potential impacts to biodiversity, and requirements for pre-clearing surveys to be completed prior to native vegetation clearing.

The management and mitigation measures that would be implemented to address potential biodiversity impacts of the proposal are listed in Table 8-46.

Table 8-46: Biodiversity management and mitigation measures

No.	Impact	Environmental management and mitigation measures
B1	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, the limits of the work zone, areas for parking and turning of vehicles and plant equipment would be clearly and accurately marked out. These areas would be located so that vegetation disturbance is minimised as much as possible and the drip-line of trees avoided.
B2	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, exclusion zones would be identified and established around all vegetation to be retained, such as the environmental protection area in the west of the proposal site. Periodic monitoring would be undertaken to ensure all controls are in place and no inadvertent impacts are occurring.
B3	Potential impact to surrounding vegetation and threatened ecological communities	Materials, plant, equipment, work vehicles and stockpiles would be placed to avoid damage to surrounding vegetation and outside tree driplines.
B4	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, personnel would be informed of the environmentally sensitive aspects of the proposal site, including plans for impacted and adjoining areas showing vegetation communities, important flora and fauna habitat areas, and locations where threatened species, populations or ecological communities have been recorded. Construction personnel would be made aware that any native fauna species encountered must be allowed to safely leave the proposal site where possible and a local wildlife rescue organisation or appropriately experienced ecologist must be called for assistance where necessary.
B5	Potential impact to surrounding vegetation and threatened ecological communities	Where possible, hollows would be cut out of hollow-bearing trees and re-established in large trees to the west of the proposal site to mitigate the loss of hollow habitat on fauna.

No.	Impact	Environmental management and mitigation measures
B6	Potential impacts to the Cumberland Plain Land Snail	Pre-clearing surveys for the Cumberland Plain Land Snail would be undertaken by a suitably qualified ecologist within 48 hours prior to the commencement of clearing to translocate any individuals that may be inhabiting areas that would be cleared or disturbed. This includes all areas of dumped rubbish across the proposal site.
B7	Potential impacts to the Cumberland Plain Land Snail	Prior to construction, exclusion zones would be established around Cumberland Plain Land Snails habitat in the environmental protection area. All personnel would be inducted to understand the exclusion zone to limit the potential of trampling snails.
B8	Potential impacts to the Cumberland Plain Land Snail	Large woody debris cleared within the proposal site would be relocated into habitat to the west of the proposal site.
B9	Potential impacts to the Green and Golden Bell Frog	Pre-clearing surveys for the Green and Golden Bell Frog would be undertaken by a suitably qualified ecologist within 48 hours prior to the commencement of clearing and dewatering of potential habitat to ensure that individuals have not inhabited the site. A suitably qualified ecologist would also be present during the dewatering of the habitat. A stop work in the immediate vicinity would be implemented if this species is identified on the proposal site, and then further consideration of approach to management of individuals on proposal site through consultation with a Green and Golden Bell Frog expert.
B10	Potential impacts to the Green and Golden Bell Frog	Any work in and around the suitable habitat during clearing would follow the Hygiene Protocol for the Control of Disease in Frogs (Department of Environment and Climate Change, 2008b) to reduce the potential for introduction and spread of Chytrid fungus.
B11	Potential impacts from introduction and spread of weeds	Weed control would be undertaken by suitably qualified and/or experienced personnel. This may include: <ul style="list-style-type: none"> <li>• Manual weed removal in preference to herbicides</li> <li>• Replacing non-target species removed/killed as a result of weed control activities</li> <li>• Protecting non-target species from spray drift</li> <li>• Using only herbicides registered for use within or near waterways for the specific target weed</li> <li>• Applying herbicides during drier times when the waterway level is below the high-water mark</li> <li>• Not applying herbicide if it is raining or if rain is expected</li> <li>• Mixing and loading herbicides, and cleaning equipment away from waterways and drains.</li> </ul>
B12	Potential impacts from introduction and spread of weeds	During construction, weed management would be undertaken in areas affected by construction prior to any clearing works in accordance with the <i>Biosecurity Act 2015</i> to ensure they are not spread to the surrounding environment; including during transport disposal off-site to a licenced waste disposal facility.
B13	Potential impacts from introduction and spread of weeds	All weeds, propagules, other plant parts and/or excavated topsoil material that is likely to be infested with weed propagules that are likely to regenerate would be treated on site or bagged, removed from site and disposed of at a licenced waste disposal facility.
B14	Potential impacts from introduction and spread of plant pathogens	During construction, all vehicles driving to and from the proposal site would follow a protocol to prevent the spread or introduction of phytophthora, namely vehicles would be clean, including the tyres and any equipment.

## 8.12 Resource use and waste management

This section assesses the potential resource use and waste management impacts of the proposal.

### 8.12.1 Methodology

The resource use and waste management assessment involved:

- Identifying resource use and management during construction and operation
- Identifying likely waste generating activities and likely waste types
- Identifying mitigation measures to manage potential impacts associated with resource use and waste management.

The waste management hierarchy principles established under the *Waste Avoidance and Resource Recovery Act 2001* of avoid/reduce/reuse/recycle/dispose would be applied to the construction and operation of the proposal.

### 8.12.2 Potential impacts

#### Construction

The type and quantities of resources and materials needed to construct the proposal are relatively minor and readily available within the Greater Sydney region. The main resources likely to be required during construction would be fill, concrete, asphalt, aggregate, sand and water.

Final specifications and quantities would be defined during detailed design and confirmed by the relevant construction contractor(s).

The volume of waste anticipated to be generated during construction would be relatively minor. Existing metropolitan waste management facilities would have capacity to receive the anticipated waste streams generated by the proposal. General construction wastes and wastes from site offices would be collected for off-site recycling wherever practicable.

Potential waste types that would be generated during construction include:

- Concrete
- Asphalt
- Green waste (from removing and pruning trees and vegetation)
- Surplus building material
- Spoil, such as excavated natural material, general solid waste, special waste, restricted solid waste, and/or hazardous waste
- Sediments
- General office waste (including sewage and grey water)
- Domestic waste from personnel (including food scraps, glass and plastic bottles, paper and plastic containers).

Potential temporary impacts associated with waste management during construction could include:

- Waste being unnecessarily directed to landfill due to inadequate collection, classification and disposal of waste
- Excess spoil being unnecessarily directed to landfill due to poor characterisation, insufficient planning, incorrect handling and/or incorrect classification
- A potential increase in vermin from the incorrect storage, handling and disposal of putrescible waste from the proposal
- Excessive amounts of materials being ordered, resulting in a large amount of left-over, unused resources
- Lack of identification of feasible options for recycling or reuse of resources.

Wastes that contain hazardous, special or otherwise contaminated materials which are unsuitable to be retained on the proposal site would be treated and/or disposed of off-site at a licensed facility in accordance with the relevant guidelines. The management of contaminated soils is discussed in Section 8.10 (Contamination).

Recyclables such as containers (plastics, glass, cans, etc.), paper and cardboard would be collected by an authorised contractor for off-site recycling. There are a number of material recovery facilities near the proposal site. The recycling facility would be determined by the contractor engaged to collect the material.

Wastewater would also be generated by the use of staff amenities at the proposal site. Sewage and grey water from these amenities would be disposed to sewer or transported to an appropriately licenced liquid waste treatment facility.

Sediment basins or tanks would be installed onsite. Sediments would be recovered from the basins/tanks and removed from the proposal site for appropriate disposal.

### Operation

The key materials required for the operation of the proposal include aggregate, sand, cement and water. Additional production materials include:

- Supplementary cementitious materials (e.g. fly ash)
- Air-entraining admixture
- Steel fibre
- Poly fibre.

The amount of input materials required would vary based on demand and resultant production rates. For the purposes of this assessment, peak production rates have been assumed at 730 tonnes of concrete per day. Refer to Chapter 5 (Proposal description) for the volume of input materials required to support this production rate.

The volumes of waste generated during operations, maintenance and repairs are anticipated to be minimal and would be readily managed through the implementation of standard mitigation measures.

Operation of the proposal would generate waste streams, including:

- Concrete from faulty precast segments (anticipated to be about two to three per cent of total production based on experience from precast segment production from Sydney Metro City & Southwest)
- Oil, grease and other liquid wastes from the maintenance of plant and equipment
- Production materials such as aggregates, sand, cement, fly ash, steel fibre and poly fibre
- General office waste (including sewerage and grey water)
- Domestic waste from personnel (including food scraps, glass and plastic bottles, paper and plastic containers).

Water management infrastructure would include onsite detention and a water recycling facility included as part of the batching plant. Water would be recycled onsite wherever possible.

Potential operation waste impacts would be similar to those mentioned above for construction. The impacts are expected to be minor and would be managed through the mitigation measures identified in Section 8.12.3. After the completion of operations and decommissioning of the precast facilities, the assets would be deconstructed and the materials removed from the proposal site. Where possible, salvaged materials would be recycled and reused. Any residual material would be disposed of at a licensed waste management facility.

### 8.12.3 Management and mitigation measures

Waste would be managed in accordance with Sydney Metro's Construction Environmental Management Framework.

Relevant initiatives in the Sydney Metro West Sustainability Plan would be applied to the proposal as outlined in Section 8.15 (Sustainability, climate change and greenhouse gases).

The Construction Environmental Management Framework also provides the basis for the development and implementation of a design and/or construction sustainability management plan. The framework provides minimum requirements for the plan which includes waste management and recycling.

The management and mitigation measures that would be implemented to manage waste and resources use are listed in Table 8-47.

Table 8-47: Waste and resource mitigation measures

No.	Impact	Management and mitigation measures
<b>WR1</b>	Compliance with legislative and policy requirements	All waste would be assessed, classified, managed, transported and disposed of in accordance with the <i>Waste Classification Guidelines and the Protection of the Environment Operations (Waste) Regulation 2014</i> .
<b>WR2</b>	Waste minimisation	Waste would be minimised by accurately calculating materials brought to the proposal site and limiting materials packaging.
<b>WR3</b>	Waste management	100 per cent of usable spoil from construction would be reused, in accordance with the Sydney Metro spoil management hierarchy.
<b>WR4</b>	Reuse and recycling	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities.
<b>WR5</b>	Waste tracking	A materials tracking system would be implemented for material transferred to offsite locations such as licensed waste management facilities.
<b>WR6</b>	Reuse and recycling	At least 95 per cent of inert and non-hazardous construction waste, excluding spoil, and at least 50 per cent of office waste would be recycled or alternatively beneficially reused.

Mitigation measures in other chapters that are relevant to the management of potential impacts include:

- Section 8.10 (Contamination), specifically measures which address the disturbance of contaminated land and measures to minimise the likelihood and potential impact of accidental spills or leaks.

## 8.13 Air quality

This section assesses the potential air quality impacts of the proposal.

### 8.13.1 Methodology

The air quality assessment involved:

- Establishing prevailing climate and meteorological conditions around the proposal site using publicly available data from the Bureau of Meteorology (BoM) monitoring station at Horsley Park
- Establishing prevailing ambient air quality conditions around the proposal using publicly available data over the last five complete calendar years (2015 to 2019) from air quality monitoring stations at St Marys and Prospect, operated by the Environment, Energy and Science Group of DPIE
- Identifying air quality sensitive receivers with the potential to be adversely affected by the proposal
- Undertaking a desktop review of Commonwealth Department of Agriculture, Water and the Environment National Pollutant Inventory data to identify any projects or facilities that may be contributing to local air quality conditions
- Identifying key potential air quality-related risks arising from the proposal. Environmental features, such as local climate and meteorology, background air quality conditions, and terrain, were analysed to identify the sensitivity of the receiving environment to potential air quality-related impacts
- Assessing potential air quality impacts during construction and operation of the proposal. Potential impacts of the proposal were qualitatively estimated using metrics developed based on guidance from the Australian and New Zealand standard AS/NZS ISO 31000: 2018 Risk Management – Principles and Guidelines
- Identifying mitigation measures to address or manage potential air quality impacts.

Based on guidance from AS/NZS ISO 31000:2018, magnitude and likelihood definitions are outlined in Table 8-48 and Table 8-49 respectively. The air quality risk assessment matrix is presented in Table 8-50.

Table 8-48: Magnitude definitions for air quality assessment

Magnitude of potential impact	Definition
<b>Catastrophic</b>	<ul style="list-style-type: none"> <li>• Long-term (greater than 12 months) and irreversible large-scale environmental impacts. Would cause exceedances at a larger number of receivers</li> <li>• Extended substantial disruptions and impacts to receivers</li> </ul>
<b>Severe</b>	<ul style="list-style-type: none"> <li>• Long-term (6 to 12 months), environmental impacts to neighbouring receivers</li> <li>• Severe disruptions or long-term impacts to receivers</li> </ul>
<b>Major</b>	<ul style="list-style-type: none"> <li>• Medium-term (between 3 and 6 months) impacts. Would likely cause exceedances at a small number of sensitive receivers under most circumstances</li> <li>• Major disruptions or long-term impacts to receivers</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• Medium-term (between 1 and 3 months), short-term and/or well-contained environmental impacts. Has the potential to result in exceedances of air quality criteria under some circumstances</li> <li>• Moderate impacts or disruptions to receivers</li> </ul>
<b>Minor</b>	<ul style="list-style-type: none"> <li>• Short-term impacts (less than 1 month). Of a magnitude that would not be expected to result in exceedances of air quality criteria under almost all circumstances</li> <li>• Minor or short-term impacts to receivers</li> </ul>
<b>Insignificant</b>	<ul style="list-style-type: none"> <li>• No noticeable changes to the environment and/or highly localised event. Not of a magnitude that would be expected to result in exceedances of air quality criteria under any circumstances</li> <li>• Negligible impact to receivers.</li> </ul>

Table 8-49: Likelihood definitions for air quality assessment

Likelihood of potential impacts	Definition	Probability
<b>Almost certain</b>	Expected to occur frequently during time of activity or project (10 or more times every year)	>90%
<b>Very likely</b>	Expected to occur occasionally during time of activity or project (1 to 10 times every year)	75% to 90%
<b>Likely</b>	More likely to occur than not occur during time of activity or project (once each year)	50% to 75%
<b>Unlikely</b>	More likely not to occur than occur during time of activity or project (once every 1 to 10 years)	25% to 50%
<b>Very Unlikely</b>	Not expected to occur during the time of activity or project (once every 10 to 100 years)	10% to 25%
<b>Almost unprecedented</b>	Not expected to ever occur during time of activity or project (less than once every 100 years)	<10%

Table 8-50: Air quality risk assessment matrix

Likelihood	Definition					
	Insignificant	Minor	Moderate	Major	Severe	Catastrophic
<b>Almost certain</b>	Medium	High	High	Very high	Very high	Very high
<b>Very likely</b>	Medium	Medium	High	High	Very high	Very high
<b>Likely</b>	Low	Medium	Medium	High	High	Very high
<b>Unlikely</b>	Low	Low	Medium	Medium	Medium	High
<b>Very unlikely</b>	Low	Low	Low	Medium	Medium	High
<b>Almost unprecedented</b>	Low	Low	Low	Low	Medium	Medium

### 8.13.2 Existing environment

#### Climate and meteorology

Meteorological conditions are important for determining the direction and rate at which air pollution would disperse. Dust generation is the main air quality risk during construction, and long-term climate data is useful for identifying periods throughout the year when conditions conducive to dust generation are most likely (such as warm and/or dry periods). The closest BoM monitoring station to the proposal site is located about six kilometres to the south-west at Horsley Park (Station ID: 067119). Meteorological data collected over the five most recent calendar years (2015 to 2019) at the Horsley Park BoM station were reviewed to identify local meteorological trends.

Temperature and rainfall data indicates that the setting around the proposal site experiences warm and wet summers (December to February) with average daily maximum temperatures between 28 and 30 degrees Celsius. The average daily maximum temperatures in winter (June to August) are between 17 to 19 degrees Celsius. Winter is the driest season. The driest period of the year is between July and September when the average monthly rainfall is around 36 millimetres per month. The average annual rainfall is 748 millimetres over an average of 74 rain days per year.

Winds blowing from the south-west were most common around the proposal site, occurring approximately eight to twelve per cent of the year. Importantly, winds from the east (e.g. winds blowing from east to west in the direction of the nearest residential receivers at Erskine Park) were only measured as occurring around four per cent of the year.

## Terrain

Terrain can affect the speed and direction of winds across a landscape and may alter the path that a pollutant may take between the emission source and the point of impact.

Elevations within 10 kilometres of the proposal site range from zero to 125 metres above sea level. Elevations at the proposal site range between approximately 50 and 60 metres; about the same elevation as the nearest sensitive receivers to the west. Therefore, topography within the proposal site is relatively even compared to its surrounds and does not significantly affect the speed and direction of winds across the proposal site.

## Ambient air quality

The Environment, Energy and Science Group uses a standardised measurement known as the air quality index to characterise air quality and acceptability of air quality at a location and compare it in relative terms with other locations throughout NSW. Average daily air quality index values for the two monitored stations between 2016 and 2020 were:

- St Marys – ranging from 50 to 75
- Prospect – ranging from 47 to 82.

These values correspond with an air quality index outcome of 'fair', indicating that air quality around these stations is generally of an acceptable quality. Worse air quality index values can occur as a result of a combination of natural and human phenomena including dust storms and bushfires. The recent bushfire events in 2019/2020 resulted in the air quality index exceeding 200 (being the hazardous level), indicating the effect that bushfires can have on air quality.

## Background air quality

Air quality data sourced from monitoring stations at St Marys (about five kilometres to the north-west) and at Prospect (about nine kilometres to the east) are summarised in Table 8-51, which also provides the air quality impact assessment criterion for each pollutant specified in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Environment Protection Authority, 2016).

Local daily particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations were occasionally measured above the relevant criterion. Concentrations and the frequency of exceedances were higher in 2019 compared with previous years, generally as a result of the 2019/20 Australian bushfires. Annually averaged PM<sub>10</sub> concentrations were measured below the Environmental Protection Authority's 25 µg/m<sup>3</sup> criterion at St Marys for all five years. At Prospect, the criterion was exceeded in 2019 with a key contributing factor also being the 2019/20 Australian bushfires. Annually averaged PM<sub>2.5</sub> concentrations were recorded above eight µg/m<sup>3</sup> (the specified criterion) at Prospect in 2015, 2016, 2018 and 2019, and at St Marys in 2019.

Nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO) and sulfur dioxide (SO<sub>2</sub>) concentrations were measured well below the relevant criteria for all years reviewed at both stations.

Collectively, this data indicates that elevated background particulate matter concentrations represent the highest air quality risk at the setting around the proposal site.

Table 8-51: Background air quality data

Pollutant	Averaging period	Criteria	St Marys					Prospect				
			2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
PM <sub>10</sub> (µg/m <sup>3</sup> )	Maximum 24-hour	50 µg/m <sup>3</sup>	53 <sup>1</sup>	100	50	101	160	69	110	61	113	183
	24-hour	Exceeded 50 µg/m <sup>3</sup> <sup>2</sup>	1	3	0	2	25	1	4	2	8	24
	Annual	25 µg/m <sup>3</sup>	15	16	16	19	24	18	19	19	22	26



Pollutant	Averaging period	Criteria	St Marys					Prospect				
			2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	Maximum 24-hour	25 $\mu\text{g}/\text{m}^3$	-	14	13	13	<b>29</b>	<b>30</b>	<b>85</b>	<b>30</b>	<b>48</b>	<b>134</b>
	24-hour	Exceeded 25 $\mu\text{g}/\text{m}^3$ <sup>2</sup>	-	<b>5</b>	<b>3</b>	<b>4</b>	<b>23</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>24</b>
	Annual	8 $\mu\text{g}/\text{m}^3$	-	7.8	7	7.8	<b>9.6</b>	<b>8.2</b>	<b>8.7</b>	7.7	8.5	<b>112</b>
CO ( $\text{mg}/\text{m}^3$ )	Maximum 1-hour	30 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	2	2	2	2	6
	1-hour	10 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	<1	2	1	1	3
NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Maximum 1-hour	246 $\mu\text{g}/\text{m}^3$	60	79	70	70	62	100	100	113	96	92
	Annual	62 $\mu\text{g}/\text{m}^3$	8	7	8	9	7	20	19	19	17	17
SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	Maximum 1-hour	570 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	71	55	60	66	55
	Maximum 24-hour	228 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	8	10	26	13	11
	Annual	60 $\mu\text{g}/\text{m}^3$	-	-	-	-	-	3	3	3	3	3

1 Exceedances of the relevant air quality impact assessment criteria are shown in bold.

2 Figures presented are the number of times the measurements have exceeded the 24-hour criteria

A search of the National Pollutant Inventory (July 2020) identified the Wallgrove Asphalt Plant located about one kilometre north-east of the proposal site at Honeycomb Drive. The main activity of this facility relates to hot mix asphalt manufacturing. Key pollutants emitted by this facility include CO, NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>, which contribute to the air quality conditions in the locality.

### Sensitive receivers

Sensitive receivers are generally located some distance from the proposal site. Sensitive receivers considered relevant to the air quality assessment include the residential area of Erskine Park about 375 metres to the west and the commercial/industrial area of Eastern Creek about 800 metres to the south and east. The nearest receivers to the north are located more than 1.7 kilometres away in Minchinbury.

### 8.13.3 Potential impacts

#### Construction

Potential air quality impacts associated with construction of the proposal would be minor with the implementation of standard mitigation measures outlined in Section 8.13.4, which would include best-practice dust management, and measures to manage exhaust emissions and airborne hazardous materials.

Potential unmitigated air quality impacts arising from construction are summarised in Table 8-52.

Table 8-52: Potential air quality impacts during construction

Potential impacts	Likelihood	Magnitude	Unmitigated risk rating
Dust-related impacts	Unlikely	Moderate	Medium
Exhaust-related pollutants	Very unlikely	Insignificant	Low
Airborne hazardous materials	Very unlikely	Major	Medium

#### Dust-related impacts

Potential construction dust impacts would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 8.13.4.

Given the background air quality and relatively low occurrence of winds blowing in the direction of the nearest receivers at Erskine Park, dust-related impacts during construction would be ‘unlikely’. Considering the intensity of activities and duration of works, the potential magnitude of dust emissions generated during construction would be ‘moderate’ without mitigation. Therefore, without mitigation, potential dust generated during construction would present a ‘medium’ risk, which would be reduced to ‘low’ with the implementation of mitigation measures outlined in Section 8.13.4.

Activities with the highest potential to result in the generation of dust during construction of the proposal would include clearing, earthworks, materials handling, storage and transport activities. The volume of dust generated during a typical work day would vary depending on the types of activities occurring at the proposal site, the prevailing weather conditions (e.g. dry windy conditions increase the potential for wind erosion) and controls that are implemented to reduce these emissions.

### Exhaust-related pollutants

Exhaust emissions generated during construction would be temporary and would not significantly contribute to emissions in the local area, given elevated background particulate matter concentrations in the locality. These emissions would be adequately managed by the implementation of mitigation measures outlined in Section 8.13.4. No long-term adverse impacts to air quality are anticipated.

Exhaust emissions would involve periodic localised emissions of pollutants such as particulate matter as PM<sub>10</sub> and PM<sub>2.5</sub>, NO<sub>2</sub>, CO and SO<sub>2</sub> from the combustion of diesel fuel and petrol.

Ambient air quality measurements for NO<sub>2</sub>, CO and SO<sub>2</sub> are well below the Environmental Protection Authority criteria. Considering this, the distance to the nearest sensitive receivers and prevailing meteorological conditions outlined above, impacts in relation to these exhaust-related pollutants are ‘very unlikely’. Considering the elevated background particulate matter concentrations in the locality and the magnitude of exhaust emissions from plant and equipment during construction, emissions from the proposal would be ‘insignificant’. Therefore, exhaust emissions from construction plant and equipment represent an overall ‘low’ risk without mitigation.

### Airborne hazardous materials

The excavation and handling of potentially contaminated and/or hazardous material during construction can be managed to acceptable levels with the implementation of standard mitigation measures outlined in Section 8.13.4 and those in Section 8.10 (Contamination).

The likelihood of potential impacts associated with airborne hazardous materials from the excavation of contaminated and/or hazardous materials during construction would be ‘very unlikely’ due to the distance of the nearest receivers and the prevailing meteorological conditions. The magnitude of potential impacts associated with airborne hazardous materials from the excavation of contaminated and/or hazardous materials would be ‘major’ as they can result in medium-term impacts to receivers if not adequately managed. Airborne hazardous materials from the excavation of contaminated and/or hazardous materials therefore represents an overall ‘medium’ risk without mitigation, which would be reduced to ‘low’ with the implementation of mitigation measures outlined in Section 8.13.4.

### Operation

Potential air quality impacts associated with operation of the proposal would be low and manageable with the implementation of standard mitigation measures outlined in Section 8.13.4.

Potential air quality impacts from operation are summarised in Table 8-53. Airborne hazardous materials do not impose a risk during operation and therefore have not been considered as part of the operational assessment.

Table 8-53: Potential air quality impacts during operation

Potential impacts	Likelihood	Magnitude	Unmitigated risk rating
Dust-related impacts	Unlikely	Minor	Low
Exhaust-related pollutants	Very unlikely	Insignificant	Low

### Dust-related impacts

Potential dust impacts associated with operation would be readily manageable using standard mitigation measures. During operation, key dust generating processes such as concrete batching would be fully enclosed within the facility. Internal roads and most of the proposal site would be sealed.

Dust may still be generated from bulk materials stored on hardstand areas and tracked materials along sealed areas. Although these sources would be ongoing for the duration of operation, it is expected that they would generate emissions at a significantly lower intensity than activities during construction. Consequently, the potential magnitude of dust emissions generated during operations would be ‘minor’.

Considering the likelihood of impacts is considered ‘unlikely’ (as established for construction), the potential dust-related impacts during operation would represent a ‘low’ risk without mitigation. This potential risk would be further reduced and adequately managed by the implementation of mitigation measures outlined in Section 8.13.4.

**Exhaust-related pollutants**

Similarly to the construction phase, the likelihood and consequence of exhaust-related pollutants would be ‘very unlikely’ and ‘insignificant’ respectively. Therefore, the potential risk without mitigation would be ‘low’ and would be adequately managed by the implementation of mitigation measures outlined in Section 8.13.4.

**8.13.4 Management and mitigation measures**

Potential air quality impacts would be managed in accordance with Sydney Metro’s Construction Environmental Management Framework. The framework includes the following air quality management objectives to:

- Minimise gaseous and particulate pollutant emissions from construction activities as far as feasible and reasonable
- Identify and control potential dust and air pollutant sources.

The management and mitigation measures that would be implemented to address the air quality risks determined during construction and operation of the proposal are listed in Table 8-54.

Table 8-54: Management and mitigation measures – air quality

No.	Impact	Management and mitigation measures
AQ1	Dust impacts during construction	The following best-practice dust management measures would be implemented during construction works: <ul style="list-style-type: none"> <li>• Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather</li> <li>• Adjust the intensity of activities based on measures and observed dust levels and weather forecasts</li> <li>• Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers</li> <li>• Regularly inspect dust emissions and apply additional controls as required.</li> </ul>
AQ2	Dust impacts during operation	The following best-practice dust management measures would be implemented during operation: <ul style="list-style-type: none"> <li>• Ensure that loads are covered and that haulage vehicles are cleaned to remove any loose debris before leaving the site</li> <li>• Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather</li> <li>• Position long-term stockpiles away from surrounding receivers</li> <li>• Regularly inspect and where necessary clean sealed haulage roads to remove tracked materials.</li> </ul>
AQ3	Exhaust emissions during construction and operation	Plant and equipment would be maintained in a proper and efficient manner. Visual inspections of emissions from plant would be carried out as part of pre-acceptance checks.
AQ4	Airborne hazardous materials uncovered during construction	The following best-practice measures would be implemented to manage airborne hazardous materials during construction: <ul style="list-style-type: none"> <li>• Temporary coverings or odour suppressing agents would be applied to excavated areas where appropriate</li> <li>• Removal and disposal of hazardous materials would be undertaken in accordance with the relevant requirements in the <i>Work Health and Safety Act 2011</i>, <i>Work Health and Safety Regulation 2017</i> and any applicable guidelines.</li> </ul>

## 8.14 Bushfire

A bushfire risk assessment has been prepared for the proposal. This assessment is attached as Appendix J (Bushfire Risk Assessment) of this REF. The methodology and results of this assessment are summarised in this section.

### 8.14.1 Methodology

The bushfire risk assessment involved:

- Reviewing the existing environment within and surrounding the proposal site, including topography and vegetation
- Undertaking an external inspection from publicly accessible areas surrounding the proposal site on 4 May 2020
- Reviewing aerial mapping relevant for bushfire analysis
- Reviewing and applying the relevant legislative requirements, policies, and guidelines to assess potential bushfire risks and impacts of the proposal
- Identifying management and mitigation measures to be implemented as part of the proposal to reduce bushfire risk.

#### Policy and guidelines

##### Planning for Bush Fire Protection 2019

Planning for Bush Fire Protection 2019 (PFBP 2019) establishes the regulatory framework for development within bushfire prone land and relevant bushfire protection measures.

The proposal is considered as 'other development' under the PFBP 2019. 'Other development' includes industrial and infrastructure development, which must satisfy the aim and objectives of PFBP 2019.

PFBP 2019 identifies the methodology to determine and assess bushfire risks. This includes identification of the Bushfire Attack Level (BAL), which is a means of measuring the severity of a building or structure's potential exposure to ember attack, radiant heat and direct flame contact. Identification of BAL involves consideration of fire weather, vegetation and slope. Further details relating to the PFBP 2019 methodology are provided in Appendix J (Bushfire Risk Assessment).

##### Australian Standards for Construction of Buildings in Bushfire Prone Areas (AS3959)

Within the Australian Standards for Construction of Buildings in Bushfire Prone Areas (AS3959), BAL is applied in combination with bushfire attack mechanisms to establish the construction requirements to improve protection of building elements and to understand the radiant heat exposures for people outside in open areas.

The BAL determines the vulnerability of assets and mitigation strategies that can be utilised to reduce the bushfire threat. In this regard, PFBP 2019 requires a maximum BAL of 40 for any proposed industrial development, including appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings. BAL levels associated radiant heat flux and predicted bushfire attack mechanisms are outlined in Table 8-55.

Table 8-55: Bushfire attack levels (AS3959)

Bushfire Attack Level (BAL)	Radiant Heat Flux exposure (kWm <sup>2</sup> ) <sup>1</sup>	Description of predicted bushfire attack and levels of exposure
BAL – Low	NA	There is insufficient risk to warrant specific construction requirements.
BAL – 12.5	<12.5kWm <sup>2</sup>	Ember attack.
BAL – 19	>12.5kWm <sup>2</sup> – <19kWm <sup>2</sup>	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux.
BAL – 29	>19kWm <sup>2</sup> – <29kWm <sup>2</sup>	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux.
BAL – 40	>29kWm <sup>2</sup> – <40kWm <sup>2</sup>	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux with the increased likelihood of exposure to flames.
BAL – Flame Zone	>40kWm <sup>2</sup>	Direct exposure to flames from the fire front in addition to radiant heat flux and ember attack.

<sup>1</sup> kWm<sup>2</sup> – Kilowatts per square metre

### NSW Rural Fire Service Guideline for Bushfire Prone Land Mapping

The NSW Rural Fire Service (RFS) Guideline for Bushfire Prone Land Mapping (RFS, 2015) establishes the methodology for categorising bushfire prone land. Vegetation buffers are a requirement of the vegetation category provided (e.g. the higher the risk associated with the vegetation type, the larger the vegetation buffer). The vegetation categories and buffer requirements include:

- **Category 1 (High)** – Land considered to be at the highest risk for bushfire and surrounded by a 100-metre buffer
- **Category 2 (Low)** – Land considered to be a lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. It is surrounded by a 30-metre buffer
- **Category 3 (Medium)** – Land considered to be at a medium risk for bushfire and surrounded by a 30-metre buffer.

#### 8.14.2 Existing environment

The north-western portion of the proposal site (about 1,157 square metres) is located within the 100 metre Category 1 vegetation buffer identified as bushfire prone land by Blacktown City Council and Penrith City Council. Other areas of the proposal site are not within areas designated as bushfire prone land. The bushfire prone land map for the proposal is shown in Figure 8-34. The land to the west of the proposal site is identified as bushfire prone land and comprises a mix of vegetation, with the majority being dry sclerophyll forest, woodland, and grassland. Vegetation surrounding the Ropes Creek corridor and the grasslands that extend beyond the proposal site are not managed (not maintained to limit the spread and impacts of bushfire) and fall into the designation of Category 3 land.

The Forest Fire Danger Index measures the degree of danger of fire in Australian vegetation. This index combines a record of dryness, based on rainfall and evaporation, with meteorological variables for wind speed, temperature, and humidity. The scale of Forest Fire Danger Index ranges between 0 and 100. Most of NSW is determined as 80, however a number of areas, including Greater Sydney, Greater Hunter, Illawarra, Far South Coast and Southern Ranges Fire Areas have a higher Forest Fire Danger Index which are set at 100 by PBP 2019. The Forest Fire Danger Index applicable to the Blacktown LGA (and therefore the proposal site) is 100, meaning that the danger of fire in vegetation is considered high.

The Cumberland Zone Bush Fire Risk Management Plan 2010 (Cumberland Zone Bushfire Management Committee, 2010) identifies the prevailing weather conditions associated with the bushfire season, and the main sources of ignition in the Cumberland Zone area in which the proposal site is located. The Cumberland Zone area has on average over 450 bush and grass fires per year, of which only a few are considered to be major fires. The Ropes Creek area (which is located to the west of the proposal site) has been identified as an area known for deliberately lit fires associated with areas of bushland around and within built up areas.

The topography (effective slope) combined with vegetation formation (bushfire fuels) may create bushfire threats within an area designated as bushfire prone. The topography to the west of the proposal site has a gentle downslope to Ropes Creek between 1.14 and 4.57 degrees. Similar gentle slopes have been identified to the north of the proposal site. Slopes to the east of the proposal site are steeper upslope and away from the proposal site, ranging from 3.43 – 5.7 degrees. Slopes within the proposal site are generally flat with some areas of gentle gradients. These areas would be developed as part of the proposal and therefore are not considered in the assessment of bushfire threat.

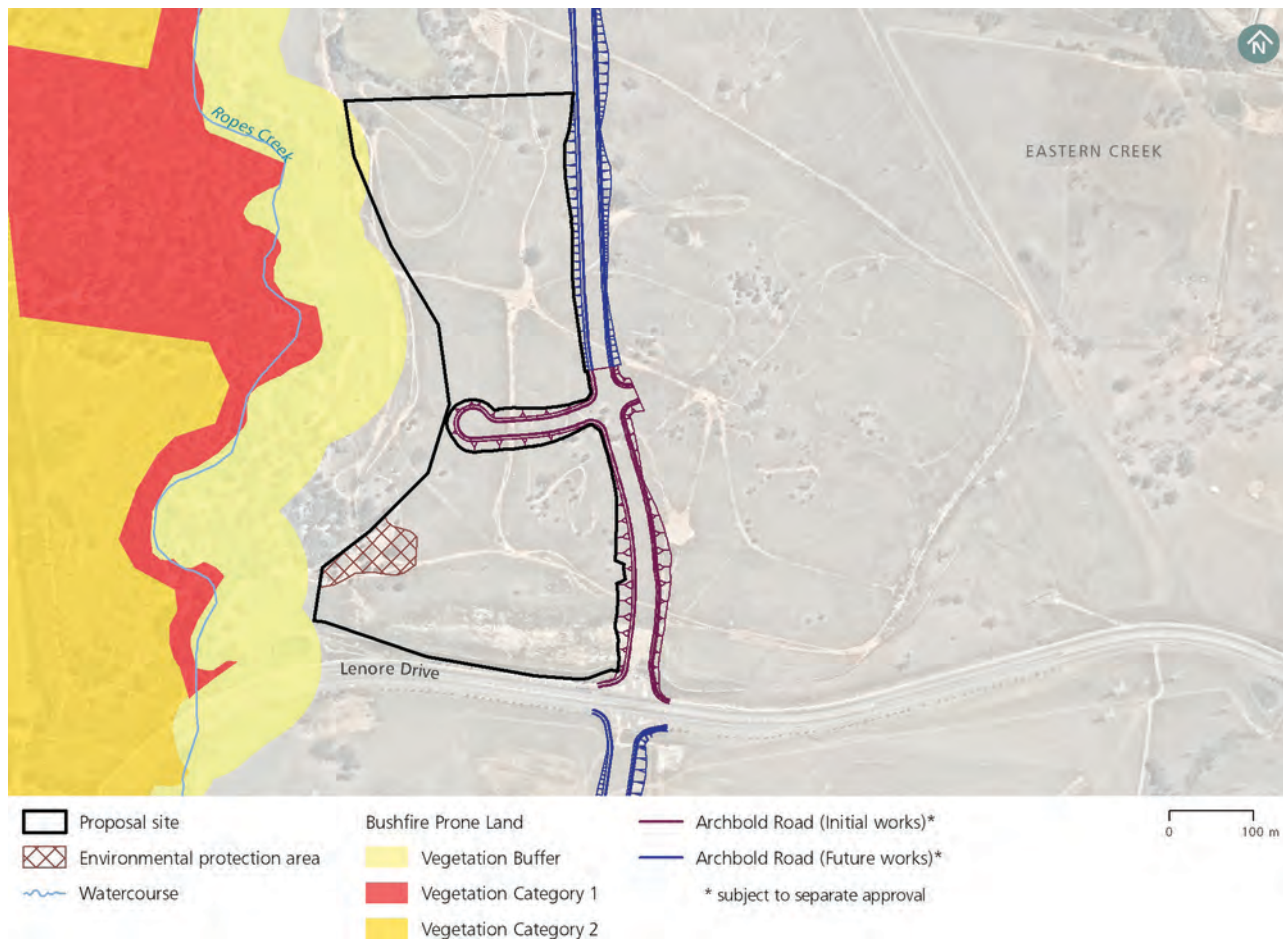


Figure 8-34: Bushfire prone land map

### 8.14.3 Potential impacts

#### Bushfire attack levels

Bushfire risk to the proposal site would be appropriately managed through the implementation of management and mitigation measures (as described in Section 8.14.4). These include the establishment of Asset Protection Zones (APZs) around the proposal site, as well as measures to provide safe emergency access and egress, adequate water supply on the proposal site and emergency management and evacuation plans.

The BAL has been established based on the proposal site boundary, and takes into account that all vegetation within the proposal site would be cleared (with the exception of the environmental protection area in the south-west of the proposal site which would be retained). Key assets within the proposal site, such as the office buildings and parts of the sheds have been assessed as having a BAL of 12.5 (refer to Figure 8-35).

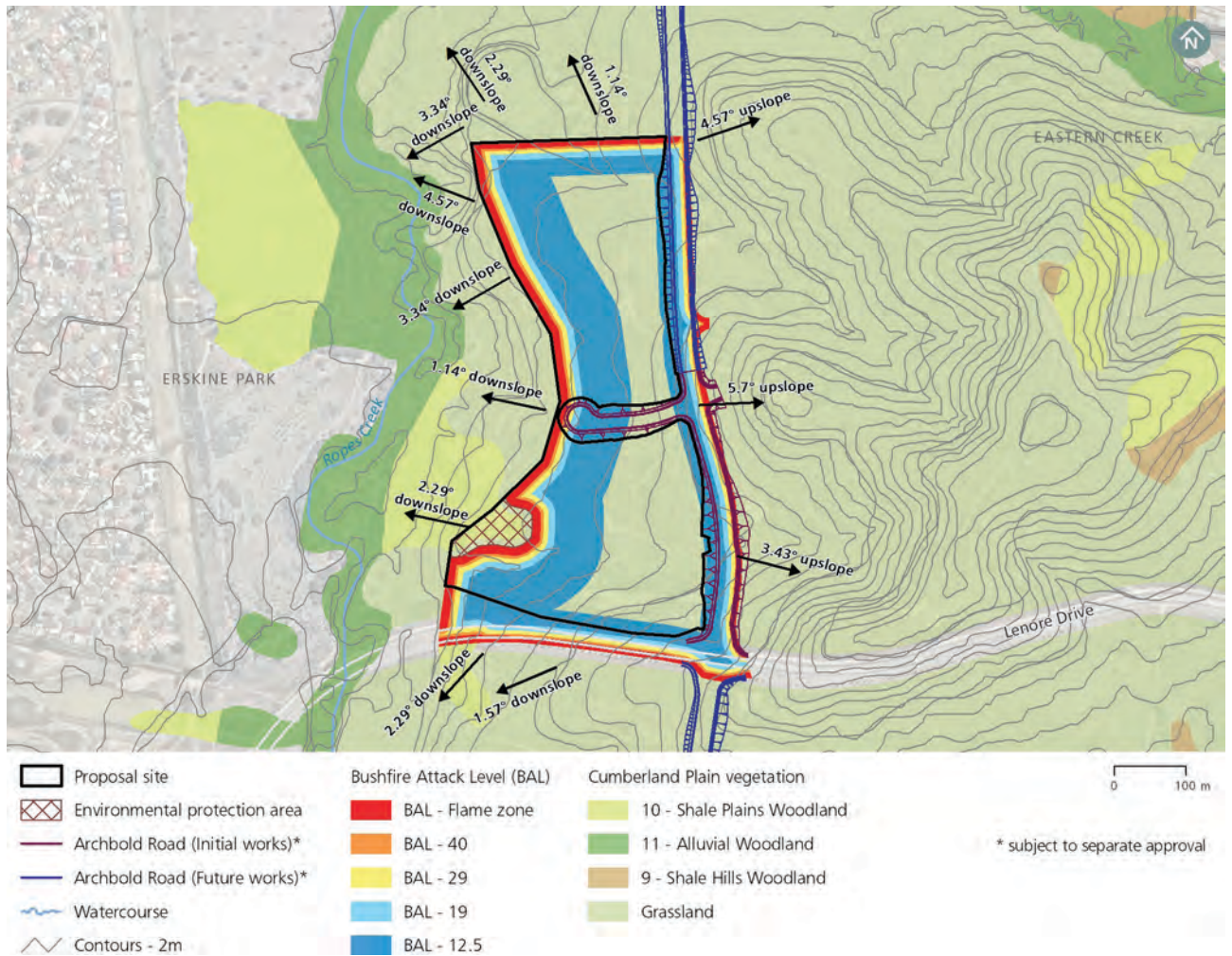


Figure 8-35: Bushfire attack levels for the proposal

### Asset protection zones

An APZ provides a fuel-reduced, physical separation between buildings and bushfire hazards. APZs comprise a key element in the suite of bushfire protection measures and dictate the type of construction required to mitigate the risk of bushfire.

To manage the bushfire risk of the proposal site, minimum APZs would be established to prevent the spread of a fire towards the proposal site (Figure 8-36). APZ widths for the proposal site have been determined in accordance with PBP 2019. In particular, access roads, carparks, hardstand areas and laydown areas are all non-combustible and would effectively operate as APZs, meeting the requirements established in the RFS document Standards for Asset Protection Zones (Standards for APZ).

APZs have been established based on potential bushfire hazards identified within the proposal site and surrounds. These APZs are in addition to the internal APZs established by the arrangement of the site infrastructure. The APZs provide maximum bushfire protection opportunities to the proposal.

As shown in Figure 8-36, APZs would be implemented based on the following:

- **APZ (10 metres)** – located outside the eastern boundary of the proposal site, adjacent to the planned Archbold Road upgrade and extension, where there is a lower risk for bushfire
- **APZ (12 metres)** – located adjacent to Lenore Drive (outside the south boundary of the proposal site), and the dam and grassland (north of the proposal site) where there is medium risk for bushfire
- **APZ (16 metres)** – located at the western boundary of the proposal site, adjacent to the riparian vegetation along Ropes Creek and the environmental protection area at the south-western portion of the proposal site where there is a higher risk for bushfire. However, hardstand and laydown areas in the western boundary of the proposal site would effectively operate as APZs to the Ropes Creek vegetation as these are non-combustible.

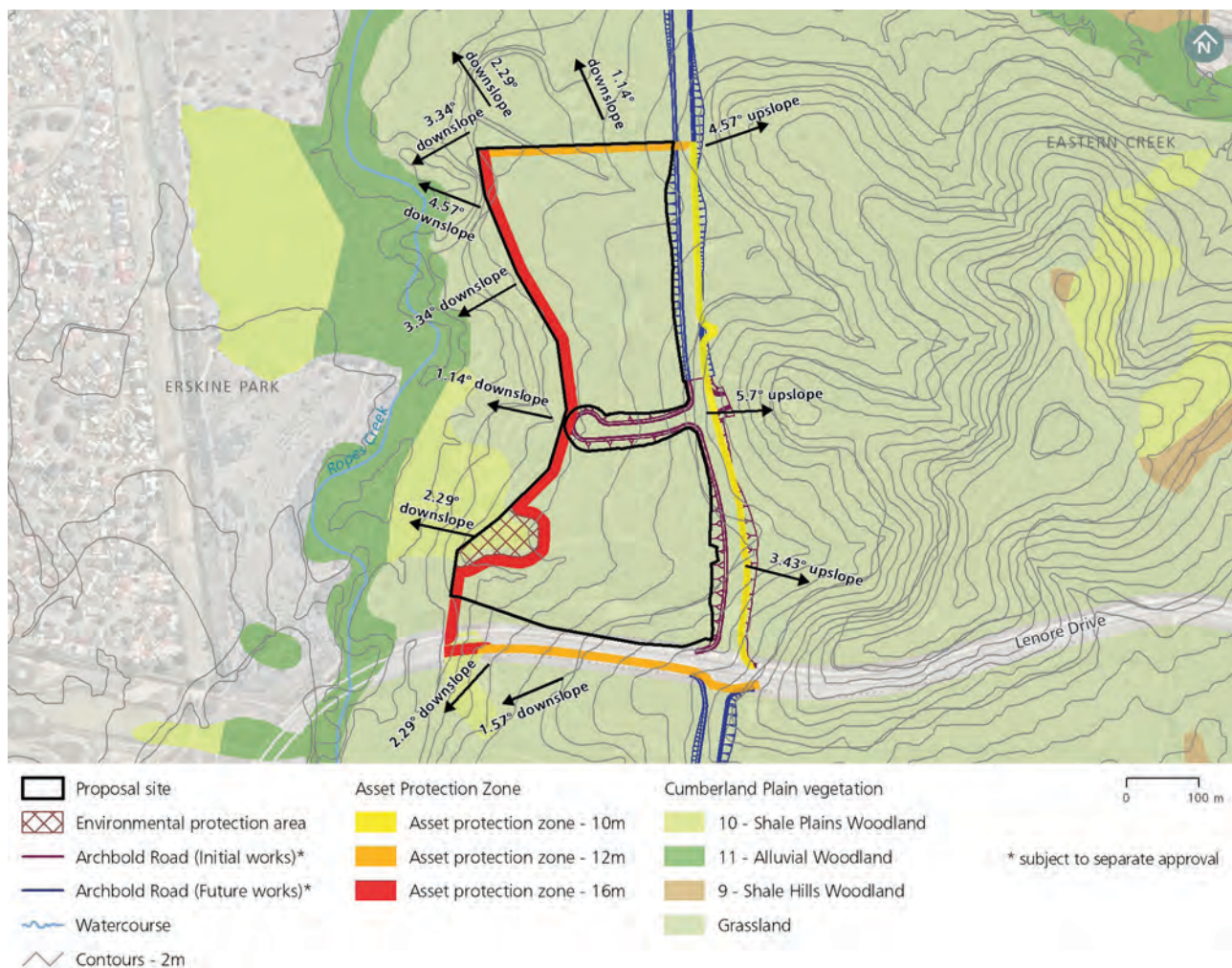


Figure 8-36: Asset protection zones for the proposal

### 8.14.4 Management and mitigation measures

The management and mitigation measures that would be implemented to address potential bushfire impacts are listed in Table 8-56.



Table 8-56: Management and mitigation measures – bushfire

No.	Impact	Management and mitigation measures
<b>BF1</b>	Bushfire protection measures	The proposal site would be managed as an Asset Protection Zone (APZ). The entire proposal site would be managed as an APZ as outlined within Appendix 4 of 'Planning for Bush Fire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. The APZ would not extend into the environmental protection area in the south-west of the site.
<b>BF2</b>	Bushfire protection measures	Vulnerable buildings and/or critical assets would be constructed to appropriate BAL in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959).
<b>BF3</b>	Bushfire protection measures	The following measures would be implemented for access roads within the proposal site: <ul style="list-style-type: none"> <li>• Access roads would be two-wheel drive, all-weather roads</li> <li>• Minimum 5.5 metre carriageway width kerb to kerb</li> <li>• Maximum grades for sealed roads would not exceed 15 degrees and an average grade of not more than 10 degrees, or other gradient specified by road design standards, whichever is the lesser gradient</li> <li>• Curves of roads would have a minimum inner radius of 6 metres</li> <li>• Dead end roads would incorporate a minimum 12 metre outer radius turning circle, and would be clearly sign posted as a dead end</li> <li>• A minimum vertical clearance of 4 metres would be provided to any overhanging obstructions, including tree branches.</li> </ul>
<b>BF4</b>	Bushfire protection measures	The following water supply and utilities would be installed during construction and maintained during operation of the proposal: <ul style="list-style-type: none"> <li>• A minimum static water supply of 20,000 litres for firefighting purposes. The firefighting water can be available in a single tank or a number of tanks around the proposal site</li> <li>• A hardened ground surface for truck access up to and within 4 metres of the water source</li> <li>• A 65 millimetre metal Storz outlet with a gate or ball valve would be provided as an outlet on each of the tanks</li> <li>• If the water tank is located above ground it would be of a non-combustible material</li> <li>• If the water tank is located underground, it would have an access hole of 200 millimetres to allow tankers to refill direct from the tank.</li> <li>• All associated fittings to the tank would be non-combustible.</li> </ul>
<b>BF5</b>	Bushfire protection measures	Bushfire Emergency Management and Evacuation Plans would be developed for the construction and operation of the proposal. The bushfire evacuation procedures would be completed in accordance with NSW Rural Fire Service Guide to Developing A Bushfire Emergency Management Plan and meet the requirements of Australian Standard AS 3745-2010 – Planning for Emergencies in facilities.
<b>BF6</b>	Bushfire protection measures	Activities that generate sparks or excessive heat would be minimised when a total fire ban is declared by Rural Fire Service.

## 8.15 Sustainability, climate change and greenhouse gases

### 8.15.1 Sustainability overview

The National Strategy for Ecologically Sustainable Development (Department of Environment and Heritage, 1992) defines Ecologically Sustainable Development (ESD) as “using, conserving and enhancing the community’s resources so that the ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased”. The concept of ESD gives formal recognition to environmental and social considerations in decision-making to ensure that current and future generations enjoy an environment that functions as well as, or better than, the environment they inherit. Consideration of the proposal against the principles of ESD are detailed in Chapter 10 (Justification and conclusion).

An overview of the key documents which set the approach to sustainability for the proposal is provided below.

#### Sydney Metro West Sustainability Plan

A Sydney Metro West Sustainability Plan is being developed to set out the sustainability principles, objectives and initiatives including performance targets and outcomes which would be adopted from planning, procurement, design, construction and operations to end-of-life. This encompasses all three aspects of sustainability – environmental, social and economic.

Six principles have been developed to govern environmental and socio-economic outcomes and performance for Sydney Metro West. The principles are set out in Figure 8-37.



Figure 8-37: Sustainability principles and objectives

Targets and initiatives have been developed to support the sustainability principles for Sydney Metro West. The following initiatives would be of particular relevance to the proposal:

- Set and implement targets for the use of non-potable water in concrete
- Identify and implement opportunities for treatment and reuse on the proposal, including water from concrete batching and casting facilities
- Minimise the embodied impacts of concrete through the adoption of project-wide supplementary cementitious materials use target
- Minimise the embodied impacts of steel through maximising the use of recycled steel and steel produced using energy-reducing processes.

### 8.15.2 Climate change and greenhouse gases

The proposal's contribution to NSW's greenhouse gas emissions and the known effects of climate change has been considered in the following sections.

Consistent with the principle of 'tackle climate change' in the Sydney Metro West Sustainability Plan, the following initiatives are applicable to the proposal and would be implemented accordingly:

- Identify opportunities to reduce energy use and carbon emissions
- Reduce embodied carbon and increase use of recycled materials
- Establish energy efficiency and renewable energy/offset targets.

#### Greenhouse gas emissions

The volume of greenhouse gas emissions generated during construction of the proposal would be relatively minor. While it would not be possible to completely mitigate the generation of greenhouse gas emissions during construction (due to the need to consume energy and resources), the amount of emissions would be minimised through the implementation of the Sydney Metro West Sustainability Plan.

Potential greenhouse gas emissions would result from the following activities:

- Construction traffic and equipment emissions
- Emissions generated in producing construction materials (embodied energy)
- Electricity-generated emissions in response to the power requirements to service the proposal
- Upstream and downstream lifecycle emissions (e.g. fuel extraction, processing, production, transport, disposal) including emissions at the construction compounds/ laydown areas
- Emissions resulting from the decomposition of cleared vegetation.

Operational greenhouse gas emissions associated with the proposal would predominantly be attributed to vehicular movements, electrical consumption to power equipment and machinery, and embodied energy in materials.

#### Climate change risks

Climate change could have potential direct and indirect impacts in Greater Sydney and more specifically to the proposal. The types of potential climate change risks during construction and operation of the proposal would be associated with severe weather events, such as the increased frequency and severity of rainfall events placing increased pressure on erosion and sediment control measures and/or resulting in the flooding of the proposal site and surrounds. Potential climate change risks can be appropriately managed through the implementation of mitigation measures including erosion and sediment controls (refer to Section 8.8 (Soils and surface water quality)) and flooding measures (refer to Section 8.7 (Flooding)).

### 8.15.3 Management and mitigation measures

The proposal would be delivered under Sydney Metro's Construction Environmental Management Framework and the Sydney Metro West Sustainability Plan (given that the proposal would support the construction of Sydney Metro West) reflecting the scope and potential impacts as appropriate.

The Construction Environmental Management Framework provides the basis for the development and implementation of a design and/or construction sustainability measures. The framework provides minimum requirements for matters such as carbon and energy management, and waste management and recycling.

The management and mitigation measures that would be implemented to manage climate change and reduce greenhouse gas emissions are listed in Table 8-57.

Table 8-57: Climate change and greenhouse gases safeguards and management measures

No.	Impact	Environmental management and mitigation measures
<b>SCC1</b>	Sustainability implementation	Sustainability initiatives would be incorporated into the detailed design and construction to support the achievement of the Sydney Metro West sustainability objectives.
<b>SCC2</b>	Sustainability implementation	Best practice level of performance would be achieved using market leading sustainability rating tools during construction and operation.
<b>SCC3</b>	Greenhouse gas emissions	25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction and operation of the proposal would be offset.
<b>SCC4</b>	Greenhouse gas emissions	An iterative process of greenhouse gas assessments and design refinements would be carried out during detailed design and construction to identify opportunities to minimise greenhouse gas emissions. Performance would be measured in terms of a percentage reduction in greenhouse gas emissions from a baseline inventory calculated at the detailed design stage.
<b>SCC5</b>	Climate change risks	Climate change risk treatments would be confirmed and incorporated into the detailed design.

## 8.16 Cumulative impacts

This section provides an assessment of the cumulative impacts associated with the proposal.

Cumulative impacts can occur when impacts from a project interact or overlap with impacts from other projects, and can potentially result in a larger overall effect on the environment, businesses or local communities. Cumulative impacts may occur when projects are constructed or operated concurrently or consecutively. Projects constructed consecutively (or sequentially) can have construction activities occurring over extended periods of time with little or no break in construction activities. This has the potential for increased impacts and construction fatigue for local communities.

### 8.16.1 Methodology

The assessment methodology for the cumulative impact assessment for the project involved:

- Developing screening criteria that would be used to determine whether a project should be assessed for cumulative impacts
- Identifying projects that could potentially result in cumulative impacts during construction and operation of the proposal
- Applying the screening criteria to determine which projects should be taken forward to the cumulative impact assessment
- Identifying potential impacts of the above projects, where known
- Assessing whether the impacts of the proposal would combine with the impacts of these projects to create a cumulative effect
- Assessing whether management and mitigation measures considered in this REF would be sufficient to manage impacts, or need modifying or supplementing.

#### Screening criteria

Screening criteria were developed as shown in Table 8-58 and applied to determine whether a project or local strategic plan should be included in the cumulative impact assessment.

Table 8-58: Cumulative impact assessment criteria

Criteria	Triggers
<b>Location</b> A project was considered relevant for consideration where the project met one of the triggers	Direct overlap: construction footprints intersect with the proposal In the area: within one kilometre of the proposal construction footprint
<b>Timeframe</b> A project was considered relevant where the project met one of the triggers	Concurrent construction programs Consecutive construction programs (less than 18 months between the proposal and the projects construction programs)
<b>Status</b> A project was considered relevant where the project was at one of the following stages of the statutory assessment and approval process	Approved projects (statutory approvals received), including approved projects that have not started construction, projects currently under construction, and recently completed projects Proposed projects (currently under statutory environmental impact assessment which includes where an application has been lodged) Local strategic plans (made public by the relevant government agency)
<b>Scale of potential impact</b> A project was considered relevant where the project involved substantial impacts to one or more of the following	<ul style="list-style-type: none"> <li>• Noise and vibration</li> <li>• Traffic and transport</li> <li>• Heritage</li> <li>• Flooding</li> <li>• Surface water</li> <li>• Soils, geology and contamination</li> <li>• Biodiversity.</li> </ul>

### Identification of projects

Projects that satisfied at least one of the triggers in each of the screening criteria (location, timeframe, status and scale of potential impact) in Table 8-57 were included in the cumulative impact assessment.

The projects assessed as part of the consideration of cumulative impacts of the proposal are provided in Section 8.16.2.

### Approach to potential cumulative impact assessment

Potential cumulative impacts have been considered for assessment based on the likely interactions of the proposal with other existing development and other reasonably foreseeable future development that was identified. The assessment of cumulative impacts has considered potential environmental impacts identified in Chapter 8 (Environmental impact assessment) of this REF. Based on analysis of the timing and aspects of the projects, the potential environmental impacts were identified. Only those impacts which are relevant to the interaction of the proposal and the identified projects were assessed.

### 8.16.2 Potential impacts

Projects considered as part of the cumulative impact assessment are provided in Table 8-59 and depicted in Figure 8-38.

Table 8-59: Projects assessed as part of the cumulative impact assessment

Project name, proponent, status and expected construction period	Description
<b>Projects</b>	
<p><b>Archbold Road Upgrade and Extension (Transport for NSW)</b></p> <p><i>Determined</i></p> <p><b>Stage 1: Early-2021 to mid-2022</b></p>	<p>REF for the upgrade and extension of Archbold Road between the Great Western Highway, Minchinbury and Old Wallgrove Road, Eastern Creek. Once complete, Archbold Road would be a key north-south route providing access to the WSEA.</p> <p>The first stage of the planned Archbold Road upgrade and extension would provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and the Western Access Road. As part of these works an Archbold Road Upgrade and Extension Addendum REF has been prepared to assess design changes to this section of road and include construction of a Western Access Road between the northern and southern precast sites. Further extensions of Archbold Road would be completed at a later stage.</p> <p>The project is located next to the proposal site. It is expected that the first stage of the planned Archbold Road upgrade and extension would involve consecutive and concurrent construction with construction of the proposal.</p>
<p><b>Eastern Creek Resource Recovery Facility (Hanson Construction Materials Pty Ltd) (SSD-9774)</b></p> <p><i>Proposed</i></p> <p><b>No construction program</b></p>	<p>Construction and operation of a resource recovery facility comprising:</p> <ul style="list-style-type: none"> <li>• A concrete recycling plant with a processing capacity of 100,000 tonnes per year</li> <li>• A material storage depot with a capacity of 36,000 tonnes per year.</li> </ul> <p>The project is located on Honeycomb Drive, about one kilometre east of the proposal site. There is no proposed construction program. In the event that an overlap of these projects did occur there may be some cumulative traffic impacts. Given that the proposal is anticipated to have a negligible impact on the operation of the surrounding road network, any potential cumulative traffic impacts would be relatively minor. Cumulative amenity related impacts such as noise and air quality would be unlikely as the proposal would have negligible impacts to receivers to the east which could be impacted by the resource recovery facility.</p> <p>As there is no information readily available for the project it has not been considered further.</p>

Project name, proponent, status and expected construction period	Description
<b>Extension of Honeycomb Drive (Archbold Road connection) (IRM Property Group (No 2) Pty Ltd)</b> <i>Proposed</i> <b>No construction program</b>	<p>Development Application (DA-19-01184) for the construction of a new precinct road (the extension of Honeycomb Drive in the east to connect to Archbold Road extension in the west). Includes the subdivision of lot 1 and 2 of DP 1145808 to create 4 industrial Torrens title lots and associated works.</p> <p>The project is located on Honeycomb Drive, within one kilometre of the proposal site. There is no proposed construction program. In the event that an overlap of these projects did occur there may be some cumulative amenity related impacts such as traffic, noise and air quality. These are anticipated to be relatively minor considering the minor nature of impacts from the proposal.</p> <p>As there is no information readily available for the project it has not been considered further.</p>
<b>Local strategies and plans</b>	
<b>Ropes Creek Precinct Draft Development Control Plan DCP</b> <i>Proposed</i>	<p>A Draft DCP is currently being finalised for the Ropes Creek Precinct. The aim of this Draft DCP is to ensure the orderly and efficient development of the Ropes Creek Precinct as envisaged by the WSEA SEPP.</p> <p>The Draft DCP includes the following development controls relevant to the proposal:</p> <ul style="list-style-type: none"> <li>• Built form and streetscape amenity</li> <li>• Subdivision requirements</li> <li>• Landscape design</li> <li>• Traffic, parking and access</li> <li>• Infrastructure services</li> <li>• Environmental management.</li> </ul> <p>The DCP has been considered in the cumulative impact assessment as the proposal is located within land included in this DCP. Development controls relevant to the proposal are discussed in Chapter 4 (Statutory and planning considerations).</p>
<b>Blacktown Local Strategic Planning Statement 2020 20-year land use vision for Blacktown City</b>	<p>The Blacktown LSPS provides a 20-year land use vision for Blacktown City, and directs how future growth and change will be managed. The Blacktown LSPS supports growing targeted industry sectors and maximising opportunities to attract advanced manufacturing in industrial land. The proposal would utilise land for industrial services while providing employment opportunities. The proposal is located within the 'Mount Druitt' Precinct identified in the LSPS.</p> <p>Planning priorities and actions relevant to the proposal are discussed in Chapter 2 (Need for the proposal). While the proposal is consistent with the LSPS, the strategy is a high level document and therefore is not relevant to consider further in the cumulative impact assessment.</p>

There is potential for cumulative environmental impacts between the proposal and projects listed in Table 8-58, particularly in relation to noise, traffic, heritage, flooding and biodiversity impacts. No cumulative impacts are anticipated from other environmental aspects including landscape and visual amenity, land-use, property and socio-economic, soils and surface water, groundwater, contamination, waste, air quality, bushfire, climate change and greenhouse gases. Whilst not all environmental impacts associated with these projects are known at this stage, likely cumulative impacts have been assessed below. Further detailed construction planning and co-ordination with stakeholders would be undertaken to manage potential cumulative impacts.

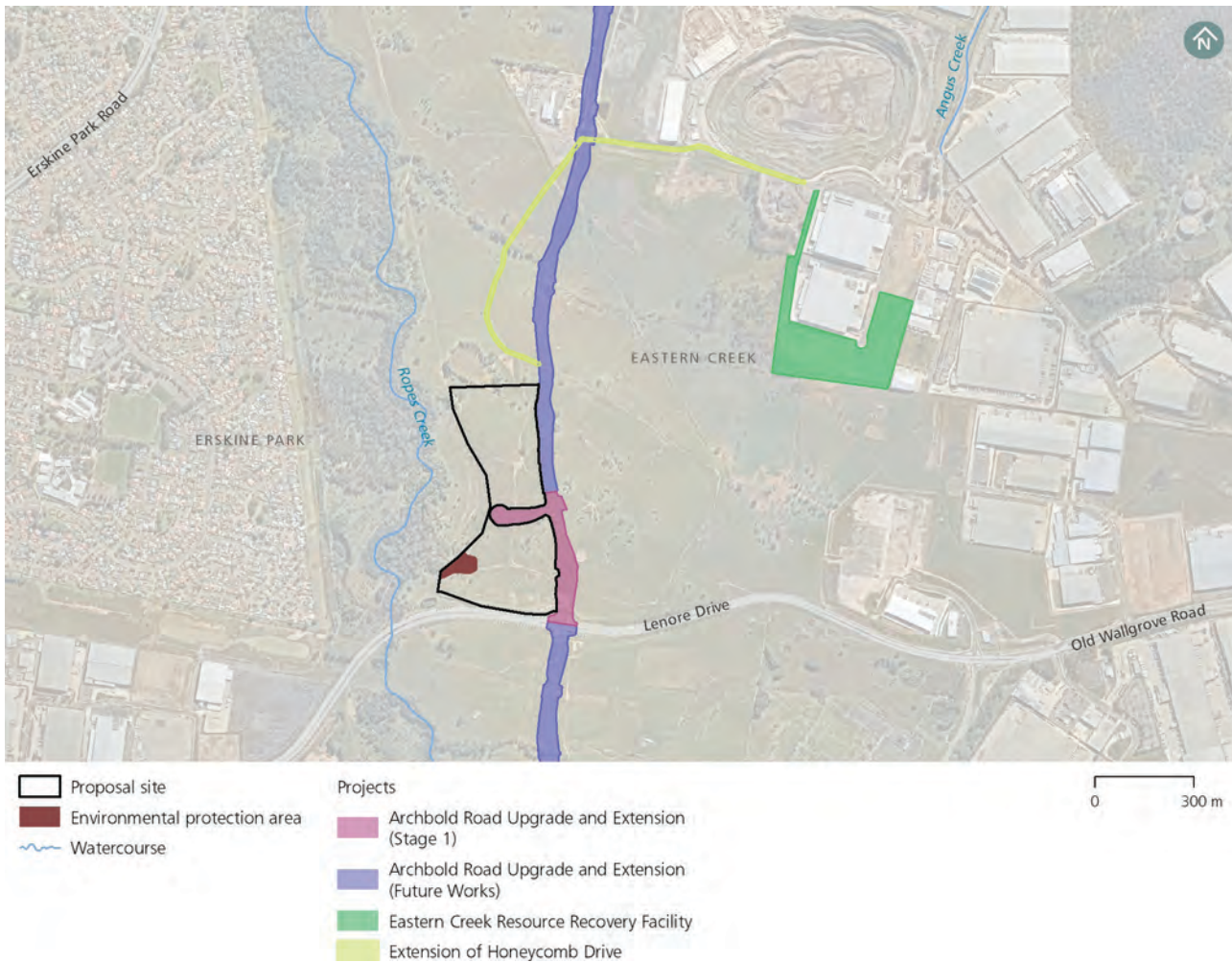


Figure 8-38: Nearby projects

**Noise and vibration**

The proposal and the planned Archbold Road upgrade and extension are not expected to generate significant cumulative noise and vibration impacts.

The first stage of the planned Archbold Road upgrade and extension would be under construction at the same time as the construction of the proposal, which could lead to concurrent noise impacts. The Archbold Road Upgrade - Operational traffic noise and construction noise and vibration assessment (WSP Parsons Brinckerhoff, 2017a) identified that residents in Erskine Park would be affected for short periods during certain noise intensive construction activities. No operational noise exceedances are predicted for residents in Erskine Park.

As discussed in Chapter 8.1 (Noise and vibration), the predicted construction noise levels for the proposal would only result in 'minor' worst-case daytime impacts at receivers potentially affected by both the Archbold Road upgrade and extension and the proposal (residents in Erskine Park). These potential impacts would only occur for a relatively short duration of the proposed construction works (less than three months), typically at the start of site clearing works. At other times, noise levels are predicted to be compliant at all receivers.

The likelihood of worst-case construction noise levels being generated by both projects at the same time is, however, considered low. Rather than increasing construction noise levels, the expected impact of concurrent works in this area would generally be an increase in the duration and potential annoyance of noise impacts at the nearest receivers. To manage this risk, co-ordination and consultation with Transport for NSW would occur where required to manage the interface of these projects (refer to Section 8.16.3).

Compliance with noise criteria is predicted at all receivers during the operation of the proposal. As such, cumulative operational noise impacts from concurrent traffic generated from the planned Archbold Road upgrade and extension and the proposal would be negligible.



### Traffic and transport

The first stage of the planned Archbold Road upgrade and extension would be under construction at the same time as the construction of the proposal, however construction traffic impacts for both the proposal and the planned Archbold Road upgrade and extension are anticipated to be minimal. As such, cumulative construction traffic impacts are expected to be minor. Other projects are not expected to be under construction or would not significantly overlap with the proposal in the assessed peak construction year (2022).

Modelling results for the proposal indicate that the operation of the proposal, in isolation when compared to existing conditions, would have a negligible impact on intersection performance. As such, cumulative operational traffic impacts due to other projects are expected to be minor. Furthermore, as the operational life of the proposal would be about four to five years, any cumulative operational traffic impacts would be limited.

### Aboriginal heritage

A cumulative impact to Aboriginal heritage takes into consideration incremental impacts to Aboriginal cultural heritage values resulting from past, present and foreseeable future actions in a particular area or region.

An ACHAR has been undertaken by Kelleher Nightingale (2017) for the planned Archbold Road upgrade and extension. The Aboriginal heritage study area for Archbold Road is outlined in Figure 8-39 and shows an overlap with the eastern portion with the Aboriginal heritage study area for the proposal.

The targeted site investigations undertaken as part of the ACHAR found that the planned Archbold Road upgrade and extension would directly impact on ten Aboriginal heritage sites (one of which overlaps with the proposal site). Six of these Aboriginal heritage sites were covered by existing/pending AHIPs at the time of the assessment (2017), allowing for their recording and removal. The four remaining Aboriginal heritage sites would result in partial or total loss as a result of the development, which include one isolated artefact and three artefact scatter sites.

As discussed in Section 8.5 (Aboriginal heritage), construction of the proposal would result in the partial or total loss of ten identified Aboriginal sites. One Aboriginal site (AIF-06 (AHIMS ID 45-5-4599)) is located within the boundary of both the proposal site and the planned Archbold Road upgrade and extension boundary. It is assumed the Aboriginal site would be directly impacted by the planned Archbold Road upgrade and extension.

Sydney Metro would work with Transport for NSW to ensure impacts to Aboriginal heritage are managed and minimised where possible. Construction on the proposal site and the planned Archbold Road upgrade and extension footprint would impact on fifteen identified Aboriginal heritage sites in total, reducing the Aboriginal archaeological potential and values of the region. Archaeological test excavation (and salvage when required) would be undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW (2010)). Once test excavation is completed, an application for an area based AHIP would be submitted to the NSW DPC for those portions of the study area with Aboriginal sites and PADs subject to impacts. Given the overlapping study areas and impacts to Aboriginal sites, Sydney Metro and other relevant parts of Transport for NSW would coordinate any future ACHAR(s) and AHIP application(s).

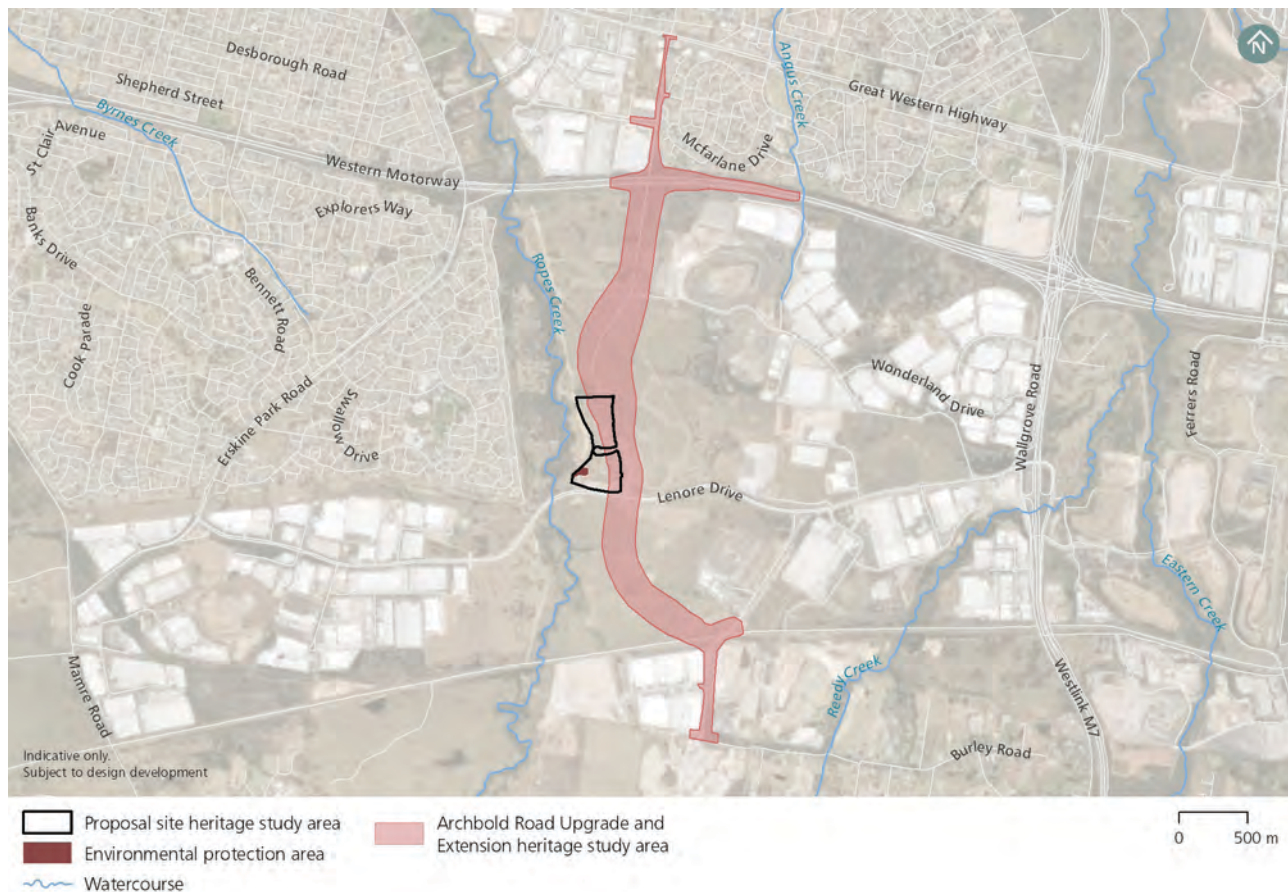


Figure 8-39: Aboriginal heritage study area for Archbold Road upgrade and extension and the proposal (Source of Archbold Road upgrade and extension Aboriginal study area: Artefact, 2017)

### Non-Aboriginal heritage

A Statement of Heritage Impact has been undertaken by Artefact for the Archbold Road upgrade and extension (Artefact, 2016). The heritage study area for Archbold Road directly overlaps with the heritage study area for the proposal. It has been determined that the planned Archbold Road upgrade and extension would result in at least partial direct impact on the shed and yard complex site (an area of archaeological potential) as seen in Figure 8-40. Works such as bulk earthworks and excavations would result in the complete removal of the sandstone yard and associated features such as the surrounding timber fence line.

As outlined in Chapter 8.4 (Non-Aboriginal heritage), the proposal overlaps with the paddocks associated with the shed and yard complex, however these potential archaeological remains are not expected to reach the threshold for local significance. As the proposal is not anticipated to have any archaeological impacts to items of non-Aboriginal heritage significance, non-Aboriginal cumulative impacts are not anticipated to occur.

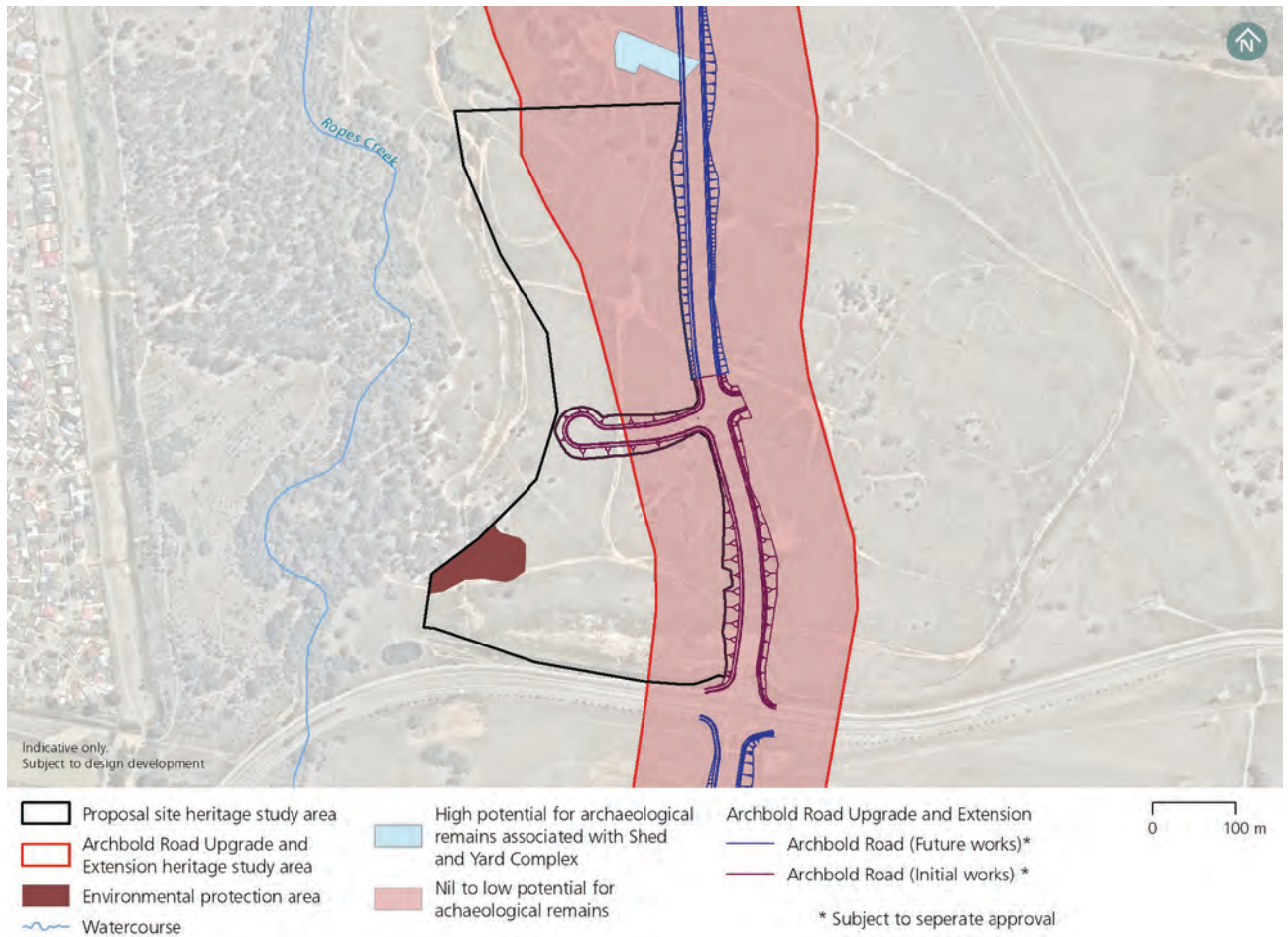


Figure 8-40: Detailed view of shed and yard complex (Artefact, 2017)

### Flooding

The detailed design of the proposal and the first stage of the planned Archbold Road upgrade and extension would be coordinated to appropriately manage stormwater drainage and any potential flooding impacts.

As noted in Chapter 8.7 (Flooding), the proposal would have no flood impacts in events up to and including the one per cent AEP event as the entire site is above the one per cent AEP flood level and any filled embankments would be outside of the flood extent. The proposal would also include the provision of appropriate flow diversion channels or culverts for management of external flows, as well as appropriate on-site stormwater detention/flood detention facilities. As such, the potential impacts of the proposal on hydrology and flooding would be minor.

The Archbold Road Upgrade and Extension REF identifies that the proposal would include an appropriate stormwater drainage system such that there would be no change in flood levels for the area immediately north of Lenore Drive in the 20-year storm event. It also identifies that the potential flood risk in both the short and long term would be minor. As a result of the minor potential impacts and the coordination of the design, the potential for cumulative flood impacts from the proposal and the planned Archbold Road upgrade and extension would be negligible.

It is anticipated that future individual developments on adjacent land would include necessary flood mitigation measures to minimise the potential for cumulative flood impacts in the locality. Therefore, the proposal, which would include flood mitigation, would not contribute to cumulative flood impacts.

### Biodiversity

When the impacts of the proposal are considered together with the planned Archbold Road upgrade and extension project, the contribution of the proposal to cumulative biodiversity impacts in the Cumberland Plain region is relatively low. While there would be some limited biodiversity impacts from the proposal, in the context of other projects, impacts are anticipated to be adequately managed through the implementation of mitigation measures.

Available information on the planned Archbold Road upgrade and extension project identifies that the project would require the removal of approximately 9.81 hectares of vegetation, of which 7.60 hectares is native vegetation (Cumberland shale plains woodland and Cumberland River-flat Forest) and is consistent with a threatened ecological community, and provides habitat for 19 threatened species (WSP Parsons Brinckerhoff, 2017b).

### 8.16.3 Management and mitigation measures

The mitigation measures that would be implemented to address potential cumulative impacts are listed in Table 8-60.

Table 8-60: Management and mitigation measures – Cumulative impacts

No.	Impact	Management and mitigation measures
CI1	Cumulative impacts	<p>Co-ordination and consultation with the following stakeholders would occur where required to manage the interface of projects under construction at the same time:</p> <ul style="list-style-type: none"> <li>• Other parts of Transport for NSW</li> <li>• Department of Planning, Industry and Environment</li> <li>• Utility providers</li> <li>• Construction contractors.</li> </ul> <p>Co-ordination and consultation with these stakeholders would include:</p> <ul style="list-style-type: none"> <li>• Provision of regular updates to the detailed construction program, construction sites and haul routes</li> <li>• Identification of key potential conflict points with other construction projects</li> <li>• Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve:                             <ul style="list-style-type: none"> <li>• Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects</li> <li>• Co-ordination of traffic management arrangements between projects.</li> </ul> </li> </ul>

Mitigation measures in other chapters would contribute to reducing the overall environmental impact of the proposal. Mitigation measures in other chapters that involve coordination with other projects include:

- Section 8.5 (Aboriginal heritage), specifically a measure which involves coordination with Transport for NSW to manage the overlapping impacts to Aboriginal site AIF-06 (AHIMS ID45-5-4599)
- Section 8.7 (Flooding), specifically a measure to integrate detailed design of the proposal with proposed Archbold Road cross drainage and road drainage outlets.

# 9 Environmental management

This chapter identifies how the environmental impacts of the proposal would be managed through Environmental Management Plans and mitigation measures. Section 8.3 lists the proposed mitigation measures for the proposal to minimise the impacts of the proposal identified in Chapter 7 (Environmental impact assessment).

---

## 9.1 Environmental management systems

The Sydney Metro environmental management system would be used to manage the construction and operation of the proposal. The management system would provide the framework for implementing the environmental management measures documented in this REF, and any conditions of other approvals, licences or permits.

## 9.2 Environmental Management Plans

Sydney Metro has developed and successfully implemented a range of documents to set out the management approach during construction of its projects. These documents are outlined below and would be applied, as relevant, to the construction of the precast facilities.

Although these documents are typically applied to the construction phase of projects, it is proposed to also adopt these management documents for the operational phase of the precast facilities considering their role in supporting construction of Sydney Metro West and their use by the tunnelling contractors.

### 9.2.1 Construction Environmental Management Framework

The Sydney Metro Construction Environmental Management Framework details the approach to environmental management and monitoring during construction, which will be applied to this proposal. The framework is a linking document between planning approval documentation (including commitments made within this REF) and construction environmental management documentation, which would be developed by the construction contractors.

The Construction Environmental Management Framework details the environmental, stakeholder and community management systems and processes for the construction of the proposal.

### 9.2.2 Construction Noise and Vibration Standard

Noise and vibration impacts of the proposal would be managed in accordance with the Sydney Metro Construction Noise and Vibration Standard, which aims to manage noise and vibration levels where feasible and reasonable using a variety of mitigation measures. The Construction Noise and Vibration Standard provides guidance for managing construction noise and vibration impacts to provide a consistent approach to management and mitigation across all Sydney Metro projects.

The Standard also provides:

- A list of standard mitigation measures that would be implemented where feasible and reasonable
- Trigger levels (based on exceedances of airborne NMLs) for the implementation of additional mitigation measures.

### 9.2.3 Construction Traffic Management Framework

Traffic impacts associated with the proposal would be managed in accordance with the Sydney Metro Construction Traffic Management Framework. This framework provides an overall strategy and approach for construction traffic management, and an outline of the traffic management requirements and processes that would be applied. It establishes the traffic management processes and acceptable criteria to be considered and followed in managing impacts to the road network.

### 9.3 Management and mitigation measures

Environmental management measures to be implemented during the construction and operation of the proposal are listed in Table 9-1.

Table 9-1: Environmental management measures (compiled from Section 7 mitigation measures)

Ref	Impact/issue	Safeguard/management measure
<b>Noise and vibration</b>		
NV1	Construction noise and vibration	During construction, receivers that would potentially be affected by noise and/or vibration from the works would be appropriately notified before the relevant works start.
NV2	Construction airborne noise	Noise monitoring at the most affected receiver(s) would be undertaken at the start of construction works to check the levels are as predicted and to confirm that the standard mitigation measures are adequate. If the standard mitigation measures are not found to be adequate, further mitigation measures would be considered and implemented where feasible and reasonable.
<b>Traffic and transport</b>		
T1	Traffic incidents	In the event of a traffic-related incident, coordination would be carried out with Transport Coordination and/or other parts of Transport for NSW.
T2	Emergency vehicles access	Access to properties for emergency vehicles would be provided at all times.
T3	Road safety	All trucks would enter and exit the proposal site in a forward direction, where feasible and reasonable.
T4	Staff parking	All staff parking would be provided on-site and not on surrounding local streets.
T5	Road safety	The driver induction process would include safety awareness in relation to all road users, particularly pedestrians and cyclists at the proposal site access point at Archbold Road / Lenore Drive during construction.
<b>Landscape and visual character</b>		
LV1	Visual impacts - construction	Where feasible and reasonable, the elements within the construction site would be located to minimise visual impacts (for example storing materials and machinery behind fencing).
LV2	Landscape and visual impact - operation	Sheds would be finished in a colour which aims to minimise visual impacts, if visible from areas external to the site.
LV3	Lighting impacts during operation	Lighting of the sites would be orientated to minimise glare and light spill impacts on adjacent receivers in accordance with AS4282:2019.
<b>Aboriginal heritage</b>		
AH1	Test excavation	Archaeological test excavation would be limited to the proposal site and undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010a) to confirm the geographic extent of RCIF 2 (AHIMS ID 45-5-3159), Blacktown Southwest 11 (AHIMS ID 45-5-0559) and the area of PAD identified within Ropes Creek Artefact Scatter 09 (AHIMS ID 45-5-5355).  Test excavation would be limited to areas subject to potential impacts by the proposal, and outside the area already salvaged and subject to impacts by the St Mary's Wastewater System Augmentation project. Archaeological test excavation would be undertaken in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010a).
AH2	Consultation	As part of the preparation of the test excavation methodology and ACHAR, comprehensive Aboriginal stakeholder consultation would be carried out in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010b) and the National Parks and Wildlife Regulation 2019.

Ref	Impact/issue	Safeguard/management measure
AH3	Aboriginal heritage	An AHIP would be submitted to the NSW DPC for those portions of the proposal site subject to impacts once test excavation is completed. The AHIP application would be supported by an ACHAR and test excavation report.
AH4	Overlapping impact	Sydney Metro would liaise with Transport for NSW regarding overlapping impacts to Aboriginal site AIF-06 (AHIMS ID 45-5-4599) and coordinating further assessment and management.
AH5	Unexpected finds	In the event that suspected Aboriginal ancestral remains are exposed during construction, the requirements of Section 3.6 of the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales</i> (DECCW 2010) would be implemented.
<b>Non-Aboriginal heritage</b>		
NAH1	Unexpected finds	An Unexpected Finds Procedure, to be implemented in the event that potential non-Aboriginal heritage objects are exposed during construction, would be prepared that complies with the <i>Heritage Act 1977</i> .
<b>Flooding</b>		
F1	Potential increase in mainstream peak flood flows	Detailed design of the proposal site would include provision of appropriate on-site stormwater detention/flood detention facilities to cater for events up to and including the 1% AEP event.
F2	Potential geomorphic impacts due to changed flow regime in low flows and frequent flood events	Detailed design of the proposal site would include the provision of appropriate on-site stormwater detention/flood detention facilities. Outlet sizing would be designed to satisfactorily mitigate potential increases in peak flows in frequent events.
F3	Potential impacts on overland flooding and drainage conditions	Detailed design of the proposal site would include the provision of appropriate flow diversion channels or culverts for management of external flows.
F4	Potential impacts on overland flooding and drainage conditions	Detailed design would integrate with the planned Archbold Road upgrade and extension cross drainage and road drainage outlets.
F5	Potential impacts on overland flooding and drainage conditions	Detailed design would provide appropriate scour protection works at channel/culvert discharge points to Ropes Creek.
F6	Potential impacts on the proposal resulting from flooding	Detailed design would provide filling to a height of at least 0.5m above Ropes Creek 1% AEP flood level.
<b>Soils and surface water</b>		
SW1	Soil salinity	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or it would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Erosion controls would be implemented in accordance with Blue Book (Landcom, 2004).

Ref	Impact/issue	Safeguard/management measure
SW2	Potential erosion and sedimentation	<p>Erosion and sediment measures would be implemented in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2D (NSW DECCW, 2008), commonly referred to as the 'Blue Book'. Additionally, any water collected from the proposal site would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts.</p> <p>Temporary sediment basins would be designed in accordance with Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction (DECC, 2008).</p>
SW3	Wastewater discharge	<p>Prior to discharge, wastewater would be treated to a level that is compliant with the ANZECC/ARMCANZ (2000) and ANZG (2018) default guidelines for 95 per cent species protection.</p> <p>For the purposes of this management measure, during operation wastewater is defined as process water from operation of the precast facility and does not include surface runoff or stormwater.</p>
<b>Contamination</b>		
C1	Management of low risk contamination	<p>For areas that have been identified as having moderate contamination impact potential, a further review of data would be performed.</p> <p>Should the additional data review confirm that contamination is likely to have a very low or low impact potential, the areas would then be managed in accordance with the Soil and Water Management Plan for the proposal. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal.</p>
C2	Detailed Site Investigation	<p>Where data from the additional data review (mitigation measure C1) is insufficient to understand the impact of contamination, a Detailed Site Investigation would be carried out in accordance with the NEPM (2013) and other guidelines made or endorsed by the NSW EPA.</p> <p>The areas requiring Detailed Site Investigation would be confirmed following the additional data review (C1), however on the basis of the PSCI, it is anticipated that a Detailed Site Investigation would be required to characterise fill materials, and sediment from dam / retention pond for on-site reuse and/or off-site disposal. Fly tipped wastes and deposited wastes (from former land use) would need to be characterised for off-site disposal.</p>
C3	Remediation	<p>Where data from additional data review (mitigation measure C1) or the Detailed Site Investigation (mitigation measure C2) confirms that contamination would have a moderate to very high risk, a Remedial Action Plan (RAP) would be developed for the area of the construction footprint.</p> <p>The RAP would detail the remediation works required to mitigate impacts from contamination throughout and following completion of construction. The RAP would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice.</p> <p>Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land.</p> <p>The requirements for a RAP and remediation would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2).</p>



Ref	Impact/issue	Safeguard/management measure
C4	Site Audit Statement	Where contamination is highly complex, such as significant groundwater contamination; contamination associated with vapour; contamination that requires specialised remediation techniques; or contamination that requires ongoing active management during and beyond construction, an accredited Site Auditor would review and approve the RAP and would develop a Site Audit Statement and Site Audit Report upon completion of remediation.  The requirement for a Site Audit Statement would be confirmed following preparation of the RAP (mitigation measure C3).
C5	Residual contamination following construction	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.
C6	Accidental leaks or spills - operation	The operational environmental management plan (OEMP) for the proposal would include an Emergency Response Plan (or equivalent) which would specify the procedure to be followed in the event of a spill, including the notification requirements and use of absorbent material to contain the spill.
C7	Contaminated soil - operation	Where contaminated soils are to remain on-site, an appropriate OEMP would be prepared and implemented. The OEMP would include relevant ongoing management requirements developed in accordance with the NEPM (2013) and relevant guidelines made or approved by the NSW EPA. Measures may include but are not limited to, including procedures for excavation works, inspections and audits.
C8	Contaminated groundwater	Potential impacts from existing groundwater contamination (if present) during operation of the proposal would be managed through management and mitigation measures such as: <ul style="list-style-type: none"> <li>• Emplacement of appropriate topographic / drainage controls to minimise seepage and ponding of water across the site</li> <li>• Drainage from sealed areas would be directed to stormwater drains (e.g. pipes, swales) via gross pollutant traps and sediment basins (if necessary) to mitigate potential impacts from sediments or wastes on receiving environments.</li> </ul>
<b>Biodiversity</b>		
B1	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, the limits of the work zone, areas for parking and turning of vehicles and plant equipment would be clearly and accurately marked out. These areas would be located so that vegetation disturbance is minimised as much as possible and the drip-line of trees avoided.
B2	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, exclusion zones would be identified and established around all vegetation to be retained, such as the environmental protection area in the west of the proposal site. Periodic monitoring would be undertaken to ensure all controls are in place and no inadvertent impacts are occurring.
B3	Potential impact to surrounding vegetation and threatened ecological communities	Materials, plant, equipment, work vehicles and stockpiles would be placed to avoid damage to surrounding vegetation and outside tree driplines.

Ref	Impact/issue	Safeguard/management measure
B4	Potential impact to surrounding vegetation and threatened ecological communities	Prior to construction, personnel would be informed of the environmentally sensitive aspects of the proposal site, including plans for impacted and adjoining areas showing vegetation communities, important flora and fauna habitat areas, and locations where threatened species, populations or ecological communities have been recorded. Construction personnel would be made aware that any native fauna species encountered must be allowed to safely leave the proposal site where possible and a local wildlife rescue organisation or appropriately experienced ecologist must be called for assistance where necessary.
B5	Potential impact to surrounding vegetation and threatened ecological communities	Where possible, hollows would be cut out of hollow-bearing trees and re-established in large trees to the west of the proposal site to mitigate the loss of hollow habitat on fauna.
B6	Potential impacts to the Cumberland Plain Land Snail	Pre-clearing surveys for the Cumberland Plain Land Snail would be undertaken by a suitably qualified ecologist within 48 hours prior to the commencement of clearing to translocate any individuals that may be inhabiting areas that would be cleared or disturbed. This includes all areas of dumped rubbish across the proposal site.
B7	Potential impacts to the Cumberland Plain Land Snail	Prior to construction, exclusion zones would be established around Cumberland Plain Land Snails habitat in the environmental protection area. All personnel would be inducted to understand the exclusion zone to limit the potential of trampling snails.
B8	Potential impacts to the Cumberland Plain Land Snail	Large woody debris cleared within the proposal site would be relocated into habitat to the west of the proposal site.
B9	Potential impacts to the Green and Golden Bell Frog	Pre-clearing surveys for the Green and Golden Bell Frog would be undertaken by a suitably qualified ecologist within 48 hours prior to the commencement of clearing and dewatering of potential habitat to ensure that individuals have not inhabited the site. A suitably qualified ecologist would also be present during the dewatering of the habitat. A stop work in the immediate vicinity would be implemented if this species is identified on the proposal site, and then further consideration of approach to management of individuals on proposal site through consultation with a Green and Golden Bell Frog expert.
B10	Potential impacts to the Green and Golden Bell Frog	Any work in and around the suitable habitat during clearing would follow the Hygiene Protocol for the Control of Disease in Frogs (Department of Environment and Climate Change 2008b) to reduce the potential for introduction and spread of Chytrid fungus.
B11	Potential impacts from introduction and spread of weeds	Weed control would be undertaken by suitably qualified and/or experienced personnel. This may include: <ul style="list-style-type: none"> <li>• Manual weed removal in preference to herbicides</li> <li>• Replacing non-target species removed/killed as a result of weed control activities</li> <li>• Protecting non-target species from spray drift</li> <li>• Using only herbicides registered for use within or near waterways for the specific target weed</li> <li>• Applying herbicides during drier times when the waterway level is below the high-water mark</li> <li>• Not applying herbicide if it is raining or if rain is expected</li> <li>• Mixing and loading herbicides, and cleaning equipment away from waterways and drains.</li> </ul>

Ref	Impact/issue	Safeguard/management measure
B12	Potential impacts from introduction and spread of weeds	During construction, weed management would be undertaken in areas affected by construction prior to any clearing works in accordance with the <i>Biosecurity Act 2015</i> to ensure they are not spread to the surrounding environment; including during transport disposal off-site to a licenced waste disposal facility.
B13	Potential impacts from introduction and spread of weeds	All weeds, propagules, other plant parts and/or excavated topsoil material that is likely to be infested with weed propagules that are likely to regenerate would be treated on site or bagged, removed from site and disposed of at a licensed waste disposal facility.
B14	Potential impacts from introduction and spread of plant pathogens	During construction, all vehicles driving to and from the proposal site would follow a protocol to prevent the spread or introduction of phytophthora, namely vehicles would be clean, including the tyres and any equipment.
<b>Resource use and waste management</b>		
WR1	Compliance with legislative and policy requirements	All waste would be assessed, classified, managed, transported and disposed of in accordance with the <i>Waste Classification Guidelines and the Protection of the Environment Operations (Waste) Regulation 2014</i> .
WR2	Waste minimisation	Waste would be minimised by accurately calculating materials brought to the proposal site and limiting materials packaging.
WR3	Waste management	100 per cent of usable spoil from construction would be reused, in accordance with the Sydney Metro spoil management hierarchy.
WR4	Reuse and recycling	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities.
WR5	Waste tracking	A materials tracking system would be implemented for material transferred to offsite locations such as licensed waste management facilities.
WR6	Reuse and recycling	At least 95 per cent of inert and non-hazardous construction waste, excluding spoil, and at least 50 per cent of office waste would be recycled or alternatively beneficially reused.
<b>Air quality</b>		
AQ1	Dust impacts during construction	The following best-practice dust management measures would be implemented during construction works: <ul style="list-style-type: none"> <li>• Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather</li> <li>• Adjust the intensity of activities based on measures and observed dust levels and weather forecasts</li> <li>• Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers</li> <li>• Regularly inspect dust emissions and apply additional controls as required.</li> </ul>
AQ2	Dust impacts during operation	The following best-practice dust management measures would be implemented during operation: <ul style="list-style-type: none"> <li>• Ensure that loads are covered and that haulage vehicles are cleaned to remove any loose debris before leaving the site</li> <li>• Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather</li> <li>• Position long-term stockpiles away from surrounding receivers</li> <li>• Regularly inspect and where necessary clean sealed haulage roads to remove tracked materials.</li> </ul>
AQ3	Exhaust emissions during construction and operation	Plant and equipment would be maintained in a proper and efficient manner. Visual inspections of emissions from plant would be carried out as part of pre-acceptance checks.

Ref	Impact/issue	Safeguard/management measure
AQ4	Airborne hazardous materials uncovered during construction	The following best-practice measures would be implemented to manage airborne hazardous materials during construction: <ul style="list-style-type: none"> <li>• Temporary coverings or odour suppressing agents would be applied to excavated areas where appropriate</li> <li>• Removal and disposal of hazardous materials would be undertaken in accordance with the relevant requirements in the <i>Work Health and Safety Act 2011</i>, <i>Work Health and Safety Regulation 2017</i> and any applicable guidelines.</li> </ul>
<b>Bushfire</b>		
BF1	Bushfire protection measures	The proposal site would be managed as an Asset Protection Zone (APZ). The entire proposal site would be managed as an APZ as outlined within Appendix 4 of 'Planning for Bush Fire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. The APZ would not extend into the environmental protection area in the south-west of the site.
BF2	Bushfire protection measures	Vulnerable buildings and/or critical assets would be constructed to appropriate BAL in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959).
BF3	Bushfire protection measures	The following measures would be implemented for access roads within the proposal site: <ul style="list-style-type: none"> <li>• Access roads would be two-wheel drive, all-weather roads</li> <li>• Minimum 5.5 metre carriageway width kerb to kerb</li> <li>• Maximum grades for sealed roads would not exceed 15 degrees and an average grade of not more than 10 degrees, or other gradient specified by road design standards, whichever is the lesser gradient</li> <li>• Curves of roads would have a minimum inner radius of 6 metres</li> <li>• Dead end roads would incorporate a minimum 12 metre outer radius turning circle, and would be clearly sign posted as a dead end</li> <li>• A minimum vertical clearance of 4 metres would be provided to any overhanging obstructions, including tree branches.</li> </ul>
BF4	Bushfire protection measures	The following water supply and utilities would be installed during construction and maintained during operation of the proposal: <ul style="list-style-type: none"> <li>• A minimum static water supply of 20,000 litres for firefighting purposes. The firefighting water can be available in a single tank or a number of tanks around the proposal site</li> <li>• A hardened ground surface for truck access up to and within 4 metres of the water source</li> <li>• A 65 millimetre metal Storz outlet with a gate or ball valve would be provided as an outlet on each of the tanks</li> <li>• If the water tank is located above ground it would be of a non-combustible material</li> <li>• If the water tank is located underground, it would have an access hole of 200 millimetres to allow tankers to refill direct from the tank.</li> <li>• All associated fittings to the tank would be non-combustible.</li> </ul>
BF5	Bushfire protection measures	Bushfire Emergency Management and Evacuation Plans would be developed for the construction and operation of the proposal. The bushfire evacuation procedures would be completed in accordance with NSW Rural Fire Service Guide to Developing A Bushfire Emergency Management Plan and meet the requirements of Australian Standard AS 3745-2010 – Planning for Emergencies in facilities.
BF6	Bushfire protection measures	Activities that generate sparks or excessive heat would be minimised when a total fire ban is declared by Rural Fire Service.

Ref	Impact/issue	Safeguard/management measure
<b>Sustainability, climate change and greenhouse gas</b>		
<b>SCC1</b>	Sustainability implementation	Sustainability initiatives would be incorporated into the detailed design and construction to support the achievement of the Sydney Metro West sustainability objectives.
<b>SCC2</b>	Sustainability implementation	Best practice level of performance would be achieved using market leading sustainability rating tools during construction and operation.
<b>SCC3</b>	Greenhouse gas emissions	25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction and operation of the proposal would be offset.
<b>SCC4</b>	Greenhouse gas emissions	An iterative process of greenhouse gas assessments and design refinements would be carried out during detailed design and construction to identify opportunities to minimise greenhouse gas emissions. Performance would be measured in terms of a percentage reduction in greenhouse gas emissions from a baseline inventory calculated at the detailed design stage.
<b>SCC5</b>	Climate change risks	Climate change risk treatments would be confirmed and incorporated into the detailed design.
<b>Cumulative impacts</b>		
<b>C11</b>	Cumulative impacts	<p>Co-ordination and consultation with the following stakeholders would occur where required to manage the interface of projects under construction at the same time:</p> <ul style="list-style-type: none"> <li>• Other parts of Transport for NSW</li> <li>• Department of Planning, Industry and Environment</li> <li>• Utility providers</li> <li>• Construction contractors.</li> </ul> <p>Co-ordination and consultation with these stakeholders would include:</p> <ul style="list-style-type: none"> <li>• Provision of regular updates to the detailed construction program, construction sites and haul routes</li> <li>• Identification of key potential conflict points with other construction projects</li> <li>• Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve: <ul style="list-style-type: none"> <li>• Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects</li> <li>• Co-ordination of traffic management arrangements between projects.</li> </ul> </li> </ul>

*This page has intentionally been left blank*

# 10 Justification and conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the proposal site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the NSW EP&A Act, including the principles of ESD as defined in Schedule 2 of the NSW EP&A Regulation.

---

This REF seeks to assess the environmental impacts resulting from construction and operation of the proposed two precast facilities in Eastern Creek.

## 10.1 Justification

### 10.1.1 Need for the proposal

Sydney Metro West would involve the construction and operation of a metro rail line between Westmead and Sydney CBD, including about 24 kilometres of underground twin tunnels. These tunnels would be lined with precast concrete segments which are erected by tunnel boring machines as they move forward. The need for Sydney Metro West is detailed in the Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement (Sydney Metro, 2020a).

Stage 1 of the works for Sydney Metro West includes the tunnel and station excavation works from Westmead to The Bays. Future stage(s), including tunnel excavation between The Bays and Sydney CBD, would be subject to future Environmental Impact Statement(s). While the design of major civil elements between Westmead and The Bays is well progressed, further planning is underway on elements such as tunnel alignment east of The Bays and through the complex Sydney CBD, and the overall delivery strategy for Sydney Metro West.

It has been identified through detailed construction planning that additional precast facilities would be required to enable the efficient delivery of Sydney Metro West (including the section from The Bays to the Sydney CBD).

Due to the scale of Sydney Metro West, the tunnelling and station excavation works have been separated into geographically-specific contract packages between Westmead and the Sydney CBD. Based on the delivery strategy for Sydney Metro West, multiple tunnelling packages would be in delivery at the same time and separate precast facilities would be required for each tunnelling contractor.

The precast facility at the Clyde stabling and maintenance facility construction site proposed as part of Stage 1 of the works for Sydney Metro West would not provide sufficient space or be able to meet the productivity requirements to support the Sydney Metro West delivery strategy. Furthermore, while tunnelling works are still underway, the precast facility at Clyde would need to be decommissioned for the land to support future construction activities, including fit out of the tunnels.

Additional precast capacity would provide the ability to align the production of precast segments with the delivery strategy, while supporting multiple tunnelling contractors concurrently. Precast facilities separate from the Clyde site would also be able to be used over the entire duration of Sydney Metro West tunnelling works, as they would not be required to be decommissioned to allow future construction activities to commence.

### 10.1.2 Benefits and impacts of the proposal

The proposal would support the delivery of the proposed Sydney Metro West. It would also deliver social and economic benefits by providing employment opportunities during construction and operation of the proposal. The proposal would be designed and managed to provide operational efficiencies and to appropriately mitigate impacts on the surrounding environment and local community.

Due to the location of the proposal and its distance from the nearest receivers, the potential amenity related impacts (such as noise and air quality) associated with the construction and operation of the proposal would be negligible to minor.

Management and mitigation measures would be implemented to minimise the potential impacts of the proposal. The potential key impacts of the proposal include:

- The preparation of an AHIP, supported by test excavation and comprehensive Aboriginal stakeholder consultation, would be completed to manage potential impacts to Aboriginal heritage. The proposal would result in the partial to total loss of value of 10 Aboriginal sites. The overall archaeological significance of seven of these sites has been assessed as low. One site, RCAS 09 (AHIMS ID 45-5-5355) has been assessed as having moderate overall significance and two sites (AHIMS ID 45-3-3159 and AHIMS ID 45-5-0559) having high overall significance. One of the sites, AIF-06 (AHIMS ID 45-5-4599) is also within the boundary of the planned Archbold Road upgrade and extension. Sydney Metro and other relevant parts of Transport for NSW would coordinate any future Aboriginal Cultural Heritage Assessment Report(s) (ACHAR) and AHIP application(s)
- The proposal has sought to minimise impacts to biodiversity, including through the establishment of an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. Construction of the proposal would require clearing of about 1.92 hectares of native vegetation, a subset of which is BC Act and EPBC Act listed as endangered and critically endangered community, respectively. This vegetation provides habitat for, or has the potential to support, other protected threatened species
- Potential temporary cumulative impacts with other projects, on noise and vibration, traffic and transport, Aboriginal heritage, non-Aboriginal heritage, flooding and biodiversity, may occur given the potential overlap with other projects including the planned Archbold upgrade and extension. Co-ordination and consultation with relevant stakeholders (including other parts of Transport for NSW) would occur where required to manage the interface of projects under construction at the same time. These potential impacts are considered manageable through the implementation of mitigation measures for these projects (and the proposal) as discussed in Section 8.16 (Cumulative impacts).

Other potential environmental impacts such as noise and vibration, traffic and transport, landscape and visual character, non-Aboriginal heritage, land-use and socio-economic, flooding, contamination, soils and surface water, groundwater, waste and resource management, air quality, bushfire and sustainability, climate change and greenhouse gas have also been assessed in this REF (refer to Chapter 8 (Environmental impact assessment)).

Environmental impacts have been avoided or would be minimised wherever possible through design and the site-specific mitigation measures summarised in Chapter 9 (Environmental management). The benefits of the proposal are considered to outweigh the potential impacts and the proposal is considered to be justified.

## 10.2 Objects of the EP&A Act

An assessment of the proposal against the objects of the EP&A Act is provided in Table 10-1.

Table 10-1: Assessment of the proposal against the objects of the EP&A Act

Object	Comment
<b>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</b>	The proposal would provide social and economic benefits by providing employment opportunities in the Western Sydney area during the construction and operation of the proposal.  The proposal would have no impact on the state's key natural and other resources; agricultural land, natural areas, forests or minerals. A range of safeguards and management measures are proposed to minimise potential environmental impacts associated with the proposal.
<b>1.3(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment</b>	Ecologically sustainable development is considered in Section 10.3.
<b>1.3(c) to promote the orderly and economic use and development of land</b>	The proposal would utilise land for industrial services, which aligns with planning for the area under the WSEA SEPP, while providing employment opportunities.



Object	Comment
<b>1.3(d) to promote the delivery and maintenance of affordable housing</b>	This objective is not directly relevant to the proposal.
<b>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</b>	<p>The proposal would retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest within an environmental protection area in the south-west of the proposal site. Construction of the proposal would require the clearing of native vegetation that is BC Act and EPBC Act listed as endangered and critically endangered community, respectively. This vegetation provides habitat (or has the potential to support) other protected threatened species. The potential impacts on vegetation, threatened species, population and ecological communities' area are discussed in Section 8.11 (Biodiversity).</p> <p>Due to the presence of the critically endangered ecological communities and threatened fauna habitat, exclusion zones would be established to delineate the works limit boundary to ensure no accidental impacts occur (including, but not limited to, the environmental protection area).</p>
<b>1.3(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)</b>	<p>The proposal would impact 10 Aboriginal heritage items. One of the sites, AIF-06 (AHIMS ID 45-5-4599) is also within the boundary of the planned Archbold Road upgrade and extension. Sydney Metro and other relevant parts of Transport for NSW would coordinate any future ACHAR and AHIP application(s). Test excavations would be undertaken to support an AHIP with objects of significance appropriately managed.</p> <p>The proposal is not predicted to have any impacts on non-Aboriginal heritage.</p> <p>Impacts to heritage and the approach to managing these impacts are discussed in Section 8.4 (Non-Aboriginal heritage) and Section 8.5 (Aboriginal heritage).</p>
<b>1.3(g) to promote good design and amenity of the built environment</b>	Design of the proposal would generally be suited to the planned industrial context surrounding the proposal site. Landscape character and visual amenity impacts from the proposal would be negligible or minor adverse at some locations and would be managed in accordance with the Construction Environmental Management Framework, which specifies key environmental management procedures. Landscape and visual amenity impacts are discussed in Section 8.3 (Landscape and visual character).
<b>1.3(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants</b>	The construction of all buildings would be completed in a manner which is consistent with the applicable Australian and international safety standards.
<b>1.3(i) To promote the sharing of the responsibility for environmental planning between different levels of government in the State</b>	<p>Sharing the responsibility of environmental planning is interpreted under two principal planning approval pathways in the EP&amp;A Act. The EP&amp;A Act also describes who is responsible for managing and coordinating these pathways. Part 5, Division 5.1 of the EP&amp;A Act describes the responsibilities for public agencies undertaking development without consent.</p> <p>These provisions are supported by the provisions of ISEPP. Collectively they describe the sharing responsibilities across all levels of Government in delivering public infrastructure. In delivering the proposal under the above pathway Sydney Metro has fulfilled its obligations in this regard under the EP&amp;A Act.</p>

Object	Comment
1.3(j) To provide increased opportunity for public involvement and participation in environmental planning and assessment	<p>Chapter 6 (Stakeholder and community consultation) outlines the opportunity for public involvement in the proposal.</p> <p>Consultation would be undertaken with the community and stakeholders as the detailed design is developed, as the pre-construction work takes place, while the proposal is being constructed, and once construction is complete.</p> <p>The exhibition of the REF and the submissions response process will provide an opportunity for the public to raise concerns and comments about the proposal. Sydney Metro will respond to these submissions and undertake additional environmental assessment or design refinements if and where required.</p>

### 10.3 Ecologically sustainable development

Sydney Metro is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). The principles of ESD are generally defined under the provisions of clause 7(4) of Schedule 2 to the EP&A Regulation as:

- **Precautionary principle** – Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for not implementing mitigation measures or strategies to avoid potential impacts
- **Inter-generational equity** – The present generation should ensure that the health, diversity and productivity of the environment are equal to or better for the future generations
- **Conservation of biological diversity and ecological integrity** – Preserving biological diversity and ecological integrity requires that ecosystems, species and genetic diversity within species are maintained
- **Improved valuation and pricing of environmental resources** – This principle establishes the need to determine economic values for services provided by the natural environment, such as the atmosphere's ability to receive gaseous emissions, cultural values and visual amenity.

The principles of ESD have been adopted by Sydney Metro throughout the development and assessment of the proposal and the proposal would be delivered within the environmental and sustainability framework established for the proposed Sydney Metro West. Table 10-2 provides an assessment of the proposal in relation to the principles of ESD.

Table 10-2: Adherence with the principles of ESD

ESD principle	Comment
<b>Precautionary principle</b>	A precautionary approach has been applied throughout the development of the proposal. The REF process has sought to minimise the environmental impact of the proposal. There are no threats of serious or irreversible damage posed by this development. All of the environmental risks have been carefully and thoughtfully considered through the preparation of the REF and would be mitigated through the implementation of Sydney Metro's Construction Environmental Management Framework for the proposal and the management and mitigation measures included in Chapter 9 (Environmental management).
<b>Inter-generational equity</b>	This proposal would serve to deliver innovation and attract the jobs of the future for Western Sydney and NSW, utilising land for industrial services while providing employment opportunities in Western Sydney. The proposal would also support the delivery of Sydney Metro West which would provide long-term transport and city-shaping benefits across Greater Sydney.

ESD principle	Comment
<b>Conservation of biological diversity and ecological integrity</b>	<p>The proposal site layout has been designed to minimise impacts to biodiversity, including through the establishment of an environmental protection area to avoid vegetation clearing in the south-west of the proposal site.</p> <p>The proposal would require the removal of about 1.92 hectares of vegetation including native plantings throughout the proposal site. The native vegetation to be removed provides habitat (or potential habitat) for 18 threatened animal species that were either identified in the ecological study area (i.e. Cumberland Plain Land Snail) or are considered at least moderately likely to occur based on the presence of suitable habitat (e.g. Green and Golden Bell Frog, Grey-headed Flying Fox).</p> <p>Due to the presence of the critically endangered ecological communities and threatened fauna habitat, exclusion zones would be established to delineate the works limit boundary to ensure no accidental impacts occur (including, but not limited to, the environmental protection area). In addition to this, the proposal would retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest for the purposes of an environmental protection area. The adherence to the mitigation measures outlined in this REF would help to ensure that biological diversity and ecological integrity of receiving environments would be retained.</p>
<b>Improved valuation and pricing of environmental resources</b>	<p>Environmental and social issues were considered in the strategic planning and establishment of the need for the proposal, and in consideration of various proposal options. The value placed on environmental resources is evident in the extent of the planning, environmental investigations, design of proposal and proposed mitigation measures. Implementation of these mitigation measures would result in an economic cost to Sydney Metro. Mitigation measures relating to resource management include the avoidance, reuse, recycling and management of waste during construction and operation of the proposal.</p>

## 10.4 Conclusion

The proposal has been subject to assessment under Division 5.1 of Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of other environmental planning instruments as well as other NSW and Commonwealth legislation.

The proposal as described in the REF best meets the proposal objectives, however would still result in some potential impacts including Aboriginal heritage and biodiversity. Management and mitigation measures as detailed in this REF would ameliorate or minimise these expected impacts.

Potential temporary cumulative impacts on noise and vibration, traffic and transport, and potential impacts to Aboriginal heritage, non-Aboriginal heritage, flooding and biodiversity, may occur given the potential overlap with other projects including the planned Archbold upgrade and extension.

The REF has considered and assessed these impacts in accordance with Clause 228 of the EP&A Regulation and the requirements of the EPBC Act (refer to Chapter 8 (Environmental impact assessment), Appendix A (Consideration of Environmental Factors and Matters of National Environmental Significance)). Based on the assessment contained in this REF, it is considered that the proposal is not likely to have a significant impact upon the environment or any threatened species, populations or communities. Accordingly, an EIS is not required, nor is the approval of the Minister for Planning and Public Spaces.

The proposal has also taken into account the principles of ecologically sustainable development and the objects of the EP&A Act. The proposal would be delivered to maximise the benefit for the community, be cost effective and minimise any adverse impacts on the environment. On balance, the proposal is considered justified and in the public interest.

*This page has intentionally been left blank*

# 11 References

- Adapt NSW, 2020, *About Climate Change in NSW. NSW Emissions*. Accessed from: <https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-emissions> on 1 May 2020.
- ANZECC, 2019, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
- ANZECC/ARMCANZ, 2019, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand*, Accessed from: <http://waterquality.gov.au/anz-guidelines>, on 27 June 2020.
- ANZECC/ARMCANZ, 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
- Artefact, 2016, *Archbold Road Statement of Heritage Impact*, prepared for Roads and Maritime Services.
- Australia ICOMOS, 2013, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*.
- Australian Building Codes Board Building Code of Australia, 2009, *Volumes 1 and 2, Councils of Standards Australia AS3959 – Australian Standard Construction of buildings in bushfire-prone areas*.
- Australian Bureau of Statistics, 2016, *Profile ID, Community Profile – Blacktown, Rooty Hill – Eastern Creek*. Accessed from: <https://profile.id.com.au/blacktown/about?WebID=380> on 5 May 2020.
- Blacktown City Council, 2017, *Our Blacktown 2036 – Community Strategic Plan*.
- Blacktown City Council, 2018, *Waterway Health Report Card 2017 – 2018*.
- Blacktown City Council, 2019, *Waterway Health Report Card 2018 – 2019*.
- Blacktown City Council, 2020, *Blacktown Local Strategic Planning Statement 2020*.
- BSI, 1993, *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2*.
- Bureau of Meteorology, 2017, *Atlas of Groundwater Dependent Ecosystems* [Online]. Accessed from: <http://www.bom.gov.au/water/groundwater/gde/> on 1 July 2020.
- Chapman, G. A. and Murphy, C. L., 1989, *Soil landscapes of the Sydney 1:100000 Sheet*, Sydney: Soil conservation Service of NSW.
- Clark N.R. and Jones D.C., 1991, *Penrith 1:100 000 Geological Sheet 9030*, 1st edition. Geological Survey of New South Wales, Sydney.
- CSIRO, 2013, *Atlas of Australian Acid Sulphate Soils*. Accessed from: <http://www.asris.csiro.au/themes/AcidSulfateSoils.html>, on 21 June 2020.
- Department of Agriculture, Water and Environment, 2020, *Directory of Important Wetlands in Australia* [Online]. Accessed from: <https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands> in 23 March 2020.
- Deutsches Institute fur Normung, 1999, *DIN 4150:Part 3-2016 Structural vibration – Effects of vibration on structures*.
- Greater Sydney Commission, 2018a, *Greater Sydney Region Plan: A Metropolis of Three Cities – connecting people*.
- Greater Sydney Commission, 2018b, *Our Greater Sydney 2056: Central City District Plan*.
- Kelleher Nightingale Pty Ltd, 2017, *Archbold Road Extension and Upgrade Great Western Highway to Southern Link Road – Cultural Heritage Assessment Report*, prepared for Roads and Maritime Services.
- Landcom, 2004, *Managing Urban Stormwater: Soils and Construction*, Volume 1, 4th Edition, New South Wales: New South Wales Government.
- National Environment Protection Council, 1999, *National Environment Protection (Assessment of Site Contamination) Measure*.
- National Environment Protection Council, 2013, *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as revised 2013).
- National Health and Medical Research Council, 2008, *Guidelines for managing risks in recreational water. National Health and Medical Research Council*, Australian Government Publishing Service, Canberra.
- NSW Department of Environment and Climate Change, 2008, *Managing Urban Stormwater: Soils and Construction*, Volume 2.

- NSW Department of Environment and Climate Change, 2009, *Interim Construction Noise Guideline*.
- NSW Department of Environment, Climate Change and Water, 2006, *NSW Water Quality and River Flow Objectives*.
- NSW Department of Environment, Climate Change and Water, 2010a, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.
- NSW Department of Environment, Climate Change and Water, 2010b, *Aboriginal cultural heritage consultation requirements for proponents*.
- NSW Department of Environment, Climate Change and Water, 2011, *Road Noise Policy*.
- NSW Department of Environment and Climate Change, 2008, *Productive Use of Saline Land and Water: Book 4 Dryland Salinity*.
- NSW Department of Environment and Conservation, 2006a, *Assessing Vibration: a technical guideline*.
- NSW Department of Environment and Conservation, 2006b, *Using the ANZECC Guidelines and Water Quality Objectives in NSW*.
- NSW Department of Planning, 2011, *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33*.
- NSW Department of Planning, Industry & Environment, 2016, *Ropes Creek Precinct Draft Development Control Plan*.
- NSW Department of Planning, Industry & Environment, 2020, *BioNet Vegetation Classification* [Online]. Accessed from: <https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx> on 15 April 2020.
- NSW Department of Primary Industries (undated) *Key Fish Habitat map - Sydney* [Online]. Accessed from: <https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/key-fish-habitat-maps> on 27 June 2020.
- NSW Department of Primary Industries (undated) Spatial Data Portal [Online]. Accessed from: <https://www.dpi.nsw.gov.au/about-us/research-development/spatial-data-portal> on 22 April 2020.
- NSW Department of Primary Industries, 2013, *Policy and Guidelines for Fish Habitat Conservation and Management*.
- NSW Environmental Protection Authority, 2009, *The NSW Interim Construction Noise Guideline*, NSW Environment Protection Authority, Sydney.
- NSW Environment Protection Authority NSW, 2014a, *Waste Classification Guidelines*, NSW Environment Protection Authority, Sydney.
- NSW Environment Protection Authority, 2014b, *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*, NSW Environment Protection Authority, Sydney.
- NSW Environment Protection Authority, 2016, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.
- NSW Environmental Protection Authority, 2017, *Noise Policy for Industry*, NSW Environment Protection Authority, Sydney.
- NSW Heritage Office, 2002, *Statement of Heritage Impact guideline*, contained within the *NSW Heritage Manual*.
- NSW Heritage Division of the Office of Environment and Heritage, 2009, *Assessing Significance for Historical Archaeological Sites and Relics*.
- NSW Office of Environment and Heritage, 2011, *Guide to Investigating, assessing and reporting on Aboriginal cultural heritage in NSW: Part 6 National Parks and Wildlife Act 1974*.
- NSW Rural Fire Service, 2015, *Guide for Bushfire Prone Land Mapping*.
- NSW Rural Fire Service, 2019, *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners*.
- NSW Rural Fire Service, 2006, *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners*.
- Standards Australia, 2009, *AS/NZS ISO 31000: 2009 Risk Management - Principles and Guidelines*. ISBN: 0-7337-9289-8.
- Sydney Metro, 2020a, *Sydney Metro West Westmead to The Bays and Sydney CBD. Concept and Stage 1 - Environmental Impact Statement*.
- Sydney Metro, 2020b, *Sydney Metro West Westmead to The Bays and Sydney CBD. Concept and Stage 1 - Submissions Report*.

- Sydney Metro, 2020c, *Sydney Metro West Westmead to The Bays and Sydney CBD. Concept and Stage 1 – Amendment Report*.
- Transport for NSW (TfNSW), 2017, *Archbold Road Upgrade and Extension – Review of Environmental Factors*.
- WaterNSW, 2020, *WaterNSW Groundwater Bore Database*.
- Worley Parsons, 2015, *South Creek Flood Study*. Prepared for Penrith City Council in association with Liverpool City Council, Blacktown City Council and Fairfield City Council.
- WSP Parsons Brinckerhoff, 2017a, *Archbold Road Upgrade - Operational traffic noise and construction noise and vibration assessment*.
- WSP Parsons Brinckerhoff, 2017b, *Biodiversity Assessment Report, Archbold Road Upgrade, Old Wallgrove Road to the Great Western Highway, prepared for Roads and Maritime Services*.

*This page has intentionally been left blank*



## 12 Glossary

Definitions	
<b>ACHAR</b>	Aboriginal Cultural Heritage Assessment Report
<b>AEP</b>	Annual Exceedance Probability
<b>AHIMS</b>	Aboriginal Heritage Information Management System
<b>AHIP</b>	Aboriginal heritage impact permit
<b>Archbold Road Upgrade and Extension REF</b>	Review of Environmental Factors determined by Transport for NSW in 2017. The works subject to the REF would include a future upgrade and extension of Archbold Road between the Great Western Highway, Minchinbury and Old Wallgrove Road, Eastern Creek
<b>APZ</b>	asset protection zone
<b>ANZECC/ ARMCANZ</b>	Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (2000)
<b>ANZG</b>	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)
<b>BAL</b>	Bushfire Attack Levels
<b>BC Act</b>	(NSW) <i>Biodiversity Conservation Act 2016</i>
<b>Blacktown LEP</b>	<i>Blacktown Local Environmental Plan 2015</i>
<b>Blacktown LSPS</b>	Blacktown Local Strategic Planning Statement 2020
<b>BoM</b>	Bureau of Meteorology
<b>BTEX</b>	benzene, ethylbenzene, toluene and three isomers of xylene
<b>CBD</b>	central business district
<b>CLM Act</b>	Contaminated Land Management Act 1997
<b>Clyde facility</b>	A temporary precast concrete segment production facility included within the Clyde stabling and maintenance facility construction site as part of Stage 1 of the works for Sydney Metro West
<b>CO</b>	carbon monoxide
<b>CO<sub>2</sub></b>	carbon dioxide
<b>dB(A)</b>	decibel
<b>DCP</b>	Development Control Plan
<b>DECCW</b>	NSW Department of Environment, Climate Change and Water
<b>DPC</b>	NSW Department of Premier and Cabinet
<b>DPI</b>	NSW Department of Primary Industries
<b>DPIE</b>	NSW Department of Planning, Industry and Environment Cluster
<b>EP&amp;A Act</b>	(NSW) <i>Environmental Planning and Assessment Act 1979</i>
<b>EP&amp;A Regulation</b>	(NSW) <i>Environmental Planning and Assessment Regulation 2000</i>
<b>EPA</b>	(NSW) Environment Protection Authority
<b>EPBC Act</b>	(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>EPL</b>	environment protection licence
<b>ESD</b>	ecologically sustainable development
<b>GDEs</b>	groundwater dependent ecosystems

Definitions	
ha	hectare
Heritage Act	(NSW) <i>Heritage Act 1977</i>
ICNG	Interim Construction Noise Guideline
IN1	Zoning General Industrial under the WSEA SEPP
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
$L_{Aeq(15minute)}$	The 'energy average noise level' considered over a 15-minute period. This parameter is used to assess potential construction noise impacts
LA90	The 'background noise level' in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively
$L_{AFmax}$	The maximum noise level measured during a monitoring period, using 'fast' weighting
LEP	Local Environmental Plan
LGA	local government area
m/s	metres per second
NEPM	National Environment Protection (Assessment of Site Contamination) Measure (2013)
NHMRC	National Health and Medical Research Council
NCA	noise catchment areas
NML	noise management level
NO <sub>2</sub>	nitrogen dioxide
Northern precast site	Site of the proposed precast facility at the north of the proposal site with an approximate area of 8 ha
NPfI	Noise Policy for Industry
NSW	New South Wales
OEMP	operational environmental management plan
PAH	Polycyclic aromatic hydrocarbons
PCTs	plant community types
PCB	polychlorinated biphenyls
PFBP 2019	Planning for Bush Fire Protection 2019
Planned Archbold Road upgrade and extension	The first stage of the planned Archbold Road upgrade and extension would provide access to the proposal site from Lenore Drive, via a new section of Archbold Road and the Western Access Road. Further extensions of Archbold Road would be completed at a later stage. Works would be undertaken by other parts of Transport for NSW.
PM <sub>2.5</sub>	particles with a diameter of 2.5 micrometres or less
PM <sub>10</sub>	particles with a diameter of 10 micrometres or less
PMF	probable maximum flood level
POEO Act	(NSW) <i>Protection of the Environment Operations Act 1997</i>
PFAS	polyfluoroalkyl substances
proponent (the)	Sydney Metro
proposal (the)	The construction and operation of two separate, adjacent precast facilities, the northern and southern precast facilities, including boiler, aggregate bins and consumables, hardstand/laydown areas, offices, parking, pre-cast carousel including batch plant, and sheds.

Definitions	
<b>proposal site (the)</b>	Site located at Lenore Drive opposite Old Wallgrove Road, Eastern Creek
<b>RAP</b>	Remedial Action Plan
<b>RBL</b>	rating background level
<b>REF</b>	Review of Environmental Factors
<b>RFS</b>	NSW Rural Fire Service
<b>RNP</b>	NSW Road Noise Policy
<b>SEPP</b>	State Environmental Planning Policy
<b>SEPP 33</b>	State Environmental Planning Policy - 33 Hazardous and Offensive Development
<b>SEPP 55 - Remediation of Land</b>	State Environmental Planning Policy No 55 - Remediation of Land
<b>SO<sub>2</sub></b>	sulfur dioxide
<b>Southern precast site</b>	Site of the proposed precast facility at the south of the proposal site with an approximate area of 8 ha
<b>SVOCs</b>	semi-volatile organic compounds
<b>TECs</b>	threatened ecological communities
<b>Transport for NSW</b>	Transport for New South Wales
<b>TRH</b>	Total recoverable hydrocarbons
<b>VOCs</b>	volatile organic compounds
<b>WSEA</b>	Western Sydney Employment Area
<b>WSEA SEPP</b>	State Environmental Planning Policy (Western Sydney Employment Area) 2009

*This page has intentionally been left blank*

# **Appendix A**

## **Consideration of Environmental Factors and Matters of National Environmental Significance**



# Appendix A

## Consideration of Environmental Factors and Matters of National Environmental Significance

### Consideration of clause 228(2) factors and matters of national environmental significance

In addition to the requirements of the Is an EIS required? guideline (Department of Urban Affairs and Planning, 1999) as detailed in the REF, the following factors, listed in Clause 228(2) of the EP&A Regulation have also been considered in Table A1-1 to assess the likely impacts of the proposal on the natural and built environment.

Table A1-1: Review of clause 228(2) environmental factors

Clause 228 considerations	Impact
<b>a. Any environmental impact on a community.</b>	
<p>Construction of the proposal would result in short-term negative impacts related to noise and vibration, visual amenity, air quality. The proposal would require clearing of about 1.92 hectares (ha) of native vegetation, a subset of which includes the following TECs:</p> <ul style="list-style-type: none"> <li>• 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)</li> <li>• 0.07 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)</li> <li>• &lt;0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 ha of the associated BC Act listed Cumberland Plain Woodland community.</li> </ul> <p>The proposal would also result in the partial to total loss of value of 10 Aboriginal sites. One Aboriginal site is located within the boundary of both the proposal site and the planned Archbold Road upgrade and extension boundary. The proposal also has the potential to temporarily impact on identified sensitive receivers and community as described in Section 8.1 (Noise and vibration), Section 8.3 (Landscape and visual character), Section 8.5 (Aboriginal heritage), Section 8.10 (Contamination) and Section 8.11 (Biodiversity). Other potential environmental impacts are negligible and therefore have not been described in further detail. These impacts would be managed according to the mitigation measures outlined in Chapter 9 (Environmental management).</p> <p>The proposal would support the construction and delivery of Sydney Metro West. It would also provide social and economic benefits by providing employment opportunities during construction and operation of the proposal in the Western Sydney area.</p>	<p>Minor adverse</p>

Clause 228 considerations	Impact
<b>b. Any transformation of a locality.</b>	
<p>The proposal site is located within an established and future industrial area. During construction, the proposal would result in impacts on the existing locality, which would be predominantly through minor adverse visual amenity impacts associated with the presence of construction vehicles, plant and equipment within the proposal site. However public access to the proposal site is restricted and, based upon the location, topography and existing vegetation these construction activities would not be viewed by concentrations of users with the exception of three viewpoints: two in close proximity from Lenore Drive and one from Sennar Road, Erskine Park. In these views the proposal would be seen in the context of industrial land uses and existing energy infrastructure, increasing the capacity of these views to absorb the proposal.</p> <p>During operation, the proposal would modify the landscape character from undeveloped land however the proposal would be consistent with the general industrial uses identified for the future development of the proposal site under the WSEA SEPP.</p>	Minor adverse
<b>c. Any environmental impact on the ecosystems of the locality.</b>	
<p>The proposal has sought to minimise impacts to biodiversity, including through establishing an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. Construction of the proposal would require clearing of about 1.92 ha of native vegetation, a subset of which includes the following TECs:</p> <ul style="list-style-type: none"> <li>• 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)</li> <li>• 0.07 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)</li> <li>• &lt;0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 ha of the associated BC Act listed Cumberland Plain Woodland community.</li> </ul> <p>This vegetation provides habitat (or has the potential to support) other protected threatened species.</p>	Minor adverse
<b>d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality.</b>	
<p>The proposal is located on unused land owned by Sydney Metro that is not publicly accessible.</p> <p>The proposal site is located within an established and future industrial area. The construction and operation of the proposal would result in temporary visual impacts associated with the presence of construction vehicles, plant and equipment within the proposal site.</p> <p>Construction and operation of the proposal would be consistent with the general industrial uses identified for the future development of the proposal site under the WSEA SEPP.</p> <p>The generally isolated vegetation within the proposal site is typically of poor quality. Construction of the proposal would also result in some loss of the area's environmental and scientific quality through habitat and vegetation loss. The proposal has sought to minimise impacts to biodiversity, including through establishing an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.</p>	Minor adverse
<b>e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.</b>	
<p>Construction of the proposal would also result in the partial to total loss of value of 10 Aboriginal sites. One Aboriginal site is located within the boundary of both the proposal site and the Archbold Road upgrade and extension boundary.</p>	Moderate adverse



Clause 228 considerations	Impact
<p><b>f. Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks &amp; Wildlife Act 1974</i>).</b></p> <p>The native vegetation to be removed for the proposal site provides habitat (or potential habitat) of 18 threatened fauna species (three listed as endangered and 15 as vulnerable under the BC Act). An assessment of significance under the BC Act has been conducted for threatened species that have been identified within the ecological study area or that are considered to have a moderate or high likelihood of occurring in the proposal site due to the presence of suitable habitat. The conclusions of the assessments indicate that a significant impact is considered unlikely on any threatened species or threatened ecological communities listed under the BC Act</p>	<p>Minor adverse</p>
<p><b>g. Any endangering of any species of animal, plant or other form of life, whether living on land, water or air.</b></p> <p>The proposal would require clearing of about 1.92 ha of native vegetation, a subset of which includes the following TECs:</p> <ul style="list-style-type: none"> <li>• 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)</li> <li>• 0.07 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)</li> <li>• &lt;0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 ha of the associated BC Act listed Cumberland Plain Woodland community.</li> </ul> <p>This vegetation provides habitat (or has the potential to support) other protected threatened species. The proposal has sought to minimise impacts to biodiversity, including through establishing an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.</p>	<p>Minor adverse</p>
<p><b>h. Any long-term effects on the environment.</b></p> <p>As described above, the proposal would have the following long-term impacts:</p> <ul style="list-style-type: none"> <li>• Clearing of about 1.92 ha of native vegetation, a subset of which includes the following TECs: <ul style="list-style-type: none"> <li>• 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)</li> <li>• 0.07 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)</li> <li>• &lt;0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 ha of the associated BC Act listed Cumberland Plain Woodland community.</li> </ul> </li> <li>• This vegetation provides habitat (or has the potential to support) other protected threatened species</li> <li>• Partial to total loss of value of 10 Aboriginal sites. One Aboriginal site is located within the boundary of both the proposal site and the Archbold Road upgrade and extension boundary.</li> </ul>	<p>Moderate adverse</p>

Clause 228 considerations	Impact
<b>i. Any degradation of the quality of the environment.</b>	
<p>Construction of the proposal would result in short-term negative impacts on noise and vibration, visual amenity, and air quality. The proposal would require clearing of about 1.92 ha of native vegetation, a subset of which includes the following TECs:</p> <ul style="list-style-type: none"> <li>• 1.74 ha of Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act: listed as critically endangered)</li> <li>• 0.07 ha of River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act: listed as endangered)</li> <li>• &lt;0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered); a subset of the 1.74 ha of the associated BC Act listed Cumberland Plain Woodland community.</li> </ul> <p>The proposal would also result in the partial to total loss of value of 10 Aboriginal sites. One additional Aboriginal site is located within the boundary of both the proposal site and the planned Archbold Road upgrade and extension boundary. The above issues could impact on identified sensitive receivers and community as described in Section 8.1 (Noise and vibration), Section 8.3 (Landscape and visual character), Section 8.5 (Aboriginal heritage), Section 8.10 (Contamination) and Section 8.11 (Biodiversity). Other potential environmental impacts are negligible and therefore have not been described in further detail. These impacts would be managed according to the mitigation measures outlined in Chapter 9 (Environmental management).</p>	Moderate adverse
<b>j. Any risk to the safety of the environment.</b>	
<p>The mitigation measures included in Chapter 9 (Environmental management) would be introduced to manage potential environmental safety risks including contamination and bushfire. Providing these measures are implemented, managed, monitored and maintained, there would be minor impact.</p>	Minor adverse
<b>k. Any reduction in the range of beneficial uses of the environment.</b>	
<p>The proposal is located on unused land owned by Sydney Metro that is not publicly accessible.</p> <p>Overall, the proposal would generally develop unused or underutilised land consistent with the general industrial uses identified for the future development of the proposal site and adjoining areas under the WSEA SEPP. The proposal would also assist in realising the overall benefits of the Sydney Metro West project as set out in the Sydney Metro West Westmead to The Bays and Sydney CBD - Environmental Impact Statement.</p>	Nil
<b>l. Any pollution of the environment.</b>	
<p>During construction, the proposal has the potential to result in minor short-term noise impacts during high noise intensity construction activities. The proposal also has the potential to result in temporary air pollution from vehicle and machinery emissions, and there is a low risk of accidental spills and leaks. There is also a low risk of water pollution from turbid stormwater following ground disturbance. These impacts would be managed in accordance with the mitigation measures outlined in Chapter 9 (Environmental management).</p>	Minor adverse

Clause 228 considerations	Impact
<b>m. Any environmental problems associated with the disposal of waste.</b>	
<p>Sampling and testing of soils in areas of potential contamination concern would be conducted if required to characterise the soils (with respect to contamination) and determine the appropriate waste classification (which may include hazardous wastes or special wastes). Soils would be managed in accordance with the waste classification and disposed of off-site.</p> <p>Illegal dumping has historically taken place across parts of the proposal site. Therefore, there is some risk and potential for encountering controlled waste. Providing the safeguards included in Chapter 9 (Environmental management) are implemented to manage waste, the proposal is unlikely to result in any environmental problems associated with waste.</p>	<p>Nil</p>
<b>n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply.</b>	
<p>The proposal would require limited quantities of common construction materials including concrete, gravel and water. The proposal would not create a substantial demand on these resources.</p>	<p>Nil</p>
<b>o. Any cumulative environmental effect with other existing or likely future activities.</b>	
<p>Cumulative construction traffic associated with the planned Archbold Road upgrade and extension could lead to cumulative impacts on the surrounding road network however construction traffic impacts for both the proposal and the planned Archbold Road upgrade and extension are anticipated to be minimal. As such, cumulative construction traffic impacts are expected to be minor.</p> <p>Cumulative construction noise impacts may occur if construction of the planned Archbold Road upgrade and extension is carried out at the same time as the proposal. However, construction noise levels predicted to be generated by the proposal are generally 'minor' and high noise intensity construction works are of short duration.</p> <p>Cumulative heritage impacts would occur as construction of the proposal and the planned Archbold Road upgrade and expansion footprint would impact on fifteen identified Aboriginal heritage sites in total, reducing the archaeological potential of the region. Sydney Metro would work with Transport for NSW so that impacts to Aboriginal Heritage are managed and minimised where possible.</p> <p>Cumulative biodiversity impacts would occur when the impacts of the proposal are considered together with the planned Archbold Road upgrade and extension project. However, the contribution of the proposal, in relation to this project, to cumulative biodiversity impacts in the Cumberland Plain region is relatively low.</p>	<p>Minor adverse</p>
<b>p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions.</b>	
<p>The proposal would not result in any impact on coastal processes and coastal hazards including those under projected climate change conditions.</p>	<p>Nil</p>

## Consideration of Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government's Department of Agriculture, Water and the Environment. These issues are considered in Table A1-2. It has been determined the proposal would not have a significant impact on a critically endangered or endangered community or species and would not need to be referred to the Australian Government's Department of Agriculture, Water and the Environment.

Table A1-2: Checklist of EPBC Act matters

Matters of national environmental significance	Impact
<b>a. World heritage properties.</b>	
There are no items within the proposal site listed on the World Heritage List.	Nil
<b>b. National heritage places.</b>	
There are no items within the proposal site listed on the National Heritage List.	Nil
<b>c. Wetlands of international importance.</b>	
There are no wetlands of international importance in the proposal site or likely to be affected by the proposal.	Nil
<b>d. Nationally threatened species and ecological communities.</b>	
The proposal would establish an environmental protection area to retain an area of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, a threatened ecological community as listed under the EPBC Act. Construction of the proposal would require clearing <0.001 ha of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act: listed as critically endangered). An assessment of significance was undertaken for the proposal which concluded that the impact of the proposal on the critically endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community is predicted to be minor.	Minor adverse
Three threatened animal species listed under the EPBC Act are considered moderately likely to use the habitats in the ecological study area for foraging: the Green and Golden Bell Frog (listed as endangered), the Swift Parrot (listed as critically endangered) and the Grey-headed Flying-fox (listed as vulnerable). However, assessments of significance concluded it is unlikely the proposal would result in a significant impact to these species.	
In consideration of the above, the proposal would not need to be referred to the Australian Government's Department of Agriculture, Water and the Environment.	
<b>e. Migratory species.</b>	
The proposal would have no impact on a listed migratory species.	Nil
<b>f. Commonwealth marine areas.</b>	
The proposal would have no impact on a Commonwealth marine area.	Nil
<b>g. The Great Barrier Reef Marine Park.</b>	
The proposal would have no impact on The Great Barrier Reef Marine Park.	Nil
<b>h. Protection of water resources from coal seam gas development and large coal mining development.</b>	
The proposal would have no impact on water resources from coal seam gas development and large coal mining development.	Nil
<b>i. Nuclear actions (including uranium mining).</b>	
The proposal does not involve a nuclear action.	Nil
<b>j. Any impact (direct or indirect) on Commonwealth land?</b>	
The proposal would have no impact (direct or indirect) on Commonwealth land.	Nil

*This page has intentionally been left blank*

